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Motivating factors on performance of primary care workers in China: A systematic review and meta-analysis

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Abstract

Objective: Although China has made remarkable progress in strengthening its primary health care system, lack of well-performed primary health workforce is still the bottleneck of deepening the reform. The objective of this review is to understand the current profile of Chinese primary care workers (PCWs) and their motivating factors of performance and propose targeted policy suggestions on improving their work performance.

Design： Systematic review

Methods: A systematic search of PubMed and MEDLINE was conducted to identify articles published from Jan 1, 2000 to Jun 2, 2018. Quality assessment and data extraction for the studies closely relevant to performance of PCWs in China were conducted by two reviewers independently. A preliminary framework containing different levels of factors influencing PCWs' motivation based on ERG theory guided the synthesis analysis. In addition, we used a random-effects model to pool individual studies on job satisfaction and estimate the overall job satisfaction of PCWs.

Results: A total of 36 articles were included; 16 (23 882 participants) in the meta-analysis. Regarding the individual level of motivation, 3 overarching themes and 12 sub-themes were developed. The sub-themes of financial incentives, career advancement and work itself were frequently mentioned and have more influences on PCWs' performance. Moreover, the healthcare system reform policies have inevitable and complex impacts on different levels of human needs, and then influences on the motivation and performance of PCWs. Meta-analysis showed that the overall job satisfaction score among PCWs was 3.30, just

reaching a satisfied rating and varied in different regions.

Conclusions: This study suggests low work satisfaction among PCWs in China, with financial incentives and career advancement being two most important motivating factors. Efforts to improve the work performance in PCWs should give priority to these motivating factors and systematically take into account the health policy's impacts on performance of PCWs.

Keywords

Primary health care, Primary care workers, Performance, Motivation, Health policy

Strengths and limitations of this study

►This is the first comprehensive systematic review that identifies the motivating factors on performance of Chinses primary care workers including both individual level factors and health system level factors.

► Reliability of the study selection, data extraction and rating of the study quality was ensured using two independent reviewers.

► Studies providing job satisfaction data of primary care workers were systematically performed by a separate meta-analysis. In addition, three main primary health sector reform policies were comprehensively analyzed.

► Chinese articles were not included in this review.

Introduction

Primary health care (PHC) services in China including public health service and basic

medical health service, are provided by urban community health centres (CHCs) and affiliated community health stations (CHSs), rural township health centres (THCs) and affiliated village clinics (VCs). These four types of primary health institutions (PHIs) act as the essential part of three-tertiary health care delivery network in China. Strengthening primary health care has been a central aim in China's health system reform initiated in 2009[1]. However, the structure of health care delivery system in China still faced lots of challenges since the 2009 health system reform, and the low-performance of PHC delivery system is the bottleneck to deepening the reform[2]. Although the number of PCWs increased from 3.3 million in 2010 to 3.7 million in 2016, the proportion of them in all health workers decreased from 40.0% to 33.0%. The utilization of health services provided by PHIs had the same pattern that the proportion of PHIs' outpatient visits decreased from 61.9% (3.6 billion visits) to 55.1% (4.4 billion visits) and the proportion of PHIs' inpatient visits decreased from 27.9% (39.5 million hospitalizations) to 18.3% (41.7 million hospitalizations) between 2010 and 2016[3]. Under these circumstances, the strengthening of primary health system will still be the emphasis of health system reform in near future: the Outline of Healthy China 2030 Plan, a government blueprint for health system development, specially highlighted the important role of primary health care[4].

Health workforce shortage is one of the major obstacles in the process of strengthening primary health care services in China[5]. The primary health workforce is facing serious challenges including low education level, lack of qualifications, aging, high turnover and poor working performance[6]. In all determinants of performance of PCWs, improving work motivation is a crucial channel to change the behavior of health providers, as motivation in

the work context can be defined as an individual's degree of willingness to exert and maintain an effort towards organizational goals[7]. It has been demonstrated that work motivation can influence job satisfaction, and then influence job performance[8 9]. In this review, we aim to synthesize and analyze the motivating factors of PCWs and provide evidence-based policy implication on how to improve the performance of PCWs in China.

Methods

Search strategy and eligibility criteria

We searched the PubMed and MEDLINE on June 2, 2018 to identify relevant studies using MeSH and free-text words, including all their possible synonyms and spellings terms[6], in conjunction to increase sensitivity to potentially appropriate literature published. Full search terms are provided in the Supplementary Appendix 1. Search results were exported to EndNote X7 to be organized and duplicates records were removed firstly. Two authors exported the citations to Microsoft Excel and independently conducted the literature screening and selection. Divergent judgments were solved by discussion. We searched for and included articles about the motivating factors on performance of PCWs who work in four kinds of PHIs, including rural THCs, VCs and urban CHCs and CHSs in China. This study defined motivation in the work context as an individual's degree of willingness to exert and maintain an effort towards organizational or system goals [10], and we also regarded the degree of job satisfaction, work stress and turnover intention as the possible reflections of motivation which may influence work performance. We also searched for relevant studies identified from references of included articles and other sources. The study designs we included are any

observational or experimental studies with primary quantitative or qualitative data. Only English language articles published between 2000 and 2018 were included. Records were excluded if the study did not address the motivating factors of PCWs, and of the participants of study were not PCWs or not belong to the four kinds of PHIs mentioned above.

Data extraction and synthesis

Extracted items included study design, year or years of study, settings, participants, sample sizes, measurement of motivation, objective, key motivation conclusions and motivating factors. Data extraction and analysis were guided by Alderfer's ERG Theory, which elicits three core human needs in organizational settings: Existence (the desire for material things), Relatedness (the desire for cordial interpersonal relations), and Growth (the desire for opportunities to be creative and to develop one's skills)[11]. A thematic synthesis approach was used for data analysis to capture the ranges of evidence illustrating PCWs' motivation. Motivating factors extracted from included articles were grouped into four themes based on the ERG framework: 1) existence needs factors include payment, fringe benefits and physical working conditions; 2) relatedness needs factors refer to the social environment and relationship; 3) growth needs factors refer to career or self-development and management environment; 4) health policy context factors and organizational context which could influence one or more needs categories mentioned above. The first three themes of motivating factors represent three different dimensions of human needs in PHIs at individual level and the last theme was listed separately because the different health policies have complex impacts on performance through influencing more than one dimension of human needs at

macro level. Firstly, authors began to aggregate data into motivating factors, extracted all original motivating factors in each articles and classified them to one of the four relevance themes. Then we identified correlations between the different factors, refined them through discussion and synthesized the familiar factors into a higher level theme.

We used meta-analysis to synthesize the 16 articles providing job satisfaction data of PCWs. We pooled the study-specific estimates using a random effects meta-analysis model to obtain an overall summary job satisfaction scores across studies in China[12]. We analyzed data using Stata version 14.0 for Windows.

Role of the funding source

The funders of the study had no role in study design; collection, analysis, and interpretation of data; writing the report; or the decision to submit the paper for publication.

Results

Characteristics of reviewed studies

We firstly screened 5466 titles and abstracts, and then 348 full-texts of potential relevant studies were retrieved and screened to evaluate their eligibility (Figure 1). After full text screening, 119 studies relevant to the human resources of primary health care in China were included for us to understand the current status of PCWs. To obtain sufficient information related to motivation of PCWs, 1 additional article from reference search was also identified and included after applying the eligibility criteria. Finally, from 119 studies, 83 studies which did not contain specific motivating factors were excluded and 36 studies closely

related to motivation of PCWs were selected for data extraction and synthesis. A list of included articles' basic characteristics can be found in Supplementary Appendix 2. This review covered at least 27 provinces of China. 25 quantitative, 7 qualitative, and 4 mixed methods primary studies were included. All of 36 articles are cross-sectional study. 17 studies took place in rural areas of China, 11 took place in urban areas, and 8 in both urban and rural areas. Among the 17 studies about rural areas, 8 articles only included village doctors in village clinics as participants, 5 articles only studied health workers in THCs and 4 articles are about rural PCWs in both village clinics and THCs. The 11 studies in urban areas are about urban PCWs in community health centers/stations. 4 articles studied all types of PCWs in different kinds of rural and urban PHIs. Included studies analyzed the motivation of PCWs from different perspectives: some directly using job satisfaction as measurement tool[13-28], some explored the motivation factors' influence on attrition and retention[16 20 29-33], some studied the impact of some policies or interventions on motivation factors of health workers [29 34-38 39-44].

Motivating factors for PCWs

Existence need factors

Financial incentives, workload and work conditions related to a person's physical needs such as food, clothing, and shelter are clustered as existence need factors. In this review, we found that work conditions, payment and the workload that had to be done were considered as significant factors relating to dissatisfaction [13 17 18 20 21 23 28 45] and turnover intention[16 20] of PCWs. 26 out of 36 articles reported financial incentives (Table 1). Financial incentives

including the income and fringe benefits were significantly associated with job satisfaction [13 15 28] and difficulties in recruitment of PCWs [30 32 33]. Moreover, both financial incentives and working conditions were the most important motivating factors for PCWs to improve performance [19 31].

Another part of literatures explored different health system reform policies on this kind of motivation factors. For example, in a qualitative study, administrators and frontline healthcare workers in PHIs mentioned that the increased income after the 2009 health system reforms did not fully reflect the increased workload, and those who worked mostly hardly did not necessarily get paid the most, which led to some health workers becoming demotivated[35].

Relatedness need factors

Relatedness need factors which related to a person's interpersonal needs within his personal as well as professional settings, were regarded as the relationship with four dimensions: the living environment, the society, the coworkers and the nature of work in this review.

Work itself and working relationships were reported by 17 and 11 studies respectively (Table 1). The PCWs were more satisfied with nature of work and work relationships as compared with satisfaction level with existence need factors [18 23 28]. It suggests that most workers get along well with their colleagues and consider their jobs to be of importance, which provide a good motivating source in the circumstances of poor physical environment.

13 of selected studies reported recognition from society including understanding by society, physical-patient relationships (Table 1). Satisfaction with social status, relationship

with patients were significantly associated with job satisfaction[13 28]. There are some significant rural–urban differences, with rural PCWs were slightly more satisfied with patients' respect than their urban counterparts [21]. However, few rural PCWs expressed satisfaction with their current relationships and indicated that the patients could not understand the doctor's work[45]. In addition, the increasing workplace violence had negative effects on the job performance and quality of life of PCWs [46] and become a major contributor to doctors' low morale in recent years [14].

6 studies reported the living environment as a relatedness need motivator (Table 1). Studies revealed that there were greater needs for improvement in rural areas than needs in urban settings, especially in living environment [19 31]. The young health workers' sense of belonging and responsibility to their hometown is gradually disappearing, which results in more difficulties in recruiting young health workers born in local areas[30].

Growth need factors

Career advancement, training, rewards, management and autonomy relating to a person's needs of personal development were considered as growth need factors in this review.

19 out of 36 articles reported the factor of career advancement (Table 1), which was considered as the one of top three items leading to dissatisfaction [13 14 17 18 20 21 27]. The gap between desired and actual professional development was one of the main sources of job satisfaction [15]. Limited opportunities for job promotion was also a way to describe how this factor contributing to lower work passion [17] and the turnover intention of village doctors [16 20].

The main causes might be few positions and opportunities for the health professionals in PHIs to get higher professional titles on the regular payroll, especially compared with the opportunities in higher level health institutions even with the same education background and technical carder.

Training was mentioned as a motivating factor by 13 out of 36 articles (Table 1). Learning and training were significantly associated with work passion[17], job satisfaction[13] [27]and turnover intention[20]. Along with career advancement, training was also considered as one of the most important motivating factors for PCWs to improve performance [19]. However, the training arrangements and needs of China's PCWs were segmented and inadequate [32 47 48]. Health workers wanted to extend the training time, converted the training method from knowledge-focus to practice-focused training (on-site guidance from senior doctors, clinical further education), and had more needs for training content of clinical skills, preventive healthcare and medication knowledge education [47]. Consequently, although training was reported to be an effective form of incentive for recruitment, it has not acted as an effective motivator to attract young doctors to rural areas in China [32].

There are 9, 9 and 14 selected studies reported the motivation factors of rewards, management and autonomy, respectively (Table 1). Most articles reported that PCWs were relatively satisfied with the decision-making ability of their superiors, contingent reward and opportunities to do work by making own decisions and utilize professional skills and talents [13] [20].

System and policy factors

Motivation is not only influenced by individual level motivators but also by the whole range of health sector reforms and specific incentive schemes targeting workers [7]. Theoretically, any health sector reforms would directly influence the motivation factors the health workers will fell or have influences on how the health organizations designed their institutions, which in turn would have an impact on what health workers will get from their works. 18 out of 36 articles reported the macro-level factors (Table 1), health system and policy factors, like National Essential Medicines System (NEMS), National Basic Public Health Service Program (NBPHSP) and Township and Village Health Services Integration Management (TVHSIM). The gap between desired and actual policies' implementation consequences was one of the main determinants of job satisfaction [15]. The comprehensive reform of PHC in Anhui has changed their compensation patterns and improved the income and work efficiency of PCWs, but decreased their work enthusiasm because of inappropriately designed performance-based evaluation system[35]. Different economic status and health reform processes may lead to different consequences. PCWs under the comprehensive reform of PHC in Shandong perceived their job as more trivial, heavy workload, blurred job description, unsatisfactory income, and a lack of professional development, but satisfied with the relationship with community and low work pressure[39].

The NEMS uses a new National Essential Drugs List to ensure free access to safe, effective medication for the patients, and also includes a series polices on drug production, pricing and distribution to encourage rational prescribing by changing their reliance on drug sales and profit seeking behaviors. The impacts of the NEMP vary by region, professional practice and the income level[40]. In a survey most PCWs perceived no change in their income

and had a high level of satisfaction towards NEMS[43]. However, according to another in-depth interviews with village doctors[34], the introduction of an essential drug list for PHIs, in which only drugs on the list were allowed to be prescribed in VCs and providers were forbidden to add a profit (zero mark-up) in drug prices, dramatically decreased their medical income in most areas with limited amounts of drug subsidies from the government to supplement their incomes. At the same time, they also complained that they had lost patients' trust and work enthusiasm as the species and total amount of essential medicines were not enough for daily treatment needs. [40 43]

The NBPHSP starting from 2009 provides a package of basic public health services for all residents, with a focus on the management of non-communicable disease. To motivate PCWs to provide preventive health services, the government pays the subsidies based on the number of covered residents. At the beginning of this reform, due to the broad scope of basic public health services and limited financial incentives, providers felt that they were under great stress because of many competing demands for their time and complained about the heavy workload, insufficient remuneration, staff shortage, lack of formal professional identity and ineffective performance appraisal, in addition to distrust and disrespect from some residents [38 44], especially those only working for public health works being regarded as having lower levels of knowledge and skill than specialists[37]. Providers who received more subsidies, training opportunities and integrated management had better performance in service provision [42].

The TVHSIM regarding a vertical integrated management which requires upper-level health institutions, THCs, to direct and supervise VCs in their works on medicine, personnel

management, financing, facilities upgrading and maintaining and other routine works, had complex influences on village doctors. Under the integrated management, most village doctors felt more respected because they were more recognized as health workers in formal health system under integrated management instead of private drug salesmen. Nevertheless they were not allowed to perform agricultural or other side activities for other income [24 34], which had a negative impact on the financial resources.

Job satisfaction for PCWs

The performance of healthcare delivery system is critically dependent on worker motivation directly mediated by workers' willingness[7]. And satisfaction is one of the important indicators to measure the workers' willingness to exert efforts and has important implications for sustainable development of primary healthcare in China. 17 included articles assessed the job satisfaction as one of the important dimensions reflecting providers' motivation (Supplementary Appendix 3). As 2 articles [22 37] provided data of 2 provinces/cities and 1 article[18] represented data of two years, there is totally 20 investigation samples extracted from these 17 cross-sectional study design articles, representing more than half of the provinces in China. The overall job satisfaction score ranged from 1.82 to 4.49. The satisfaction level varied from region to region (Figure 2). The satisfaction scores of most samples from more than three provinces were stable between 3.37 and 3.55. The scores of samples from the middle areas were lower than the eastern areas and the score of Xinjiang representing the western areas was the highest among the included samples.

Meta-analysis methods of combining results weighted by sample size showed that the

overall job satisfaction score among PCWs was 3.30, equivalent 0.66 ([95% CI 0.61–0.71]; I^2=98.7%; P<0.001; Figure 3), just reaching a satisfied rating. But the overall satisfaction mean of rural health workers was lower than the urban workers (Table 2).

Discussion

Financial incentives and career advancement were the most important motivating factors for PCWs in China. The balance between remuneration and workload, and career promotion opportunities were most frequently mentioned in the included articles as critical motivating factors on performance of PCWs. Though in recent years, China government has input a lot to improve the income security of health workers in PHIs, with increasing urbanization and life costs, the gaps between actual and expected income have been increasing. Performance-related salary was mentioned by some doctors in THCs as a policy which was supposed to account for 30-40% of the salary based on their workload, quality of service and patients' satisfaction, but with limitation of overall revenue level and its structure, in order to only reward well-performed health worked by reducing the income levels of those poorly performed. Actually this payment method was rarely operated well in practice for motivating health workers at this moment [33]. How to improve the income level of health workers in primary health delivery system is a crucial but very hard policy problem in the near future.

Besides, according to our analysis from Figure 2, financial incentives are no longer the sole means for stimulating motivation, improving job satisfaction and work performance. Other factors, particularly professional development, work characteristics and training has been

equally, if not more, important for PCWs in China. In particular, the lack of chances for professional title promotion and limited career development space are important reasons that lead to turnover intention. This is in line with other studies published internationally and highlights the importance of packaging financial and non-financial incentives[7 49]. The ERG framework implies that the fulfillment of human needs has an important role in PCWs' motivation and the order of importance of the existence need, relatedness needs and growth needs may vary from each individual. In this review, we find that Chinese PCWs are at the stage where barriers exist in fulfillment of all three levels human needs. Income security has increased, but far lower than the expected level; the recognition and cooperation of residents on the public health works of PCWs have played negative role in influencing the motivation and behaviors of health workers; career promotion system and training arrangements did not meet their growth need neither. Policy makers must recognize that a health worker has multiple needs to satisfy simultaneously and priority measures in improving the motivation should be selected based on local institutional environments and personal preference. Focusing exclusively on one kind of need at a time will not effectively work for motivating PCWs.

The overall job satisfaction score among PCWs was still low, especially in rural areas. The overall job satisfaction score was considered as the predictors of job satisfaction, reflecting the PCWs' emotional situation and status of human needs satisfaction. There is considerable room for improvement in Chinese PCWs' performance by identifying motivating factors and increasing their work satisfaction. The most prominent factor causing general dissatisfaction of PCWs, especially of those from rural areas is the financial rewards

from work The annual income of 84.06% village doctors was less than 30 000 renminbi (RMB), which is still much lower than the average income for a doctor in higher level health institutions of Jiangxi Province in 2014 (56 394 RMB) and nearly half the village doctors thought their income level was lower compared with other people in the local area[13]. In addition, the health system reform policies also have indirect and negative consequences on PCWs' income level and are further damaging their job satisfaction, which is discussed in the following paragraphs. These findings have significant implications for policy makers and managers of PHIs regarding their efforts to improve workers' job satisfaction [15 26]. Another finding of the synthesis was the significant differences of satisfaction scores among eastern, western and middle areas of China. It is no doubt that there is imbalance existing among all levels of areas in China. Provinces in the eastern areas were more developed in economy and health facilities there are better equipped than other areas, so the job satisfaction of PCWs was higher than it in the middle areas China under better environments. However, the job satisfaction score in western China was better than it in the eastern areas. Considering western areas of China are remote areas with less economic development status the higher job satisfaction of PCWs may due to the lower expectations of PCWs in western areas and more financial transfer subsidies and other supports from central government directing to remote western areas. The government should also considered the imbalance the development in different areas specially the middle areas China where the economic development and resources inputs are limited, and the central government's transfer subsidy are also neglected.

The health system reform and some specific policies have inevitable and indirect impacts on PCWs. In 2009, China launched a landmark healthcare reform with the goal of

providing affordable and equitable basic health care for all by 2020[5]. Strengthening the primary health system is one of the key reform aspects in the health system reform, so several policies directly targeted to PHIs or PCWs. The satisfaction of pay and contingent rewards has slightly improved, which may be attributed to the guarantee of the PCWs' basic wages by government finance [18]. However, with China making remarkable progress in strengthening the primary health system, some new problems or unintended consequences of related reforms appeared, for example, a brain drain of experienced health workers from THCs, and patients have flowed to county hospitals at greater cost[6 29]. In the process of health system reforms, three policies and their impacts on motivation of health workers were frequently studied in literatures:

The NEMS has had lasting impacts on PCWs' income structure since the policies' implementation in 2009[34]. The essential drug list removed the incentives for overprescribing, but led to falls in income and loss of autonomy [29] because the government subsidies for public health works were not enough to offset the decline in revenue from drug prescriptions at PHIs. With problems in drug supply procurement, unintended consequences on motivation and related behavior of health workers emerged: a brain drain of experienced health workers from THCs have flowed to county hospitals because the limited supply of many medicines have restricted their prescription behavior and resulted in the loss of many patients. In conclusion, policy makers should consider how to reduce the adverse effects of essential drug policy on motivation of PCWs, including how to appropriately remunerate health workers and ensure the enough clinical autonomy, and to ensure a timely supplied, transparent and accountable the drug supply procurement.

At the beginning of the NBPHSP, PCWs - who were responsible for basic public health services held negative attitudes toward the sustainable provision of these basic public health services, because this policy increased their workload and the subsidy being insufficient remuneration for their efforts [36 38 44 50]. To motivate PCWs to provide these health services, the government subsidies have increased from 15 RMB per person for 2009 to 50 RMB for 2017. However, the heavy workload, rigid performance assessment procedure and lack of professional knowledge still exist, resulting in a negative effect on PCWs' job satisfaction and performance. We would suggest shifting the evaluation of PCWs' performance from faults seeking to supportive directions, improving ability of public health providers or strengthening the team work between clinical doctors with public health workers in order to strengthen the overall capacity on delivery of these public health services.

After the implementing of TVHSIM, village doctors were managed just as the same role as staff of THCs and no longer the self-employed status that was not integrated in to formal health delivery system. Their income structure had gradually transformed as government subsidy has become an increasing source of income. They were motivated not only by the more stable financial subsidy from government, but also enjoyed good reputation and respect from local residents as a health provider with formal status. However, the income level and fringe benefit village doctors obtained are still lower than the regular employee in THCs, which still be an demotivating factor for village doctors[32]. A well-rounded social insurance model for village doctors is urgently needed further promotion[41].

The findings of this review adds value to the current literature, as it included qualitative, quantitative and mix methods studies to present an overview on the motivation of

primary health workers in China, but it should be interpreted with caution because of several limitations. First, this review only focuses on the motivating factors of PCWs' work performance, and other relevant articles on motivation factors for attracting or retaining PCWs had been excluded by the search strategy. Secondly, all included studies analyzed PCWs' motivation from the perspective of negative problems and critics, which could lead to some bias because of few positive thoughts on current motivation status of PCWs being found.

Conclusions

Low motivation of PCWs is a bottleneck for promoting work performance of on-service PCWs in China. Policy makers should take account of all level of human needs influencing motivation of PCWs based on local reality, and consider firstly ensuring PCWs' appropriate remuneration level and career development space as priorities. We also suggest that countries undergoing health system level reform should consider the views of different stakeholders and analyze the potential side effects on health providers of some specific policies who are not directly targeted, in order to achieve benefits for both providers and demanders[13]

Abbreviations

PCW: Primary care worker; PHC: Primary health care; CHC: Community health centre; CHS: Community health station; THC: Township health centre; VC: Village clinic;

PHI: Primary health institution; NEMS: National Essential Medicines System; NBPHSP: National Basic Public Health Service Program; TVHSIM: Township and Village Health Services Integration Management; RMB: renminbi

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Contributors

All authors proposed the hypothesis and idea for the systematic review and take responsibility for all aspects of it. QM, BY and HL discussed and contributed to conceptualization of this review and development of review protocol. BY applied the inclusion criteria. HL and DW applied data extraction. HL was a major contributor in writing the manuscript. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interests.

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Figure legends

Figure 1. PRISMA diagram.

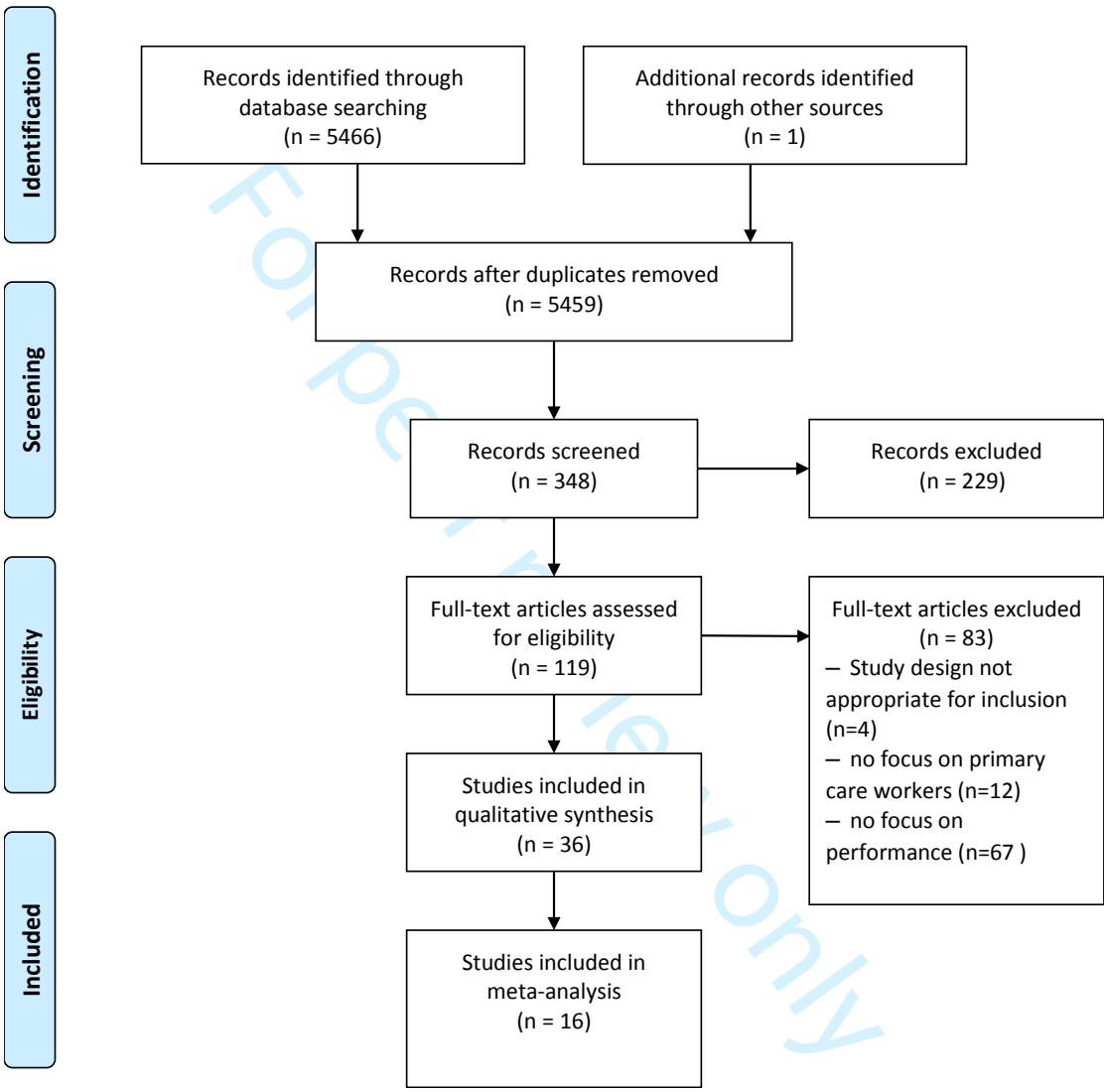


Figure 2. Job satisfaction score among primary care workers across different regions in China

Figure 3. Forest plot of the Job satisfaction score among primary care workers

Tables

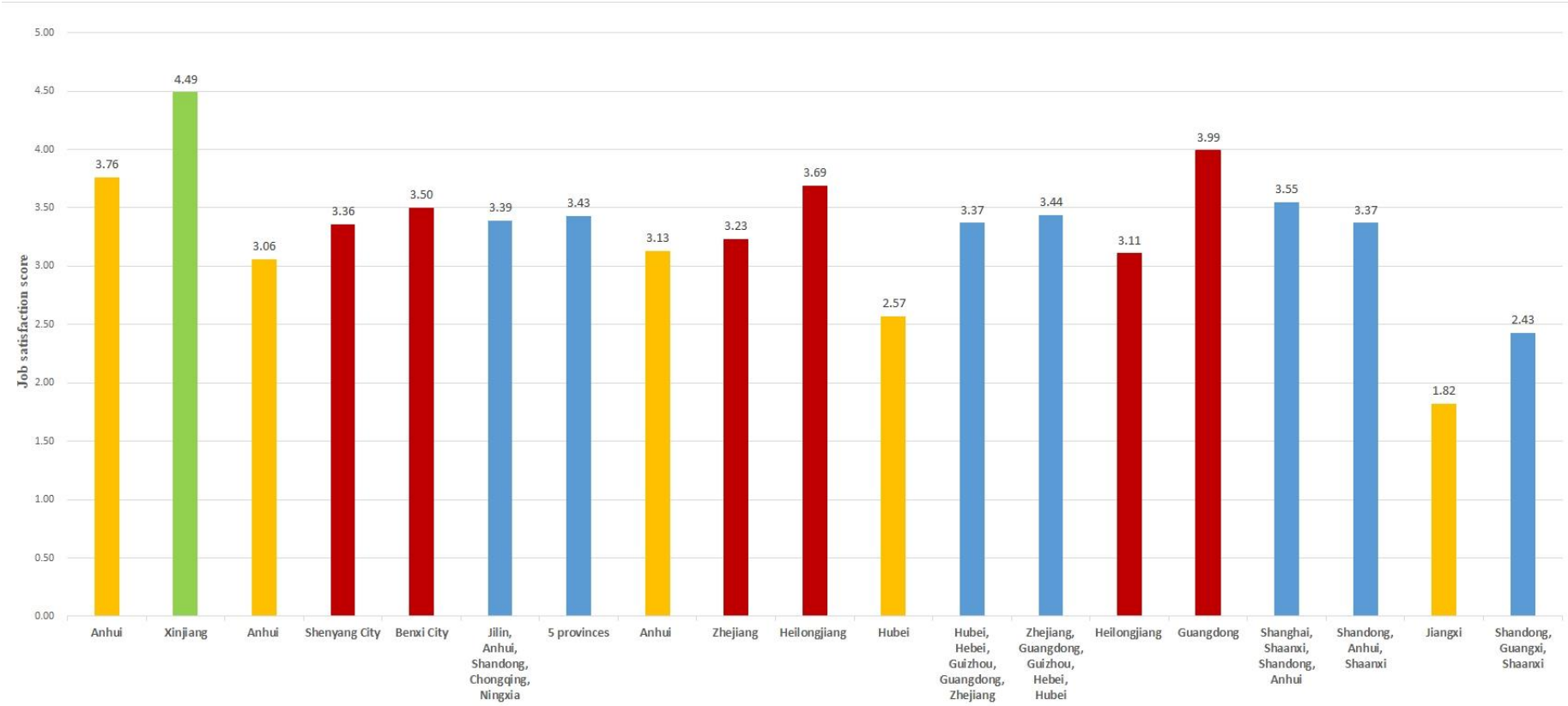
Table 1. Motivating factors for primary care workers

Table 2 Means of overall job satisfaction score among primary care workers

Study	No. of included studies	Mean
All included studies	20	3.30
Studies in urban areas	9	3.35
Studies in rural areas	7	3.06

Table 1

Motivating factor	Definition	Motivation to stay	Motivation to join/leave	Number of selected studies reporting the factors
Existence				
Financial incentives	Basic salary, bonus, benefits (insurances, vacation, etc.)	22	5	26
Workload	Hours of work, the amount of work done, flexibility in scheduling	12	1	13
Work conditions	Work environment, job stability, job security,	14	2	15
Relatedness				
Living environment	Geographical location and socioeconomic level of workplace	4	2	6
Recognition in society	Patients' respect, workplace violence, social status	11	2	13
Work itself	Nature of work (interest, meaningfulness, enjoyment), Job fulfilment, Job achievement, work enthusiasm	17	1	17
Working relationships	Relationships with coworkers/subordinates/nurses, communication	11	0	11
Growth				
Career advancement	opportunities for professional development	17	3	19
Training	Support for training and education, opportunity to learn new skills and new knowledge	11	2	13
Rewards	recognition, appreciation, contingent rewards,	9	0	9
Management	Supervision(level of competence, fairness, interest in subordinates), relationship with superior	8	1	9
Autonomy	Opportunities to do work making own decisions, opportunity to utilize your professional skills and talents	14	0	14
System and policy				
The health-care reform policies	Putting organizational policies into practice	18	1	18


Job satisfaction score
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
3.76
4.49
3.06
3.36
3.50
3.39
3.43
3.13
3.23
3.69
2.57
3.37
3.44
3.11
3.99
3.55
3.37
1.82
2.43
Anhui
Xinjiang
Anhui
Shenyang City
Benxi City
Jilin, Anhui, Shandong, Chongqing, Ningxia
5 provinces
Anhui
Zhejiang
Heilongjiang
Hubei
Hubei, Hebei, Guizhou, Guangdong, Zhejiang
Zhejiang, Guangdong, Guizhou, Hebei, Hubei
Heilongjiang
Guangdong
Shanghai, Shaanxi, Shandong, Anhui
Shandong, Anhui, Shaanxi
Jiangxi
Shandong, Guangxi, Shaanxi

1
2

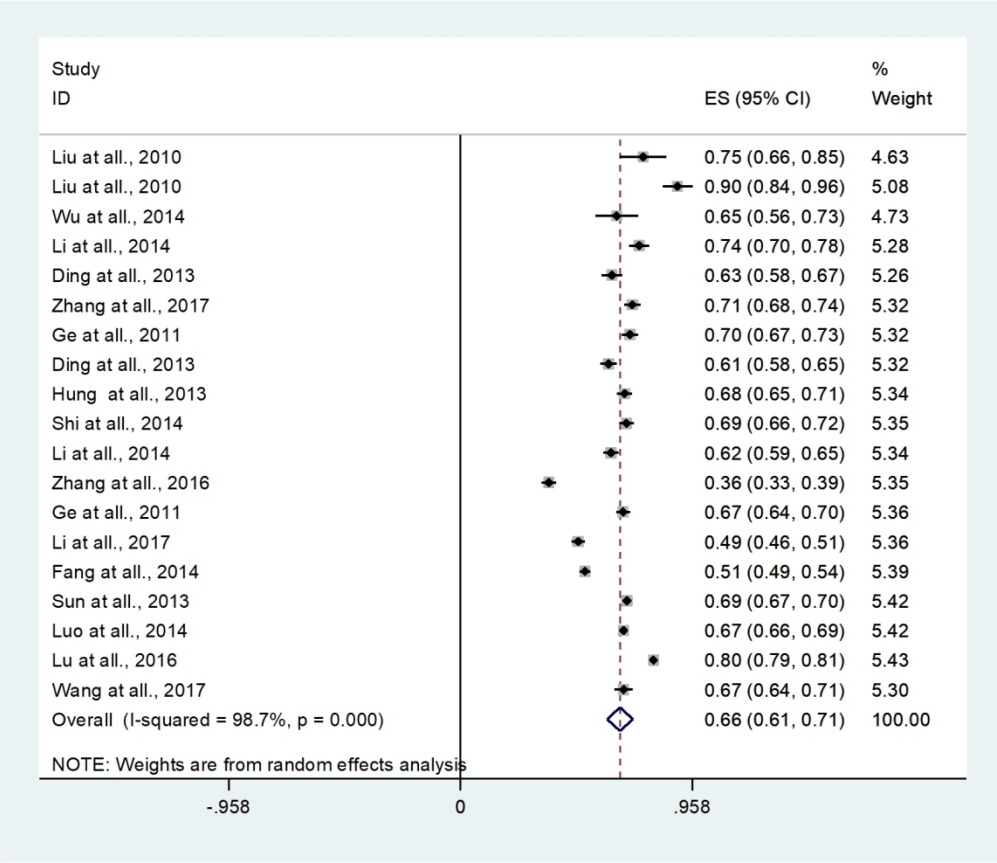


Figure 3. Forest plot of the Job satisfaction score among primary care workers

143x124mm (288 x 288 DPI)

Supplementary Appendix

1. Search terms

(China[Title/Abstract] OR Chinese[Title/Abstract]) AND ("primary health care"[Mesh] OR "General Practice"[Mesh] OR "General Practitioners"[Mesh] OR "Physicians, Family "[Mesh] OR "Community Health Services"[Mesh] OR "Delivery of Health Care"[Mesh] OR "township hospital"[Title/Abstract] OR "township health center"[Title/Abstract] OR "township health centre"[Title/Abstract] OR "community health station"[Title/Abstract] OR "village clinic"[Title/Abstract] OR "community health center"[Title/Abstract] OR "community health centre"[Title/Abstract]) AND (“manpower"[Mesh] OR “Education, Public Health Professional"[Mesh] OR “Education, Professional"[Mesh] OR “Education, Medical, Continuing"[Mesh] OR “Professionalism"[Mesh] OR “Career Choice"[Mesh] OR “Career Mobility"[Mesh] OR "human resources"[Title/Abstract] OR "retention"[Title/Abstract] OR "incentives"[Title/Abstract] OR "salary"[Title/Abstract] OR "professional medical master"[Title/Abstract] OR Motivation[Mesh] OR “Salaries and Fringe Benefits”[Mesh] OR “Staff Development”[Mesh] OR recruit[Title/Abstract] OR recruited[Title/Abstract] OR recruits[Title/Abstract] OR migration[Title/Abstract] OR migrate[Title/Abstract] OR migrating[Title/Abstract] OR migrated[Title/Abstract] OR migrates[Title/Abstract] OR immigration[Title/Abstract] OR immigrate[Title/Abstract] OR immigrating[Title/Abstract] OR immigrated[Title/Abstract] OR immigrates[Title/Abstract] OR emigration[Title/Abstract] OR emigrate[Title/Abstract] OR emigrating[Title/Abstract] OR emigrated[Title/Abstract] OR emigrates[Title/Abstract] OR mobility[Title/Abstract] OR turnover[Title/Abstract] OR "brain drain"[Title/Abstract]) AND ((eng[Language]) OR chi[Language]) NOT “Autobiography”[ptyp] NOT “Bibliography”[ptyp] NOT “Biography”[ptyp] NOT “Consensus Development Conference”[ptyp] NOT “Consensus Development Conference, NIH”[ptyp] NOT “Corrected and Republished Article”[ptyp] NOT “Dataset”[ptyp] NOT “Dictionary”[ptyp] NOT “Directory”[ptyp] NOT “Duplicate Publication”[ptyp] NOT “Electronic Supplementary Materials”[ptyp] NOT “Festschrift” [ptyp] NOT “Interactive Tutorial”[ptyp] NOT “Legal Cases”[ptyp] NOT “Letter”[ptyp] NOT “News”[ptyp] NOT “Patient Education Handout”[ptyp] NOT “Periodical Index”[ptyp] NOT “Personal Narratives”[ptyp] NOT “Portraits”[ptyp] NOT “Published Erratum”[ptyp] NOT “Retracted Publication”[ptyp] NOT “Retraction of Publication”[ptyp] NOT “Twin Study”[ptyp] NOT “Video-Audio Media”[ptyp] NOT “Webcasts”[ptyp].

2. List of included studies' general characteristics

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors
Zhang *at all.*, 2016	2014	Quantitative study	Jiangxi	Rural	Village Clinic	To assess village doctors' job satisfaction during the reforms and to explore factors affecting job satisfaction.	Low job satisfaction. The top three items leading to dissatisfaction were pay and the amount of work that had to be done, opportunities for job promotion and work conditions.	Marriage, income, intention to leave, satisfaction with learning and training, social status, relationship with patients and satisfaction with the new healthcare reforms were significantly associated with job satisfaction.
Lin *at all.*, 2015	2013.9-2014.4	Quantitative study	Guangdong	Urban	Community Health Centre	To explore the impact of workplace violence on job performance and quality of life of community healthcare workers in China, especially the relationship of these three variables.	Workplace violence among community healthcare workers is prevalent in China.	The workplace violence had negative effects on the job performance and quality of life of CHCs' workers.

Zhang *at all.*, 2015	2013.8-2014.1	Qualitative Study	Jiangsu, Henan, Jiangxi, Heilongjiang, Sichuan, Gansu.	Rural	Village Clinic	To investigate the village doctors' income structure and analyze how these health policies influenced it.	The health-care reform policies have had lasting impacts on village doctors' income structure since the policies' implementation in 2009.	Several policies such as the National Essential Medicines System, Integrated management, National Basic Public Health Services, New Rural Cooperative Medical Scheme had major impact on village doctors.
Wu *at all.*, 2014	2012	Quantitative study	Zhejiang	Both	Community Health Centre; Township Health Centre	To explore the factors influencing doctors' job satisfaction and morale in China, in the context of the ongoing health system reforms and the deteriorating doctor–patient relationship.	Low job satisfaction. Primary care doctors were the least dissatisfied with the income and opportunities for promotion. Patients were becoming more aggressive in their demands and there was an increasing trend of violence against doctors.	Doctors in the provincial hospital appeared to be the most dissatisfied group, and primary care physicians were most satisfied with their work and the causes of dissatisfaction fall into three main areas: low income, heavy workload and patient aggression.

Li *at all.*, 2014	2012	Quantitative study	Heilongjiang	Urban	Community Health Centre	To assess the determinants of job satisfaction in community health workers in one Chinese province.	Overall job satisfaction was higher than extrinsic job satisfaction and lower than intrinsic job satisfaction. All desired workplace characteristics were higher than the associated actual workplace characteristics.	The main determinants of job satisfaction were occupation, years worked in health service institution, and five subscales representing the gap between desired and actual workplace characteristics, which were system and policy; fringe benefits; working relationship; professional development; and remuneration.
Fang *at all.*, 2014	2012.07 -08	Quantitative study	Hubei	Rural	Village Clinic	To analyzes the factors that influence the turnover intention of village doctors by investigating village clinic workers in rural areas, particularly in Xiangyang City, Hubei Province.	Village doctors were most dissatisfied with my pay and the amount of work I do, the chances for advancement on this job, and the work conditions. Highlight the influence of job satisfaction on turnover intention of village doctors	Income satisfaction, the way organization policies are put into practice, my pay and the amount of work I do, the chances for advancement on this job and the work conditions were significantly related to the turnover intention of village doctors.

Zhou *at all.*, 2014	2013.1-3	Qualitative Study	Zhejiang, Yunnan	Rural	Township Health Centre	To explore the impacts of these reforms on health workers and service users at township level, which has been the major target of the first phase of the reforms.	Some elements of the reforms may actually be undermining primary care. While the new health insurance system was popular among service-users, it was criticized for contributing to fast-growing medical costs, and for an imbalance of benefits between outpatient and inpatient services. Salary reform has guaranteed health workers' income, but greatly reduced their incentives. The essential drug list removed perverse incentives to overprescribe, but led to falls in income for health workers, and loss of autonomy for doctors.	The health workers' intention was mostly blamed on the loss of income and incentives and in the larger hospitals, on the essential drug list, and the way it limits clinical autonomy and the provision of specialist services.

Liu *at all.*, 2014	2009-2010	Mixed method study	Anhui	Both	Township Health Centre; Village Clinic; Community Health Centre/ Station	To conduct an initial assessment of the effects of specific parts of the reforms in Anhui.	The reform of primary healthcare institutions in Anhui has improved the personnel structures surrounding frontline healthcare workers, increased their incomes, improved work efficiency, and changed the compensation patterns of primary healthcare institutions, improved hardware, reduced drug prices, and, to some extent, improved the diagnosis and treatment structure. However, the reforms have not radically changed the behavior of medical workers or the visit patterns of patients.	Two problems emerged from the reforms.First, the enthusiasm of medical staff decreased, and second, the supply of drugs could not adequately meet the demand.

Luo *at all.*, 2014	maybe 2012	Quantitative study	Hubei , Guizhou, Hebei , Guangdong , Zhejiang	Urban	Community Health Centre	To analyze and determine the main related factors that influence work passion of CHS workers by investigating CHS workers from five Chinese provinces.	Low passion for current work. Workers were most dissatisfied with the balance between remuneration and workload, job promotion opportunities and most dissatisfied with the balance between remuneration and workload, job promotion opportunities.	The related factors that influence CHS workers' work passion are socio-demographic factors such as age, and years of employment, and other work-related factors such as learning and training opportunities, compensation packages, work stress, and personal development opportunities.

Ding *at all.*, 2013	2009 v.s. 2012	Quantitative study	Anhui	Urban	Community Health Centre	To compare the job satisfaction (JS) of community health workers (CHWs) before and after the local comprehensive medical care reform (LCMR) in Anhui Province to provide evidence for improving the LCMR policy to increase the JS of CHWs.	After two years' implementation of the LCMR, CHWs' total JS have a small improvement. CHWs have lower satisfaction in the dimensions of pay, promotion and benefits dimensions before and after the LCMR.	The average scores of total JS and satisfaction with pay, contingent rewards, operating procedures and communication in the effect evaluation survey were statistically significantly higher than those of the baseline survey. The average score of satisfaction with promotion in the effect evaluation survey was statistically significantly lower than that in the baseline survey.

Hung *at all.*, 2013	2011	Quantitative study	Jilin, Shandong, Anhui, Chongqing, Ningxia	Both	Township Health Centre; Village Clinic; Community Health Centre/ Station	To provide an overview of major performance motivating factors for primary care providers (PCPs) in China and examine associations between these factors and individual and practice setting characteristics.	There were greater needs for improvement in rural than urban settings, especially in living environment. Types of PCPs were associated with needs for improvement in different factors. There were more needs from nurses and village doctors.	The most important motivating factors for PCPs to improve performance were professional development, training opportunities, living environment, benefits, working conditions and income.
Sun *at all*., 2013	Maybe 2012	Quantitative study	Zhejiang, Guangdong, Guizhou, Hebei, and Hubei	Urban	Community Health Centre	To ascertain the key factors that influence the CHS worker turnover intention to increase their work satisfaction and stability.	38.7 % community health workers intended to quit. CHS workers were less satisfied with the balance between payment and work quantity, promotion opportunity, and working conditions.	The influencing factors that result in CHS worker turnover intention are socio-demographic factors such as age, post of duty, professional title, and working seniority, and other work-related factors such as pay packets, learning and training opportunities, promotion and personal development space, and working stress.

Ding *at all.*, 2013	2011.3-6	Quantitative study	Hubei, Jiangxi	Rural	Township Health Centre; Village Clinic	To improve the early detection of epidemics in rural China by integrating syndromic surveillance with the existing case report system.	Village doctors prioritize medical services but they do their best to manage their time to include public health services. The willingness of township health centre directors and village doctors to provide public health services has improved since the introduction of the package and a minimum subsidy, but village doctors do not find the subsidy to be sufficient remuneration for their efforts.	Factors to consider in future activities to improve the quality and extent of public health services provided by village doctors include actual and potential sources of village doctor income (i.e. medical services, social pension and other government support), the relationship between village clinics and township health centres and the amount of public health subsidy.

Li *at all.*, 2013	2009.12 -2010.12	Quantitative study	Beijing, Jiangsu, Zhejiang, Hainan ,Guang xi , Shanxi, Jiangxi, Guizhou, Yunnan, Gansu	Rural	Township Health Centre; Village Clinic	To analyze the educational status and future training needs of China's rural doctors and provide a basis to improve their future training.	Rural health professionals in China who have relatively low healthcare education should be focused on. Rural doctors the training status and needs of China's rural doctors are still disjointed in terms of the training time, training method and training content.	Rural doctors wanted to extend the training time, preferred to practice-focused training (on-site guidance from senior doctors, clinical further education), and had greater desire for clinical skills, preventive healthcare and medication knowledge education.
Shi *at all.*, 2014	2011	Quantitative study	5 provinces representing Eastern, Central, and Western China	Both	Township Health Centre; Village Clinic; Community Health Centre/ Station	To provide a snapshot of the current state of primary care workforce (PCW) serving China's grassroots communities and examine the factors associated with their job satisfaction.	Low job satisfaction PCW are least satisfied with their income level (only 8.6% are either satisfied or very satisfied), benefits (12.8%), and professional development (19.5%).	Lower income and higher workload are the two major contributing factors toward job dissatisfaction.

Ge *at all.*, 2011	2009.12 -2010.2	Quantitative study	Liaoning	Urban	Community Health Centre	To clarify the level of job satisfaction of Chinese community health workers between a metropolitan (Shenyang) and a small city (Benxi) in Liaoning province and explore its associated factors.	A moderate level of job satisfactions. Community health workers in a metropolitan had lower job satisfaction as compared to those in a small city.	Three significant predictors of intrinsic and extrinsic job satisfactions were the two dimensions (social support and decision latitude) of stress and cynicism of burnout.
Zhao *at all.*, 2011	2008.12 - 2009.2	Qualitative study	Beijing	Urban	Community Health Centre	To understand the advancements in and barriers to the implementation of measures to improve basic public health services in an urban Chinese community.	The number of practitioners and their low levels of skill were insufficient to provide adequate services for community residents.	Due to the broad scope of basic public health services and limited financial incentives, providers felt that they were under great stress and often complained that community members for whom they were responsible did not trust them as these clinicians had lower levels of knowledge and skill than specialists.

Liu *at all.*, 2010	2007	Quantitative study	Anhui, Xinjiang	Rural	Township Health Centre	To measure job satisfaction level of THC employees in poor rural China and to identify relevant features in order to provide policy advice on human resource development of health service institutions in poor regions.	Moderate job satisfactions in poor areas. Job satisfaction scores reflecting job significance, job competency and team work were highest, while work conditions and atmosphere and job reward were lowest.	Township health centers employees are more satisfied with the work significance and cooperation with colleagues, while less satisfied with work conditions, reward and promotion opportunities.
Zhou *at all.*, 2015 Feb	2013	Qualitative Study	Jiangxi	Rural	Township Health Centre; Village Clinic	To explore the perspectives of health providers on the contract service policy, and investigate the demand side's attitude toward the public health services delivered under the contract policy.	The contract service actually promoted the supply side to provide more public health services to the villagers and contracted patients felt satisfied with the doctor-patient relationship.	Most health providers complained about the heavy workload, insufficient remuneration, staff shortage, lack of official identity and ineffective performance appraisal, in addition to contempt from some villagers and supervisors after the implementation of the contract service.

Chen *at all.*, 2015	2012.5-7	Mixed method study	Jiangsu	Rural	Township Health Centre; Village Clinic	To reveal the challenges of village doctors' survival and training in economically developed areas in eastern China.	The main challenges in Changzhou include an insufficient amount of village doctors, difficulties in obtaining professional qualification for village doctors, low salaries and benefits, and difficulties in recruitment.	The gap between expected and actual income is the primary factor affecting the attractiveness of a career as a village doctor. Changes to training have influenced the stability of village doctor teams. Declining attachment of young people to their hometown village has contributed to recruitment difficulties.
Wang *at all.*, 2013	2009.9-11	Quantitative study	Beijing	Rural	Village Clinic	To explore the reasons for the poor recruitment and to propose possible strategies to improve the situation.	Rural doctors were generally older than average and considered the training strategy to be inadequate in in China.	In general, the initiatives identified by rural doctors as being of most value in the recruitment of doctors were those targeting retirement pension and income.

Li *at all.*, 2017	2014.4	Mixed method study	Shandong, Guangxi, Shaanxi	Rural	Village Clinic	To describe village doctors' job satisfaction under the context of health sector reform and investigate the associated factors.	Low job satisfaction. Village doctors who earned the top level of monthly income felt more satisfied, while on the county level, those who lived in counties with the highest GDP felt less satisfied.	From interviews, most workers believed that age, income, and integrated management had a positive influence on the job satisfaction, while pension plan and basic public health care policies exhibited negative effects. Also, the increasing in availability of healthcare and health resources along with local economic development had negative effects on village doctors' job satisfaction.
Zhang *at all.*, 2017	2013	Quantitative study	Shanghai, Shaanxi, Shandong, Anhui	Urban	Community Health Centre	To examine the mediation effect of job satisfaction on the relationship between person-organization fit (P-O fit) and turnover intention based on data from China.	The effect of P-O fit on turnover intention was partially mediated through job satisfaction.	P-O fit was directly related to job satisfaction and inversely related to turnover intention.

Li *at all.*, 2014	2013.3.1 -10.31	Quantitative study	Heilongjiang	Urban	Community Health Centre	To examine levels of work stress and motivation and their contribution to job satisfaction among community health workers in Heilongjiang Province, China.	Levels of overall motivation perception and scores on the career development, responsibility and recognition motivation subscales were higher in satisfied respondents relative to dissatisfied respondents.	The main determinants of job satisfaction were occupation; age; title; income; the career development, and wages and benefits subscales of work stress; and the recognition, responsibility and financial subscales of work motivation.
Meng *at all.*, 2009	2006	Qualitative Study	10 provinces	Both	Township Health Centre; Community Health Centre	To analyze the mobility of health workers in township and community health centres.	Increased rate of workers leaving township and community health centres between 2000 and 2005, with the majority of the mobile health workers moving to higher-level health facilities; very few moving to other rural township health centres.	The main reasons for leaving were low salaries, limited opportunities for professional development and poor living conditions.

Wang at all., 2017	2013	Quantitative study	Shandong, Anhui, Shaanxi	Rural	Township Health Centre	To investigate the association between the latent clusters and health-care staff's personal and professional features.	The minority of health-care staff belong to the "satisfied class". Three among four subgroups are not satisfied with income, benefit, training, and career development.	Low job satisfaction was associated with specialty, training opportunity, and income inequality.
Chen at all., 2017	After 2009	Qualitative study	Guangxi	Rural	Township Health Centre	To understand the level of job satisfaction as felt by primary health care providers.	Increasing the incomes and fringe benefits of healthcare workers, improving their work conditions, and providing training and continuing education opportunities would help rural clinics retain doctors and eliminate the current unsatisfactory conditions.	The main concerns related to job satisfaction included working conditions, financial rewards, and the doctor's relationships with patients.

Lu at all., 2016	2013	Quantitative study	Guangdong	Both	Township Health Centre; Village Clinic; Community Health Centre/ Station	To explore job satisfaction among healthcare staff in Guangdong following the health system reforms in 2009, and to investigate the association between job satisfaction and work stress, work–family conflict and doctor–patient relationship.	The overall job satisfaction exceeded slightly dissatisfied and approached slightly satisfied. Measures to enhance job satisfaction include the reduction of workload, increase of welfare, maintaining moderate stress and balancing work–family conflict.	The sociodemographic variables including occupation, educational background, professional status, years of service, annual income and night shift, work stress, work–family conflict and doctor–patient relationship frequency significantly influenced the level of job satisfaction.

Song at all., 2015	2011	Quantitative study	Jilin, Shandong, Anhui, Chongqing, Shaanxi	Both	Township Health Centre; Community Health Centre	To find out which job attributes affect Chinese primary care providers' choice of job and whether there are any differences in these job preferences between doctors and nurses.	Policymakers need to improve primary care providers' income, benefits and working conditions to fulfil their basic needs, invest in infrastructure and strengthen training programmes in order to raise the community's confidence in the services.	Though income was important, Chinese primary care providers also had strong preferences for sufficient welfare benefits, sufficient essential equipment and respect from the community.
Mo at all., 2017	2014	Quantitative study	Guangxi	Rural	Township Health Centre	To explore the current health training status of nurses working in rural Chinese township health centers and to ascertain their perceived needs.	A decentralized degree-linked training program in which medical universities and city hospitals collaborate would be an appropriate mode of delivery.	Mismatch between current health training initiatives and desired programs in terms of training setting, content, and delivery mode

Zhang at all., 2017	2013	Qualitative Study	Shandong	Urban	Community Health Centre/ Station	To analyze how health reform of CHS led to changing job features for primary health providers.	The new model of primary health care significantly affected the nature of primary health work and triggered a range of PHC providers' coping processes.	Health workers perceived their job as less intensive than hospital medical work but often more trivial, characterized by heavy workload, blurred job description, unsatisfactory income, and a lack of professional development.
Zhang at all., 2017	2014	Quantitative study	Zhejiang, Jiangxi, Shaanxi, Xinjiang	Urban	Community Health Centre	To investigate the perceptions of primary care workers about the impacts of the national essential medicines policy (NEMP).	The NEMP has significant impacts (as perceived by the health workers) on health services delivery in primary care settings.	The impacts of the NEMP vary by region, professional practice and the income level of health workers. It is important to maintain support from physicians through income subsidies (to compensate for potential loss) and training.

Feng at all., 2017	2014	Quantitative study	Qinghai, Inner Mongolia, Xinjiang	Rural	Village Clinic	To examine the satisfaction of village doctors with the Township and Village Health Services Integration Management (TVHSIM).	Low satisfaction with the TVHSIM. A well-rounded social insurance model for village doctors is urgently needed and enhancing essential medical training should be carefully considered.	Social insurance, essential medical knowledge, year of practice significantly influenced satisfaction of village doctors on human resources management, drug and medical device management, and financing management.
Li at all., 2016	2014	Quantitative study	Shandong, Guangxi, Shaanxi	Rural	Village Clinic	To identify factors associated with village doctors' basic public health services provision and to formulate targeted interventions in rural China.	There is considerable room for improvement regarding the factors associated with village doctors' basic public health services provision.	Increasing public health care subsidies received by individual village doctors, availability and attendance of training opportunities, and integrated management and NCMS contracting of village clinics are important factors in increasing basic public health services rovision in rural areas.

Song at all., 2016	2011	Quantitative study	Ningxia	Both	Primary healthcare centers	To examine current understanding and opinions of China's National Essential Medicine System (NEMS) of primary care providers and patients.	High level of satisfaction towards NEMS among primary care providers, which is a reflection of the improvements in the health care system.	Overall there was a link between knowledge about NEMS and satisfaction with the program: the providers with greater knowledge of NEMS, reported higher satisfaction.
Feng at all., 2025	2012	Mixed method study	Jiangsu	Rural	Village Clinic	To identify specific factors of and potential solutions to the shortage in village doctors.	The shortage in village doctors presents a major obstacle toward the realization of China's policy of public health service equalization.	Many factors associated with the shortage of village doctors were payment related including low salaries and bonuses, heavy workload, few opportunities for continuing education, unattractive pension plans and poor working environments.

3. Overall job satisfaction score among primary care workers

Study [Citation]	Study period	Province/city	Area	Sample size	Measurement of scales	Measurement of overall satisfaction	Job satisfaction score	Standard deviation
Liu *at all.*, 2010	2007	Anhui	rural	77	Likert 5 point	Sum of dimension	3.76*	-
Liu *at all.*, 2010	2007	Xinjiang	rural	95	Likert 5 point	Sum of dimension	4.49*	-
Ding *at all.*, 2013	2009	Anhui	urban	765	Likert 5 point	Sum of dimension	3.06	0.497
Ge *at all.*, 2011[22]	2009-2010	Shenyang City	urban	1010	Likert 5 point	Sum of dimension	3.36*	-
Ge *at all.*, 2011[22]	2009-2010	Benxi City	urban	684	Likert 5 point	Sum of dimension	3.50*	-
Shi *at all.*, 2014	2011	5 provinces	both	863	Likert 5 point	Sum of dimension	3.43	0.77
Hung *at all.*, 2013	2011	Jilin, Anhui, Shandong, Chongqing, Ningxia	both	823	Likert 5 point	Sum of dimension	3.39	-
Wu *at all.*, 2014	2012	Zhejiang	both	111	Likert 5 point	Sum of dimension	3.23	0.06
Li *at all.*, 2014	2012	Heilongjiang	urban	448	Likert 5 point	Sum of dimension	3.69	-
Ding *at all.*, 2013	2012	Anhui	urban	495	Likert 5 point	Sum of dimension	3.13	0.643
Luo *at all.*, 2014	2012	Hubei,Hebei, Guizhou, Guangdong, Zhejiang	urban	3220	Likert 5 point	Sum of dimension	3.37	-

Sun at all., 2013	2013	Zhejiang, Guangdong, Guizhou, Hebei, Hubei	urban	3212	Likert 5 point	Sum of dimension	3.44	-
Fang at all., 2014	2012	Hubei	rural	1889	Likert 5 point	Sum of dimension	2.57	-
Zhang *at all.*, 2017	2013	Shanghai, Shaanxi, Shandong, Anhui	urban	656	Likert 5 point	Standalone item	3.55	0.74
Li *at all.*, 2014	2013	Heilongjiang	urban	930	4 point	Sum of dimension	3.11	0.68
Zhang *at all.*, 2016	2014	Jiangxi	rural	935	Likert 5 point	Standalone item	1.82	0.63
Li *at all.*, 2017	2014	Shandong, Guangxi, Shaanxi	rural	1221	4 point	Standalone item	2.43*	-
Lu *at all.*, 2016	2013	Guangdong	both	5845	Likert 6 point	Sum of dimension	3.99	0.99
Wang *at all.*, 2017	2013	Shandong, Anhui, Shaanxi	rural	603	Likert 5 point	Sum of dimension	3.37	-

* We converted these scores from the sum of percentage scores into 5-grade score: Overall satisfaction = summed score/maximum total score × 5

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.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3-4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	5
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.	5
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.	5
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.	5
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	5
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).	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.	6
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	7
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.	N/A
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	7
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.	7

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).	N/A
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A
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.	7
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.	Supplementary Material
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).	N/A
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.	8-14
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	14-15
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A
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).	15-19
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).	19-20
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	20
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.	21

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Motivating factors on performance of primary care workers in China: A systematic review and meta-analysis

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Number of tables and figures: 2 tables and 3 figures are included in this article.

Abstract

Objective: Although China has made remarkable progress in strengthening its primary health care system, lack of well-performed primary health workforce is still the bottleneck of deepening the reform. The objective of this review is to understand the current profile of Chinese primary care workers (PCWs) and their motivating factors of performance and propose targeted policy suggestions on improving their work performance.

Design： Systematic review

Methods: A systematic search of PubMed and MEDLINE was conducted to identify articles published from Jan 1, 2000 to Jun 2, 2018. Quality assessment and data extraction for the studies closely relevant to performance of PCWs in China were conducted by two reviewers independently. A preliminary framework containing different levels of factors influencing PCWs' motivation based on ERG theory guided the synthesis analysis. In addition, we used a random-effects model to pool individual studies on job satisfaction and estimate the overall job satisfaction of PCWs.

Results: A total of 36 articles were included; 16 (23 882 participants) in the meta-analysis. Regarding the individual level of motivation, 3 overarching themes and 12 sub-themes were developed. The sub-themes of financial incentives, career advancement and work itself were frequently mentioned and have more influences on PCWs' performance. Moreover, the healthcare system reform policies have inevitable and complex impacts on different levels of human needs, and then influences on the motivation and performance of PCWs. Meta-analysis showed that the overall job satisfaction score among PCWs was 3.30, just

reaching a satisfied rating and varied in different regions.

Conclusions: This study suggests low work satisfaction among PCWs in China, with financial incentives and career advancement being two most important motivating factors. Efforts to improve the work performance in PCWs should give priority to these motivating factors and systematically take into account the health policy's impacts on performance of PCWs.

Keywords

Primary health care, Primary care worker, Performance, Motivation, Health policy

Strengths and limitations of this study

►A myriad of potentially eligible articles were screened and included using a comprehensive search strategy.

► Reliability of the study selection, data extraction and quality assessment was ensured by involving two independent reviewers.

► This review contributes to the current literature as it included studies that adopted qualitative, quantitative or mix methods to present a comprehensive overview of the motivating factors on performance of China's primary care workers.

►This study benefited from summarizing all the motivating factors on performance of China's primary care workers in a systematical way, namely, at both an individual level and a health system level.

► Chinese articles were not included in this review.

Introduction

In China, the primary health care (PHC) services that include public health services and basic medical health services are provided by community health centres (CHCs) and their affiliated community health stations (CHSs) in the urban areas and by township health centres (THCs) and their affiliated village clinics (VCs) in the rural areas. These four types of PHC institutions constitute the essential part of China's three-tertiary health care delivery network. Administered by CHCs and THCs respectively, CHSs and VCs function as the satellite sites of their superior institutions. As is central to China's health system reform initiated in 2009[1], the strengthening of the primary health care has been hindered by the grave challenges concerning the structure of China's health care delivery system, in particular, the low-performance of PHC delivery system[2]. From 2010 to 2016, China's PCWs have experienced a rise in their number from 3.3 million to 3.7 million, but a decrease in their proportion in health workers, from 40.0% to 33.0%. This trend is mirrored by the utilization of health services during the same period of time: PHC institutions' proportion has dropped from 61.9% (3.6 billion visits) to 55.1% (4.4 billion visits) in terms of the outpatient visits and from 27.9% (39.5 million hospitalizations) to 18.3% (41.7 million hospitalizations) in terms of the inpatient visits[3]. Against this backdrop, the strengthening of primary health system will remain as the focus of health system reform in the near future, which can be seen from the fact that *the Outline of Healthy China 2030 Plan*, the government's blueprint for health system development, has underscored the importance of primary health care[4].

Health workforce shortage is one of the major obstacles to strengthen China's primary health care services[5]. To make matters worse, the primary health workforce is confronted with

serious challenges such as low education level, lack of qualifications, aging, high turnover and poor working performance[6]. Of all the determinants of PCWs' performance, work motivation, defined as an individual's degree of willingness to exert and maintain an effort towards organizational goals[7], plays a crucial role in changing the behavior of health providers. It has been demonstrated that work motivation can influence job satisfaction, hence influencing job performance[8 9]. There has been an expanding body of studies exploring the motivating factors for PCWs through qualitative, quantitative or mixed methods, but the study sites and methodological quality of these studies varied. Synthesizing these motivating factors in different areas of China could help identify the most important motivating factors and appreciate the overall job satisfaction level of PHWs in China. In addition, synthesizing the motivating factors for PCWs and analyzing the complexity pathway between motivating factors and performance hold general and applicable implications for improving the motivation and performance of China's PCWs. In light of this, this review aims to synthesize and analyze the motivating factors for PCWs and provide evidence-based policy implication on how to improve the performance of China's PCWs.

Methods

Search strategy and eligibility criteria

We searched the PubMed and MEDLINE on June 2, 2018 to identify relevant studies using MeSH terms in conjunction with free-text words including all the possible synonyms, alternative terms and spellings[6] to increase sensitivity to any potentially eligible literature. All the search terms were provided in the Supplementary Appendix 1. Search results were

exported to EndNote X7 to be organized and duplicate records were removed in the first place. Then two authors exported the citations to Microsoft Excel and conducted the literature screening and selection independently. Divergent judgments were settled through discussion. We searched for and included articles about the motivating factors on performance of the PCWs who work in four types of China's PHC institutions: rural THCs, rural VCs, urban CHCs and urban CHSs. In this study, motivation in the work context is defined as an individual's degree of willingness to exert and maintain an effort towards organizational or system goals [10], and the degree of job satisfaction, work stress and turnover intention seen as possible reflections of motivation which may influence work performance. Therefore, all the studies that explored the level of work motivation, job satisfaction, work stress, turnover intention and the influencing factors of these motivation expressions were included. We also searched for relevant studies found in the references of the included articles and other sources. The included studies adopted either observational or experimental design, and presented primary quantitative or qualitative data. All the included articles were in English language and published between 2000 and 2018. Studies were excluded if they did not address the motivating factors for PCWs, or if the participants were not PCWs or did not work in the four types of PHC institutions mentioned above.

Assessment of risk of bias

Methodological quality of the included studies was evaluated using Hoy's risk of bias tool which is adapted from the one developed by Leboeuf-Yde and Lauritsen[11]. Based on a total score, studies are put into three categories: low risk of bias (8-10), moderate risk of bias

(5-7) and high risk of bias (0-4).

Data extraction and synthesis

Extracted data included study design, year or years of study, settings, participants, sample sizes, measurement of motivation, objective, key motivation, conclusions and motivating factors. Data extraction and analysis were guided by Alderfer's ERG theory, which proposes three core human needs in organizational settings: existence (the desire for material things), relatedness (the desire for cordial interpersonal relations), and growth (the desire for opportunities to be creative and to develop one's skills)[12]. A thematic synthesis approach was adopted for data analysis to capture the evidence illustrating PCWs' motivation. Motivating factors extracted from the included articles were grouped into four themes: 1) factors concerning the existence needs, including payment, fringe benefits and physical working conditions; 2) factors concerning the relatedness needs, which are concerned with social environment and relationship; 3) factors concerning the growth needs, referring to career or self-development and management environment; 4) factors concerning the health policy context and organizational context that could influence one or more needs categories mentioned above. The first three themes of motivating factors represented, at an individual level, three different dimensions of human needs in PHC institutions based on the ERG framework and the last theme was singled out because different health policies had complex impacts on the performance by influencing more than one dimension of human needs at a macro level. First, authors aggregated data into motivating factors and extracted all original motivating factors in each article to put them into one of the four themes. Then we identified

correlations between the different factors, refined them through discussion and synthesized similar factors into a higher level theme.

As job satisfaction was positively associated with job performance[13] and nearly half of the selected articles studied job satisfaction with quantitative measurement, we resorted to meta-analysis to synthesize the 16 articles that provide data of PCWs' job satisfactions. We unified the measurement of overall job satisfaction by transforming different calculations into a 5-point rating scale and pooled the study-specific estimates using a random effects meta-analysis model to obtain an overall summary of the job satisfaction scores across studies [14]. We analyzed the data using Stata version 14.0 for Windows.

Patient and public involvement

Patients and public were not involved in this study.

Role of the funding source

The funders of the study had no role in study design; data collection, analysis and interpretation; writing of the report; and the decision to submit the paper for publication.

Results

Characteristics of reviewed studies

We firstly screened 5466 titles and abstracts, and then retrieved and screened the full-texts of 348 potential relevant studies to evaluate their eligibility (Figure 1). After the full text screening, 119 studies relevant to the human resources of PHC in China were included

for us to appreciate the current status of PCWs. To obtain sufficient information related to the motivation of PCWs, 1 additional article from reference search was also identified and included after applying the eligibility criteria. Finally, of the 119 studies, 83 articles that did not contain specific motivating factors were excluded; 36 articles that were closely relevant to PCWs' motivation for were selected for data extraction and synthesis. A list of the basic characteristics of the included articles can be found in Supplementary Appendix 2. 25 quantitative, 7 qualitative, and 4 mixed methods primary studies were included, covering at least 27 provinces of China. All of the 36 articles were cross-sectional studies, with 17 studies taking place in rural China, 11 in urban China and 8 in both China's urban and rural areas. Of the 17 studies concerning rural areas, 8 articles only included village doctors in village clinics as participants, 5 articles only studied health workers in THCs and 4 articles were concerned with rural PCWs in both village clinics and THCs. The 11 studies that were concerned with urban areas addressed urban PCWs in community health centers/stations. 4 articles studied all types of PCWs in different kinds of rural and urban PHC institutions. As for the risk of bias, more than half of the included studies presented a low risk of bias, with the total score ranging from six points to ten points (in Supplementary Appendix 2). Included studies analyzed the motivation of PCWs from different perspectives: some measured job satisfaction [15-30]; some explored the motivating factors' influence on attrition and retention[18 22 31-35]; some studied the impact of some policies or interventions on the motivating factors for health workers [31 36-40 41-46].

Motivating factors for PCWs

Factors concerning existence needs

Financial incentives, workload and the work conditions related to a person's physical needs such as food, clothing, and shelter were clustered into factors concerning existence needs. In this review, we found that work conditions, payment and the mandatory workload were considered as significant factors of PCWs' satisfaction [15 19 20 22 23 25 30 47] and turnover intention[18 22]. 26 out of the 36 articles reported financial incentives (Table 1) and found that the financial incentives such as income and fringe benefits were significantly associated with job satisfaction [15 17 30]and difficulties in PCW recruitment [32 34 35]. Moreover, financial incentives and working conditions were the top two motivating factors for PCWs to improve performance [21 33].

Another line of inquiry explored the impact of different health system reform policies on motivating factors. For example, in a qualitative study, administrators and frontline healthcare workers in PHC institutions mentioned that the increased income after the 2009 health system reforms did not fully reflect the increased workload, and those who worked the most were not necessarily rewarded the most, constituting a demotivating factor for some health workers[37].

Factors concerning relatedness needs

Relatedness needs refer to a person's interpersonal needs in his personal and professional settings and in this review, factors concerning relatedness needs were deemed as a person's relationships with the living environment, the society, the coworkers and the nature of work.

17 studies reported work itself and 11 studies reported work relationships (Table 1). Compared with factors concerning existence needs, the PCWs were more satisfied with the nature of work and work relationships [20 25 30]. This finding indicated that most workers got along well with their colleagues and believed that their jobs were to be of value, which can act as a motivating factor in case of poor physical environment.

13 of the selected studies reported recognition from society including being understood by society and physician-patient relationships (Table 1). Satisfaction with social status and relationship with patients was significantly associated with job satisfaction[15 30]. In terms of patients' respect, there seemed to be an urban-rural difference, with the rural PCWs being slightly more satisfied than their urban counterparts [23]. However, few rural PCWs expressed satisfaction with their current relationships and indicated that the patients could not understand the doctor's work[47]. In addition, the growing workplace violence negatively affected the PCWs' job performance and quality of life [48] and emerged as a major contributor to doctors' low morale in recent years [16].

6 studies reported living environment as a factor concerning relatedness needs (Table 1) and showed that compared with urban areas, rural areas had greater needs to improve the living environment [21 33]. In addition, young health workers' weakening sense of belonging and responsibility to their hometown has made it more difficult to recruit young health workers born in local areas[32].

Factors concerning growth need factors

Career advancement, training, rewards, management and autonomy relating to a

person's needs of personal development were considered as factors concerning growth needs in this review.

19 out of the 36 articles reported the factor of career advancement (Table 1), which was considered as the one of top three contributors to satisfaction [15 16 19 20 22 23 29]. The gap between the expected and actual professional development was one of the main sources of job dissatisfaction [17]. Limited opportunities for job promotion was another factor contributing to the low levels of work passion [19] and turnover intentions of village doctors [18 22]. The main causes might be that few positions and opportunities were available for the health professionals in PHC institutions to get higher professional titles on the regular payroll, especially compared with the opportunities that their counterparts in higher level health institutions can enjoy.

Training was mentioned as a motivating factor by 13 out of the 36 articles (Table 1). Learning and training were significantly associated with work passion[19], job satisfaction[15] [29]and turnover intention[22]. Along with career advancement, training was also considered as one of the most important motivating factors for PCWs to improve performance [21]. However, training arrangements were inadequate [34 49 50] to address the fragmented needs of China's PCWs. Health workers preferred more training time for practice-focused training (on-site guidance from senior doctors and further clinical education) over knowledge-focused training, and favoured such training contents as clinical skills, preventive healthcare and medication knowledge education [49]. As a result, although training was reported as an effective incentive in recruitment, it failed to act as an effective motivating factor to attract young doctors to rural areas in China [34].

Among the selected studies, the number of studies that reported the motivating factors of rewards, management and autonomy stood at 9, 9 and 14, respectively (Table 1). According to most of the selected articles, PCWs were relatively satisfied with the decision-making ability of their superiors, the contingent rewards and the opportunities to do work by making decisions on their own and to utilize their professional skills and talents [15 22].

System and policy factors

Motivation was not only influenced by the motivating factors at the individual level, but also by the health sector reforms and specific incentive schemes that target workers [7]. Theoretically, any health sector reform would directly influence the motivating factors that the health workers feel or that affect the structure of health organizations, thus in turn affecting the work rewards of the health workers. 18 out of the 36 articles reported macro-level factors (Table 1), namely, the health system and policy factors such as National Essential Medicines System (NEMS), National Basic Public Health Service Program (NBPHSP) and Township and Village Health Services Integration Management (TVHSIM). The gap between the intended and actual consequences of the policies was one of the main determinants of job satisfaction [17]. The comprehensive reform of PHC in Anhui has changed PCWs' compensation structure and improved their income and work efficiency, but dampened their work enthusiasm because of the poorly designed performance-based evaluation system[37]. Different economic status and health reform processes may lead to different consequences. Take the comprehensive reform of PHC in Shandong as an example. PCWs there on the one hand complained about increased trivialities at work, heavier workload, blurry job description, unsatisfactory income and a lack of professional

development, but on the other hand were satisfied with the relationships with the community and low work pressure[41].

The NEMS included a new National Essential Drugs List to ensure free access to safe and effective medication for the patients, and introduced a series of polices on drug production, pricing and distribution in the hope of promoting the rational use of medications by reducing the reliance on drug sales and profit seeking behaviors. To be more specific, only drugs on the list were allowed to be prescribed in VCs and price mark-ups were forbidden. The impacts of the NEMP varied by region, professional practice and income level[42]. In one survey, most PCWs perceived no change in their income and reported a high level of satisfaction towards NEMS[45]. However, according to another in-depth interview with village doctors[36], the introduction of the essential drug list for PHC institution dramatically reduced their medical income as most areas had limited government subsidies to supplement their incomes. At the same time, they also complained that they had lost patients' trust and work enthusiasm as the classes and total amount of essential medicines were not enough to meet daily treatment needs [42 45].

The NBPHSP starting from 2009 provided a package of basic public health services for all residents, with a focus on the management of non-communicable disease. To motivate PCWs to provide preventive health services, the government grants subsidies based on the number of covered residents. At the beginning of this reform, due to the broad scope of basic public health services and limited financial incentives, providers felt that they were under great stress due to the competing demands for their time and complained about the heavy workload, insufficient remuneration, staff shortage, lack of formal professional identity and

ineffective performance appraisal. In addition, providers had to deal with the distrust and disrespect from some residents [40 46], especially those public health workers who were dismissed as having lower levels of knowledge and skill than specialists[39]. Providers with more subsidies, training opportunities and integrated management had better performance in service provision [44].

The TVHSIM required THCs, the upper-level health institutions, to direct and supervise VCs in their routine work and their work in medicine, personnel management, financing, and the upgrade and maintenance of facilities, resulting in mixed impacts on village doctors. On the one hand, most village doctors felt more respected under this integrated management because they were more recognized as health workers in a formal health system rather than private drug salesmen. On the other hand, they were not allowed to perform agricultural or any other side activity for extra money [26 36], which negatively affected their financial conditions.

Job satisfaction for PCWs

The performance of healthcare delivery system is critically dependent on workers' motivation which is directly mediated by workers' willingness[7]. As an important indicator to measure workers' willingness to exert efforts, satisfaction is highly relevant for the sustainable development of PHC in China. 16 included articles assessed job satisfaction as an important dimension reflecting providers' motivation (See supplementary Appendix 3). A total of 19 investigation samples were extracted from these 16 articles with cross-sectional study design, representing more than half of the provinces in China. In particular, 2 articles[24]

[25] provided data of 2 provinces/cities and 1 article[20] represented data of two years. The overall job satisfaction score ranged from 1.82 to 4.49 and also varied from region to region (Figure 2). To be more specific, for most samples drawn from more than three provinces, the satisfaction scores leveled off between 3.37 and 3.55, but the samples from the middle area samples scored lower than those from the eastern area. Besides, the score of Xinjiang, the representative of the western areas, was the highest among the included samples.

Meta-analysis was approached by combining results weighted by sample size and showed that the overall job satisfaction score among PCWs was 3.30, equivalent 0.66 ([95% CI 0.61–0.71]; I^2=98.7%; P<0.001; Figure 3), just reaching a level indicating satisfaction. But the overall satisfaction mean of rural health workers was lower than that of the urban health workers (Table 2).

Discussion

Financial incentives and career advancement were the top two motivating factors for PCWs in China. In the included articles, the balance between remuneration, workload, and career promotion opportunities was most frequently mentioned as a critical motivating factor on PCW's performance. In spite of Chinese government's considerable investments in recent years to improve the income of the health workers in PHC institutions, the gap between the actual and expected income continued to widen due to increasing urbanization and ever growing living costs. According to some doctors in THCs, the performance-based salary means that 30-40% of the salary was based on their workload, quality of service and patients' satisfaction, but due to the limit of overall revenue and revenue

structure, the well-performing health workers can only be rewarded by reducing the income of their co-workers with poor performance. This payment method did not work well in reality as to motivate health workers. How to improve the income level of health workers in primary health delivery system will remain a crucial but tricky issue in the near future. Besides, as shown in our analysis in Figure 2, financial incentives were no longer the sole means to promote motivation, improve job satisfaction and enhance work performance. Other factors, in particular, professional development, work characteristics and training, have been equally, if not more, important for China's PCWs. More specifically, the lack of chances for professional title promotion and limited career development opportunities were important reasons that lead to turnover intention. This finding is in line with other internationally published studies and underscores the importance of the non-financial as well as the financial incentives[7 51]. The ERG framework implies that the fulfillment of human needs plays an important role in PCWs' motivation, but each individual prioritizes the existence needs, relatedness needs and growth needs differently. In this review, we found that the PCWs in China are confronted with barriers in fulfilling all of the three levels of human needs. Income security has increased, but still far lower than the expected level; the residents' recognition of and cooperation with the PCWs have played a negative role in influencing the motivation and behaviors of health workers; career promotion system and training arrangements did not meet their growths need neither. Policy makers must realize that a health worker has multiple needs to be met simultaneously. In addition, motivation improvement should be prioritized in a way that suits local institutional environments and personal preference. A sole focus on one type of need at a time cannot effectively motivate PCWs [52].

The overall job satisfaction score among PCWs was still low, especially in rural areas. As the predictor of job satisfaction, the overall job satisfaction score reflects PCWs' emotional status and to what extent their human needs are satisfied. PCWs' performance can be considerably improved by identifying the motivating factors so as to increase their work satisfaction. The most prominent factor causing the general dissatisfaction of PCWs, especially the PCWs in rural areas, was the financial rewards from work. In 2014, the annual income of 84.06% village doctors was less than 30 000 RMB, much lower than the average income (56 394 RMB) of the doctors in Jiangxi province's higher level health institutions, and nearly half of the village doctors thought that they earned less than other people in the local area[15]. In addition, as discussed above, the health system reform policies also had indirect and negative impacts on PCWs' income level and further reduced their job satisfactions. These findings hold significant implications for policy makers and PHC institution managers who make efforts to improve workers' job satisfaction [17 28]. Another finding of the synthesis was the significant differences of satisfaction scores among eastern, western and middle regions of China. There is no doubt that imbalance exist among these regions at all levels. As for the satisfactions of PCWs, provinces in the eastern region, with more developed economy and better health facilities, scored higher than provinces in the middle region and lower than provinces in the western region. Considering western China are remote areas with less economic development, the higher job satisfaction of PCWs may be explained by the lower expectations of PCWs, more government subsidies and other central government supports that target remote western areas. In light of this, the government should take into account the imbalanced development of China's different areas, especially China's

middle area where the economic development and resources are limited and the central government's subsidies are also absent.

The health system reform and some specific policies have inevitable and indirect impacts on PCWs. In 2009, China launched a landmark healthcare reform which aims at providing affordable and equitable basic health care for all by 2020[5]. As strengthening the primary health system is central to the health system reform, several policies have directly targeted PHC institutions or PCWs. As a result, the satisfaction of pay and contingent rewards have improved slightly, which may be attributed to the fact that PCWs' basic wages are guaranteed by government finance [20]. However, despite of the progress China has made in enhancing the primary health system, new problems and unintended consequences of related reforms have surfaced. For example, the brain drain of experienced health workers and the loss of patients from THCs to county hospitals have incurred a great cost[6 31]. As for the health system reforms, three policies and their respective impacts on health workers' motivation were most studied in the literature.

Since its introduction in 2009[36], the NEMS has exerted a lasting impact on PCWs' income structure. The essential drug list removed the incentives for over-prescribing, resulting in a drop in income and a loss of autonomy [31] because government subsidies for public health workers were not enough to compensate the decline in PHC institutions' revenue from drug prescriptions. Along with the problems in drug supply procurement, unintended consequences on health workers' motivation and related behaviors also emerged: THCs has suffered a brain drain of experienced health workers who have flowed to county

hospitals because their prescriptions have been restricted due to a limited supply of medicines and they have lost many patients as a result. In conclusion, policy makers should consider how to reduce the policy's adverse effects on the motivation of PCWs, including how to appropriately remunerate health workers, ensure enough clinical autonomy and supply the drugs in a timely, transparent and accountable manner.

At the beginning of the NBPHSP, the PCWs responsible for basic public health services held negative attitudes toward the sustainable provision of these services because it was accompanied by a heavier workload and insufficient subsidy to compensate their efforts [38 40 46 53]. To motivate PCWs, the government has increased the subsidies from 15 RMB per person in 2009 to 50 RMB in 2017. However, the combination of heavy workload, rigid performance assessment procedure and lack of professional knowledge remained unchanged, resulting in a negative effect on PCWs' job satisfaction and performance. We suggest that the evaluation of PCWs' performance be shifted from being fault-finding oriented to being support-providing oriented, such as improving the ability of public health providers or strengthening the teamwork between clinical doctors and the public health workers in order to enhance the overall delivery of these public health services.

After the implementation of TVHSIM, the village doctors who had been previously self-employed and not integrated into the formal health delivery system, were managed in the same way as THC staffs and experienced a transformation of their income structure as government subsidy has become an increasing source of income. They were motivated not only by the more stable financial subsidy from government, but also by the good reputation and respect from local residents as health providers with formal status. However, their income

and fringe benefits still lagged behind the regular employees in THCs, which remained an demotivating factor for village doctors[34]. A well-rounded social insurance model for village doctors is urgently needed [43].

The rationale for using ERG theory to guide the analysis lies in the fact that this needs-based theory generally encompasses work motivation, provides a useful conceptualization of what PCWs care about (motivating factors) and explains their performance in organizations. The findings of this review suggest that PCWs can be encouraged to perform well by positive motivations responding to satisfying ERG needs, but it should be interpreted with caution because of several limitations. First, this review only focuses on the motivating factors of PCWs' work performance, therefore, other relevant articles on motivating factors influencing the attraction of PCWs were excluded by the search strategy. Second, all the included studies analyzed PCWs' motivation from the perspective of problems and critics, which could lead to some bias because few positive thoughts on PCW's current motivation status have been reported. Third, factors related to personal sociodemographic characteristics and mental state were not analyzed as motivating factors. They were only exacted from the original article and presented as influencing factors, as shown in the Supplementary Appendix 2.

Conclusions

Low motivation is at the crux of promoting the work performance of China's on-service PCWs. Policy makers should take into account all level of human needs that

influence PCWs' motivation and start from the local reality to set priorities to ensure of PCWs' appropriate remuneration and career development opportunities. Just as illustrated by the *Global Strategy on Human Resources for Health*, efforts should be made to improve deployment strategies, working conditions, reward systems, continuous professional development opportunities and career pathways by adopting and implementing evidence-based health workforce policies that are tailored to the local context so as to make the best possible use of limited resources and enhance both capacity and motivation for improved performance[52]. We also suggest that countries undergoing health system reform should consider the views of different stakeholders and analyze the potential side effects of some specific policies on health providers who are not directly targeted in order to benefit both providers and demanders[15].

Abbreviations

PCW: Primary care worker; PHC: Primary health care; CHC: Community health centre; CHS: Community health station; THC: Township health centre; VC: Village clinic;; NEMS: National Essential Medicines System; NBPHSP: National Basic Public Health Service Program; TVHSIM: Township and Village Health Services Integration Management; RMB: renminbi

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Contributors

All authors proposed the hypothesis and idea for the systematic review and take responsibility for all aspects of it. QM, BY and HL discussed and contributed to the conceptualization of this review and the development of review protocol. BY applied the inclusion criteria. HL and DW extracted the data. HL was a major contributor to the draft of the manuscript. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interests.

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Figure legends

Figure 1. PRISMA diagram

Figure 2. Job satisfaction score among primary care workers across different regions in China

Figure 3. Forest plot of the job satisfaction score among primary care workers

Tables

Table 2 Means of overall job satisfaction score among primary care workers

Study	No. of included studies	Mean
All included studies	19	3.30
Studies in urban areas	9	3.35
Studies in rural areas	7	3.06

Table 1. Motivating factors for primary care workers

Motivating factor	Definition	Motivation to stay	Motivation to join/leave	Number of selected studies reporting the factors
Individual-level factors				
Existence				
Financial incentives	Basic salary, bonus, benefits (insurances, vacation, etc.)	22	5	26
Workload	Hours of work, the amount of work done, flexibility in scheduling	12	1	13
Work conditions	Work environment, job stability, job security	14	2	15
Relatedness				
Living environment	Geographical location and socioeconomic level of workplace	4	2	6
Recognition in society	Patients' respect, workplace violence, social status	11	2	13
Work itself	Nature of work (interest, meaningfulness, enjoyment), job fullfilment, job achievement, work enthusiasm	17	1	17
Working relationships	Relationships with coworkers/subordinates/nurses, communication	11	0	11
Growth				
Career advancement	Opportunities for professional development	17	3	19
Training	Support for training and education, opportunity to learn new skills and new knowledge	11	2	13
Rewards	Recognition, appreciation, contingent rewards,	9	0	9
Management	Supervision (level of competence, fairness, interest in subordinates), relationship with superior	8	1	9
Autonomy	Opportunities to do work by making decisions on their own. opportunity to utilize your professional skills and talents	14	0	14
Macro-level factors				
System and policy				
The health-care reform policies	Putting organizational policies into practice e.g. NEMS, NBPHSP and TVHSIM.	18	1	18

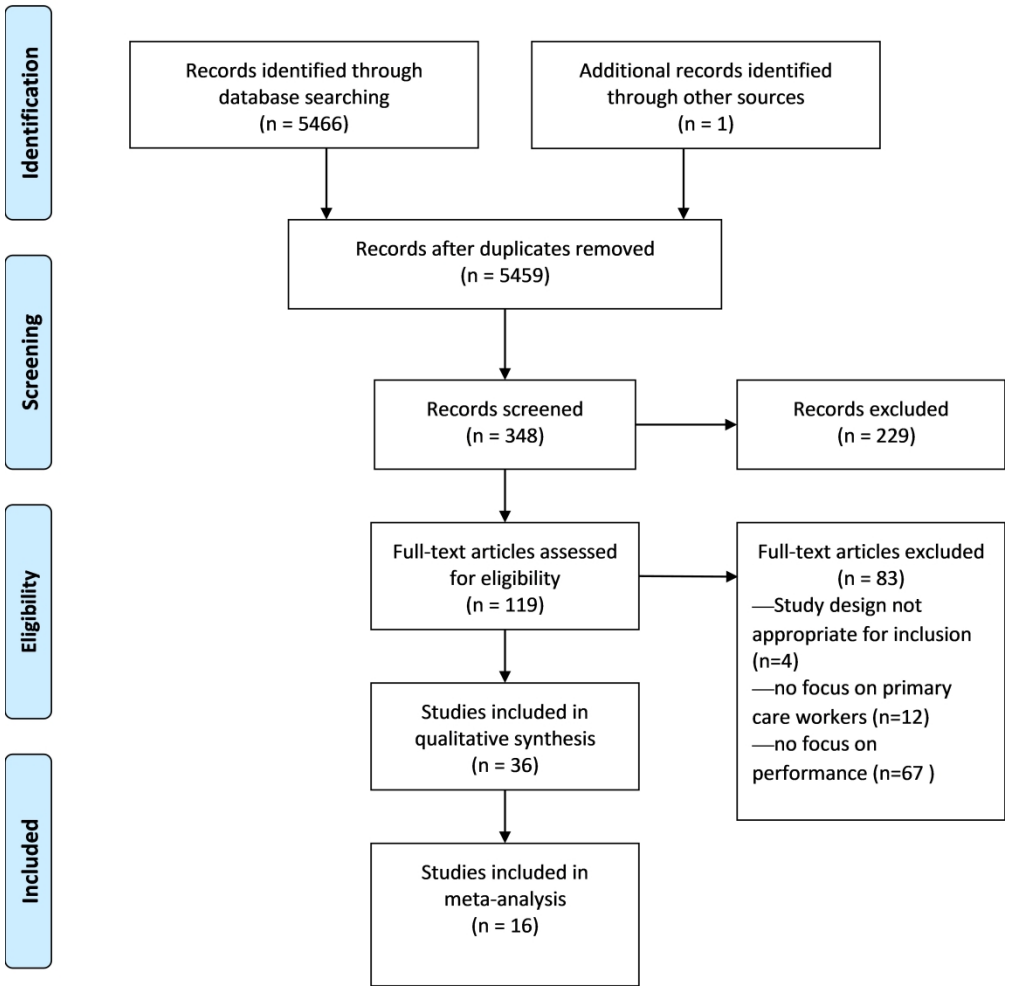
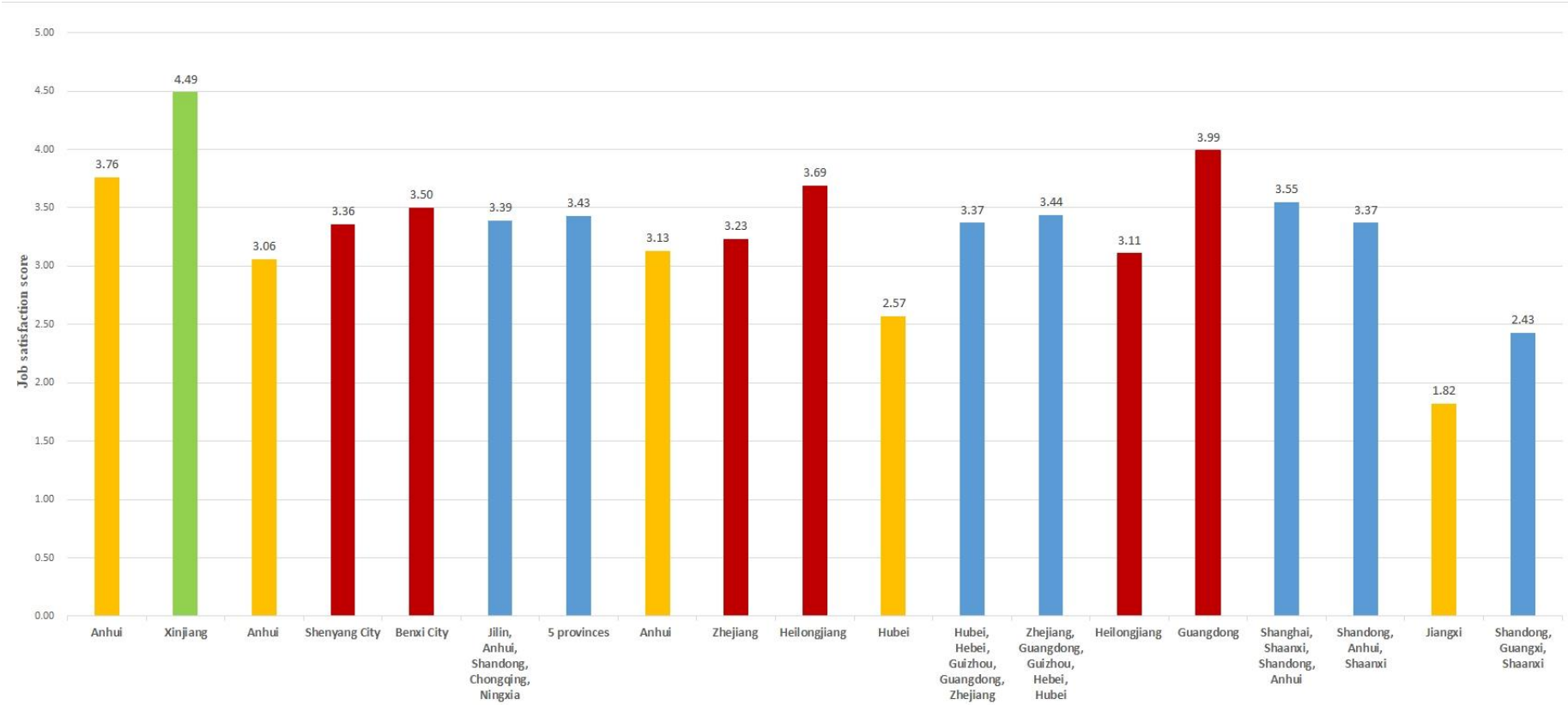


Figure 1. PRISMA diagram

370x397mm (288 x 288 DPI)


Job satisfaction score
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
3.76
4.49
3.06
3.36
3.50
3.39
3.43
3.13
3.23
3.69
2.57
3.37
3.44
3.11
3.99
3.55
3.37
1.82
2.43
Anhui
Xinjiang
Anhui
Shenyang City
Benxi City
Jilin, Anhui, Shandong, Chongqing, Ningxia
5 provinces
Anhui
Zhejiang
Heilongjiang
Hubei
Hubei, Hebei, Guizhou, Guangdong, Zhejiang
Zhejiang, Guangdong, Guizhou, Hebei, Hubei
Heilongjiang
Guangdong
Shanghai, Shaanxi, Shandong, Anhui
Shandong, Anhui, Shaanxi
Jiangxi
Shandong, Guangxi, Shaanxi

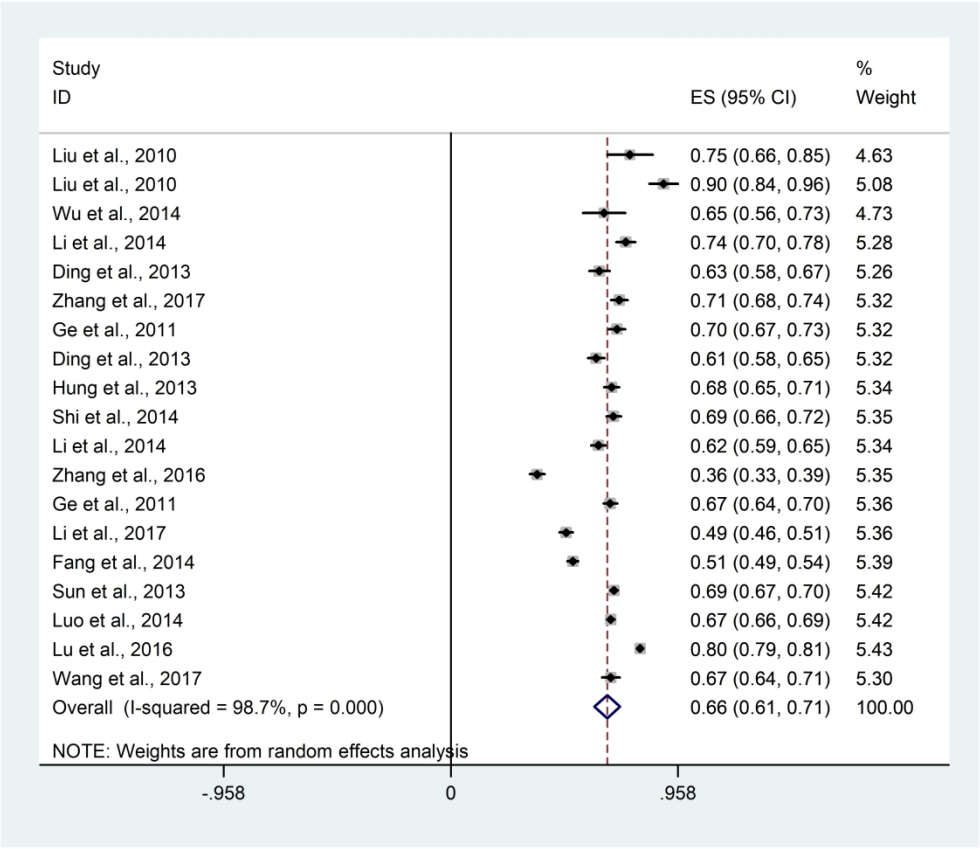


Figure 3. Forest plot of the Job satisfaction score among primary care workers

333x288mm (288 x 288 DPI)

Supplementary Appendix

1. Search terms

(China[Title/Abstract] OR Chinese[Title/Abstract]) AND ("primary health care"[Mesh] OR "General Practice"[Mesh] OR "General Practitioners"[Mesh] OR "Physicians, Family "[Mesh] OR "Community Health Services"[Mesh] OR "Delivery of Health Care"[Mesh] OR "township hospital"[Title/Abstract] OR "township health center"[Title/Abstract] OR "township health centre"[Title/Abstract] OR "community health station"[Title/Abstract] OR "village clinic"[Title/Abstract] OR "community health center"[Title/Abstract] OR "community health centre"[Title/Abstract]) AND (“manpower"[Mesh] OR “Education, Public Health Professional"[Mesh] OR “Education, Professional"[Mesh] OR “Education, Medical, Continuing"[Mesh] OR “Professionalism"[Mesh] OR “Career Choice"[Mesh] OR “Career Mobility"[Mesh] OR "human resources"[Title/Abstract] OR "retention"[Title/Abstract] OR "incentives"[Title/Abstract] OR "salary"[Title/Abstract] OR "professional medical master"[Title/Abstract] OR Motivation[Mesh] OR “Salaries and Fringe Benefits”[Mesh] OR “Staff Development”[Mesh] OR recruit[Title/Abstract] OR recruited[Title/Abstract] OR recruits[Title/Abstract] OR migration[Title/Abstract] OR migrate[Title/Abstract] OR migrating[Title/Abstract] OR migrated[Title/Abstract] OR migrates[Title/Abstract] OR immigration[Title/Abstract] OR immigrate[Title/Abstract] OR immigrating[Title/Abstract] OR immigrated[Title/Abstract] OR immigrates[Title/Abstract] OR emigration[Title/Abstract] OR emigrate[Title/Abstract] OR emigrating[Title/Abstract] OR emigrated[Title/Abstract] OR emigrates[Title/Abstract] OR mobility[Title/Abstract] OR turnover[Title/Abstract] OR "brain drain"[Title/Abstract]) AND ((eng[Language]) OR chi[Language]) NOT “Autobiography”[ptyp] NOT “Bibliography”[ptyp] NOT “Biography”[ptyp] NOT “Consensus Development Conference”[ptyp] NOT “Consensus Development Conference, NIH”[ptyp] NOT “Corrected and Republished Article”[ptyp] NOT “Dataset”[ptyp] NOT “Dictionary”[ptyp] NOT “Directory”[ptyp] NOT “Duplicate Publication”[ptyp] NOT “Electronic Supplementary Materials”[ptyp] NOT “Festschrift” [ptyp] NOT “Interactive Tutorial”[ptyp] NOT “Legal Cases”[ptyp] NOT “Letter”[ptyp] NOT “News”[ptyp] NOT “Patient Education Handout”[ptyp] NOT “Periodical Index”[ptyp] NOT “Personal Narratives”[ptyp] NOT “Portraits”[ptyp] NOT “Published Erratum”[ptyp] NOT “Retracted Publication”[ptyp] NOT “Retraction of Publication”[ptyp] NOT “Twin Study”[ptyp] NOT “Video-Audio Media”[ptyp] NOT “Webcasts”[ptyp].

2. List of included studies' general characteristics

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhang *et al.*, 2016	2014	Quantitative study	Jiangxi	Rural	Village Clinic	To assess village doctors' job satisfaction during the reforms and to explore factors affecting job satisfaction.	Low job satisfaction. The top three items leading to dissatisfaction were pay and the amount of work that had to be done, opportunities for job promotion and work conditions.	Marriage, income, intention to leave, satisfaction with learning and training, social status, relationship with patients and satisfaction with the new healthcare reforms were significantly associated with job satisfaction.	Low
Lin *et al.*, 2015	2013.9-2014.4	Quantitative study	Guangdong	Urban	Community Health Centre	To explore the impact of workplace violence on job performance and quality of life of community healthcare workers in China, especially the relationship of these three variables.	Workplace violence among community healthcare workers is prevalent in China.	The workplace violence had negative effects on the job performance and quality of life of CHCs' workers.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhang *et al.*, 2015	2013.8-2014.1	Qualitative Study	Jiangsu, Henan, Jiangxi, Heilongjiang, Sichuan, Gansu.	Rural	Village Clinic	To investigate the village doctors' income structure and analyze how these health policies influenced it.	The health-care reform policies have had lasting impacts on village doctors' income structure since the policies' implementation in 2009.	Several policies such as the National Essential Medicines System, Integrated management, National Basic Public Health Services, New Rural Cooperative Medical Scheme had major impact on village doctors.	Moderate
Wu *et al.*, 2014	2012	Quantitative study	Zhejiang	Both	Community Health Centre; Township Health Centre	To explore the factors influencing doctors' job satisfaction and morale in China, in the context of the ongoing health system reforms and the deteriorating doctor–patient relationship.	Low job satisfaction. Primary care doctors were the least dissatisfied with the income and opportunities for promotion. Patients were becoming more aggressive in their demands and there was an increasing trend of violence against doctors.	Doctors in the provincial hospital appeared to be the most dissatisfied group, and primary care physicians were most satisfied with their work and the causes of dissatisfaction fall into three main areas: low income, heavy workload and patient aggression.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Li *et al.*, 2014	2012	Quantitative study	Heilongjiang	Urban	Community Health Centre	To assess the determinants of job satisfaction in community health workers in one Chinese province.	Overall job satisfaction was higher than extrinsic job satisfaction and lower than intrinsic job satisfaction. All desired workplace characteristics were higher than the associated actual workplace characteristics.	The main determinants of job satisfaction were occupation, years worked in health service institution, and five subscales representing the gap between desired and actual workplace characteristics, which were system and policy; fringe benefits; working relationship; professional development; and remuneration.	Low
Fang *et al.*, 2014	2012.07 -08	Quantitative study	Hubei	Rural	Village Clinic	To analyzes the factors that influence the turnover intention of village doctors by investigating village clinic workers in rural areas, particularly in Xiangyang City, Hubei Province.	Village doctors were most dissatisfied with my pay and the amount of work I do, the chances for advancement on this job, and the work conditions. Highlight the influence of job satisfaction on turnover intention of village doctors	Income satisfaction, the way organization policies are put into practice, my pay and the amount of work I do, the chances for advancement on this job and the work conditions were significantly related to the turnover intention of village doctors.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhou *et al.*, 2014	2013.1-3	Qualitative Study	Zhejiang, Yunnan	Rural	Township Health Centre	To explore the impacts of these reforms on health workers and service users at township level, which has been the major target of the first phase of the reforms.	Some elements of the reforms may actually be undermining primary care. While the new health insurance system was popular among service-users, it was criticized for contributing to fast-growing medical costs, and for an imbalance of benefits between outpatient and inpatient services. Salary reform has guaranteed health workers' income, but greatly reduced their incentives. The essential drug list removed perverse incentives to overprescribe, but led to falls in income for health workers, and loss of autonomy for doctors.	The health workers' intention was mostly blamed on the loss of income and incentives and in the larger hospitals, on the essential drug list, and the way it limits clinical autonomy and the provision of specialist services.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Liu *et al.*, 2014	2009-2010	Mixed method study	Anhui	Both	Township Health Centre; Village Clinic; Community Health Centre/ Station	To conduct an initial assessment of the effects of specific parts of the reforms in Anhui.	The reform of primary healthcare institutions in Anhui has improved the personnel structures surrounding frontline healthcare workers, increased their incomes, improved work efficiency, and changed the compensation patterns of primary healthcare institutions, improved hardware, reduced drug prices, and, to some extent, improved the diagnosis and treatment structure. However, the reforms have not radically changed the behavior of medical workers or the visit patterns of patients.	Two problems emerged from the reforms.First, the enthusiasm of medical staff decreased, and second, the supply of drugs could not adequately meet the demand.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Luo *et al.*, 2014	maybe 2012	Quantitative study	Hubei , Guizhou, Hebei , Guangdong , Zhejiang	Urban	Community Health Centre	To analyze and determine the main related factors that influence work passion of CHS workers by investigating CHS workers from five Chinese provinces.	Low passion for current work. Workers were most dissatisfied with the balance between remuneration and workload, job promotion opportunities and most dissatisfied with the balance between remuneration and workload, job promotion opportunities.	The related factors that influence CHS workers' work passion are socio-demographic factors such as age, and years of employment, and other work-related factors such as learning and training opportunities, compensation packages, work stress, and personal development opportunities.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Ding *et al.*, 2013	2009 v.s. 2012	Quantitative study	Anhui	Urban	Community Health Centre	To compare the job satisfaction (JS) of community health workers (CHWs) before and after the local comprehensive medical care reform (LCMR) in Anhui Province to provide evidence for improving the LCMR policy to increase the JS of CHWs.	After two years' implementation of the LCMR, CHWs' total JS have a small improvement. CHWs have lower satisfaction in the dimensions of pay, promotion and benefits dimensions before and after the LCMR.	The average scores of total JS and satisfaction with pay, contingent rewards, operating procedures and communication in the effect evaluation survey were statistically significantly higher than those of the baseline survey. The average score of satisfaction with promotion in the effect evaluation survey was statistically significantly lower than that in the baseline survey.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Hung *et al.*, 2013	2011	Quantitative study	Jilin, Shandong, Anhui, Chongqing, Ningxia	Both	Township Health Centre; Village Clinic; Community Health Centre/ Station	To provide an overview of major performance motivating factors for primary care providers (PCPs) in China and examine associations between these factors and individual and practice setting characteristics.	There were greater needs for improvement in rural than urban settings, especially in living environment. Types of PCPs were associated with needs for improvement in different factors. There were more needs from nurses and village doctors.	The most important motivating factors for PCPs to improve performance were professional development, training opportunities, living environment, benefits, working conditions and income.	Low
Sun *et al.*, 2013	Maybe 2012	Quantitative study	Zhejiang, Guangdong, Guizhou, Hebei, and Hubei	Urban	Community Health Centre	To ascertain the key factors that influence the CHS worker turnover intention to increase their work satisfaction and stability.	38.7 % community health workers intended to quit. CHS workers were less satisfied with the balance between payment and work quantity, promotion opportunity, and working conditions.	The influencing factors that result in turnover intention are socio-demographic factors such as age, post of duty, professional title, and working seniority, and other work-related factors such as pay packets, learning and training opportunities, promotion and personal development space, and working stress.	

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Ding *et al.*, 2013	2011.3-6	Quantitative study	Hubei, Jiangxi	Rural	Township Health Centre; Village Clinic	To improve the early detection of epidemics in rural China by integrating syndromic surveillance with the existing case report system.	Village doctors prioritize medical services but they do their best to manage their time to include public health services. The willingness of township health centre directors and village doctors to provide public health services has improved since the introduction of the package and a minimum subsidy, but village doctors do not find the subsidy to be sufficient remuneration for their efforts.	Factors to consider in future activities to improve the quality and extent of public health services provided by village doctors include actual and potential sources of village doctor income (i.e. medical services, social pension and other government support), the relationship between village clinics and township health centres and the amount of public health subsidy.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Li *et al.*, 2013	2009.12 -2010.12	Quantitative study	Beijing, Jiangsu, Zhejiang, Hainan ,Guangxi , Shanxi, Jiangxi, Guizhou, Yunnan, Gansu	Rural	Township Health Centre; Village Clinic	To analyze the educational status and future training needs of China's rural doctors and provide a basis to improve their future training.	Rural health professionals in China who have relatively low healthcare education should be focused on. Rural doctors the training status and needs of China's rural doctors are still disjointed in terms of the training time, training method and training content.	Rural doctors wanted to extend the training time, preferred to practice-focused training (on-site guidance from senior doctors, clinical further education), and had greater desire for clinical skills, preventive healthcare and medication knowledge education.	Low
Shi *et al.*, 2014	2011	Quantitative study	5 provinces representing Eastern, Central, and Western China	Both	Township Health Centre; Village Clinic; Community Health Centre/ Station	To provide a snapshot of the current state of primary care workforce (PCW) serving China's grassroots communities and examine the factors associated with their job satisfaction.	Low job satisfaction PCW are least satisfied with their income level (only 8.6% are either satisfied or very satisfied), benefits (12.8%), and professional development (19.5%).	Lower income and higher workload are the two major contributing factors toward job dissatisfaction.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Ge *et al.*, 2011	2009.12 -2010.2	Quantitative study	Liaoning	Urban	Community Health Centre	To clarify the level of job satisfaction of Chinese community health workers between a metropolitan (Shenyang) and a small city (Benxi) in Liaoning province and explore its associated factors.	A moderate level of job satisfactions. Community health workers in a metropolitan had lower job satisfaction as compared to those in a small city.	Three significant predictors of intrinsic and extrinsic job satisfactions were the two dimensions (social support and decision latitude) of stress and cynicism of burnout.	Low
Zhao *et al.*, 2011	2008.12 - 2009.2	Qualitative study	Beijing	Urban	Community Health Centre	To understand the advancements in and barriers to the implementation of measures to improve basic public health services in an urban Chinese community.	The number of practitioners and their low levels of skill were insufficient to provide adequate services for community residents.	Due to the broad scope of basic public health services and limited financial incentives, providers felt that they were under great stress and often complained that community members for whom they were responsible did not trust them as these clinicians had lower levels of knowledge and skill than specialists.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Liu *et al.*, 2010	2007	Quantitative study	Anhui, Xinjiang	Rural	Township Health Centre	To measure job satisfaction level of THC employees in poor rural China and to identify relevant features in order to provide policy advice on human resource development of health service institutions in poor regions.	Moderate job satisfactions in poor areas. Job satisfaction scores reflecting job significance, job competency and team work were highest, while work conditions and atmosphere and job reward were lowest.	Township health centers employees are more satisfied with the work significance and cooperation with colleagues, while less satisfied with work conditions, reward and promotion opportunities.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhou *et al.*, 2015 Feb	2013	Qualitative Study	Jiangxi	Rural	Township Health Centre; Village Clinic	To explore the perspectives of health providers on the contract service policy, and investigate the demand side's attitude toward the public health services delivered under the contract policy.	The contract service actually promoted the supply side to provide more public health services to the villagers and contracted patients felt satisfied with the doctor-patient relationship.	Most health providers complained about the heavy workload, insufficient remuneration, staff shortage, lack of official identity and ineffective performance appraisal, in addition to contempt from some villagers and supervisors after the implementation of the contract service.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Chen *et al.*, 2015	2012.5-7	Mixed method study	Jiangsu	Rural	Township Health Centre; Village Clinic	To reveal the challenges of village doctors' survival and training in economically developed areas in eastern China.	The main challenges in Changzhou include an insufficient amount of village doctors, difficulties in obtaining professional qualification for village doctors, low salaries and benefits, and difficulties in recruitment.	The gap between expected and actual income is the primary factor affecting the attractiveness of a career as a village doctor. Changes to training have influenced the stability of village doctor teams. Declining attachment of young people to their hometown village has contributed to recruitment difficulties.	Moderate
Wang *et al.*, 2013	2009.9-11	Quantitative study	Beijing	Rural	Village Clinic	To explore the reasons for the poor recruitment and to propose possible strategies to improve the situation.	Rural doctors were generally older than average and considered the training strategy to be inadequate in in China.	In general, the initiatives identified by rural doctors as being of most value in the recruitment of doctors were those targeting retirement pension and income.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Li *et al.*, 2017	2014.4	Mixed method study	Shandong, Guangxi, Shaanxi	Rural	Village Clinic	To describe village doctors' job satisfaction under the context of health sector reform and investigate the associated factors.	Low job satisfaction. Village doctors who earned the top level of monthly income felt more satisfied, while on the county level, those who lived in counties with the highest GDP felt less satisfied.	From interviews, most workers believed that age, income, and integrated management had a positive influence on the job satisfaction, while pension plan and basic public health care policies exhibited negative effects. Also, the increasing in availability of healthcare and health resources along with local economic development had negative effects on village doctors' job satisfaction.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhang *et al.*, 2017	2013	Quantitative study	Shanghai, Shaanxi, Shandong, Anhui	Urban	Community Health Centre	To examine the mediation effect of job satisfaction on the relationship between person-organization fit (P-O fit) and turnover intention based on data from China.	The effect of P-O fit on turnover intention was partially mediated through job satisfaction.	P-O fit was directly related to job satisfaction and inversely related to turnover intention.	Low
Li *et al.*, 2014	2013.3.1 -10.31	Quantitative study	Heilongjiang	Urban	Community Health Centre	To examine levels of work stress and motivation and their contribution to job satisfaction among community health workers in Heilongjiang Province, China.	Levels of overall motivation perception and scores on the career development, responsibility and recognition motivation subscales were higher in satisfied respondents relative to dissatisfied respondents.	The main determinants of job satisfaction were occupation; age; title; income; the career development, and wages and benefits subscales of work stress; and the recognition, responsibility and financial subscales of work motivation.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Meng *et al.*, 2009	2006	Qualitative Study	10 provinces	Both	Township Health Centre; Community Health Centre	To analyze the mobility of health workers in township and community health centres.	Increased rate of workers leaving township and community health centres between 2000 and 2005, with the majority of the mobile health workers moving to higher-level health facilities; very few moving to other rural township health centres.	The main reasons for leaving were low salaries, limited opportunities for professional development and poor living conditions.	Moderate
Wang et al., 2017	2013	Quantitative study	Shandong, Anhui, Shaanxi	Rural	Township Health Centre	To investigate the association between the latent clusters and health-care staff's personal and professional features.	The minority of health-care staff belong to the "satisfied class". Three among four subgroups are not satisfied with income, benefit, training, and career development.	Low job satisfaction was associated with specialty, training opportunity, and income inequality.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Chen et al., 2017	After 2009	Qualitative study	Guangxi	Rural	Township Health Centre	To understand the level of job satisfaction as felt by primary health care providers.	Increasing the incomes and fringe benefits of healthcare workers, improving their work conditions, and providing training and continuing education opportunities would help rural clinics retain doctors and eliminate the current unsatisfactory conditions.	The main concerns related to job satisfaction included working conditions, financial rewards, and the doctor's relationships with patients.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Lu et al., 2016	2013	Quantitative study	Guangdong	Both	Township Health Centre; Village Clinic; Community Health Centre/ Station	To explore job satisfaction among healthcare staff in Guangdong following the health system reforms in 2009, and to investigate the association between job satisfaction and work stress, work–family conflict and doctor–patient relationship.	The overall job satisfaction exceeded slightly dissatisfied and approached slightly satisfied. Measures to enhance job satisfaction include the reduction of workload, increase of welfare, maintaining moderate stress and balancing work–family conflict.	The sociodemographic variables including occupation, educational background, professional status, years of service, annual income and night shift, work stress, work–family conflict and doctor–patient relationship frequency significantly influenced the level of job satisfaction.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Song et al., 2015	2011	Quantitative study	Jilin, Shandong, Anhui, Chongqing, Shaanxi	Both	Township Health Centre; Community Health Centre	To find out which job attributes affect Chinese primary care providers' choice of job and whether there are any differences in these job preferences between doctors and nurses.	Policymakers need to improve primary care providers' income, benefits and working conditions to fulfil their basic needs, invest in infrastructure and strengthen training programmes in order to raise the community's confidence in the services.	Though income was important, Chinese primary care providers also had strong preferences for sufficient welfare benefits, sufficient essential equipment and respect from the community.	Low
Mo et al., 2017	2014	Quantitative study	Guangxi	Rural	Township Health Centre	To explore the current health training status of nurses working in rural Chinese township health centers and to ascertain their perceived needs.	A decentralized degree-linked training program in which medical universities and city hospitals collaborate would be an appropriate mode of delivery.	Mismatch between current health training initiatives and desired programs in terms of training setting, content, and delivery mode	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhang et al., 2017	2013	Qualitative Study	Shandong	Urban	Community Health Centre/ Station	To analyze how health reform of CHS led to changing job features for primary health providers.	The new model of primary health care significantly affected the nature of primary health work and triggered a range of PHC providers' coping processes.	Health workers perceived their job as less intensive than hospital medical work but often more trivial, characterized by heavy workload, blurred job description, unsatisfactory income, and a lack of professional development.	Moderate
Zhang et al., 2017	2014	Quantitative study	Zhejiang, Jiangxi, Shaanxi, Xinjiang	Urban	Community Health Centre	To investigate the perceptions of primary care workers about the impacts of the national essential medicines policy (NEMP).	The NEMP has significant impacts (as perceived by the health workers) on health services delivery in primary care settings.	The impacts of the NEMP vary by region, professional practice and the income level of health workers. It is important to maintain support from physicians through income subsidies (to compensate for potential loss) and training.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Feng et al., 2017	2014	Quantitative study	Qinghai, Inner Mongolia, Xinjiang	Rural	Village Clinic	To examine the satisfaction of village doctors with the Township and Village Health Services Integration Management (TVHSIM).	Low satisfaction with the TVHSIM. A well-rounded social insurance model for village doctors is urgently needed and enhancing essential medical training should be carefully considered.	Social insurance, essential medical knowledge, year of practice significantly influenced satisfaction of village doctors on human resources management, drug and medical device management, and financing management.	Low
Li et al., 2016	2014	Quantitative study	Shandong, Guangxi, Shaanxi	Rural	Village Clinic	To identify factors associated with village doctors' basic public health services provision and to formulate targeted interventions in rural China.	There is considerable room for improvement regarding the factors associated with village doctors' basic public health services provision.	Increasing public health care subsidies received by individual village doctors, availability and attendance of training opportunities, and integrated management and NCMS contracting of village clinics are important factors in increasing basic public health services rovision in rural areas.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Song et al., 2016	2011	Quantitative study	Ningxia	Both	Primary healthcare centers	To examine current understanding and opinions of China's National Essential Medicine System (NEMS) of primary care providers and patients.	High level of satisfaction towards NEMS among primary care providers, which is a reflection of the improvements in the health care system.	Overall there was a link between knowledge about NEMS and satisfaction with the program: the providers with greater knowledge of NEMS, reported higher satisfaction.	Moderate
Li et al., 2015	2012	Mixed method study	Jiangsu	Rural	Village Clinic	To identify specific factors of and potential solutions to the shortage in village doctors.	The shortage in village doctors presents a major obstacle toward the realization of China's policy of public health service equalization.	Many factors associated with the shortage of village doctors were payment related including low salaries and bonuses, heavy workload, few opportunities for continuing education, unattractive pension plans and poor working environments.	Moderate

3. Overall job satisfaction score among primary care workers

Study [Citation]	Study period	Province/city	Area	Sample size	Measurement of scales	Measurement of overall satisfaction	Job satisfaction score	Standard deviation
Liu *et al.*, 2010	2007	Anhui	rural	77	Likert 5 point	Sum of dimension	3.76*	-
Liu *et al.*, 2010	2007	Xinjiang	rural	95	Likert 5 point	Sum of dimension	4.49*	-
Ding *et al.*, 2013	2009	Anhui	urban	765	Likert 5 point	Sum of dimension	3.06	0.497
Ge *et al.*, 2011	2009-2010	Shenyang City	urban	1010	Likert 5 point	Sum of dimension	3.36*	-
Ge *et al.*, 2011	2009-2010	Benxi City	urban	684	Likert 5 point	Sum of dimension	3.50*	-
Shi *et al.*, 2014	2011	5 provinces	both	863	Likert 5 point	Sum of dimension	3.43	0.77
Hung *et al.*, 2013	2011	Jilin, Anhui, Shandong, Chongqing, Ningxia	both	823	Likert 5 point	Sum of dimension	3.39	-
Wu *et al.*, 2014	2012	Zhejiang	both	111	Likert 5 point	Sum of dimension	3.23	0.06
Li *et al.*, 2014	2012	Heilongjiang	urban	448	Likert 5 point	Sum of dimension	3.69	-
Ding *et al.*, 2013	2012	Anhui	urban	495	Likert 5 point	Sum of dimension	3.13	0.643

Luo *et al.*, 2014	2012	Hubei,Hebei, Guizhou, Guangdong, Zhejiang	urban	3220	Likert 5 point	Sum of dimension	3.37	-
Sun et al., 2013	2013	Zhejiang, Guangdong, Guizhou, Hebei, Hubei	urban	3212	Likert 5 point	Sum of dimension	3.44	-
Fang et al., 2014	2012	Hubei	rural	1889	Likert 5 point	Sum of dimension	2.57	-
Zhang *et al.*, 2017	2013	Shanghai, Shaanxi, Shandong, Anhui	urban	656	Likert 5 point	Standalone item	3.55	0.74
Li *et al.*, 2014	2013	Heilongjiang	urban	930	4 point	Sum of dimension	3.11	0.68
Zhang *et al.*, 2016	2014	Jiangxi	rural	935	Likert 5 point	Standalone item	1.82	0.63
Li *et al.*, 2017	2014	Shandong, Guangxi, Shaanxi	rural	1221	4 point	Standalone item	2.43*	-
Lu *et al.*, 2016	2013	Guangdong	both	5845	Likert 6 point	Sum of dimension	3.99	0.99
Wang *et al.*, 2017	2013	Shandong, Anhui, Shaanxi	rural	603	Likert 5 point	Sum of dimension	3.37	-

* We converted these scores from the sum of percentage scores into 5-grade score: Overall satisfaction = summed score/maximum total score × 5

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.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3-4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	5
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.	5
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.	5
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.	5
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	5
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).	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.	6
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	7
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.	N/A
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	7
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.	7

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).	N/A
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A
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.	7
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.	Supplementary Material
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).	N/A
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.	8-14
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	14-15
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A
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).	15-19
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).	19-20
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	20
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.	21

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Motivating factors on performance of primary care workers in China: A systematic review and meta-analysis

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Motivating factors on performance of primary care workers in China: A systematic review and meta-analysis

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Number of tables and figures: 2 tables and 3 figures are included in this article.

Abstract

Objective: Although China has made remarkable progress in strengthening its primary health care system, lack of well-performed primary health workforce is still the bottleneck of deepening the reform. The objective of this review is to understand the current profile of Chinese primary care workers (PCWs) and their motivating factors of performance and propose targeted policy suggestions on improving their work performance.

Design： Systematic review

Methods: A systematic search of PubMed and MEDLINE was conducted to identify articles published from Jan 1, 2000 to Jun 2, 2018. Quality assessment and data extraction for the studies closely relevant to performance of PCWs in China were conducted by two reviewers independently. A preliminary framework containing different levels of factors influencing PCWs' motivation based on ERG theory guided the synthesis analysis. In addition, we used a random-effects model to pool individual studies on job satisfaction and estimate the overall job satisfaction of PCWs.

Results: A total of 36 articles were included; 16 (23 882 participants) in the meta-analysis. Regarding the individual level of motivation, 3 overarching themes and 12 sub-themes were developed. The sub-themes of financial incentives, career advancement and work itself were frequently mentioned and have more influences on PCWs' performance. Moreover, the healthcare system reform policies have inevitable and complex impacts on different levels of human needs, and then influences on the motivation and performance of PCWs. Meta-analysis showed that the overall job satisfaction score among PCWs was 3.30, just

reaching a satisfied rating and varied in different regions.

Conclusions: This study suggests low work satisfaction among PCWs in China, with financial incentives and career advancement being two most important motivating factors. Efforts to improve the work performance in PCWs should give priority to these motivating factors and systematically take into account the health policy's impacts on performance of PCWs.

Keywords

Primary health care, Primary care worker, Performance, Motivation, Health policy

Strengths and limitations of this study

► A myriad of potentially eligible articles were screened and included using a comprehensive search strategy.

► Reliability of the study selection, data extraction and quality assessment was ensured by involving two independent reviewers.

► This review contributes to the current literature as it included studies that adopted qualitative, quantitative or mix methods to present a comprehensive overview of the motivating factors on performance of China's primary care workers.

►This study benefited from summarizing all the motivating factors on performance of China's primary care workers in a systematical way, namely, at both an individual level and a health system level.

► Chinese articles were not included in this review.

Introduction

In China, the primary health care (PHC) services that include public health services and basic medical health services are provided by community health centres (CHCs) and their affiliated community health stations (CHSs) in the urban areas and by township health centres (THCs) and their affiliated village clinics (VCs) in the rural areas. These four types of PHC institutions constitute the essential part of China's three-tertiary health care delivery network. Administered by CHCs and THCs respectively, CHSs and VCs function as the satellite sites of their superior institutions. As is central to China's health system reform initiated in 2009[1], the strengthening of the primary health care has been hindered by the grave challenges concerning the structure of China's health care delivery system, in particular, the low-performance of PHC delivery system[2]. From 2010 to 2016, China's PCWs have experienced a rise in their number from 3.3 million to 3.7 million, but a decrease in their proportion in health workers, from 40.0% to 33.0%. This trend is mirrored by the utilization of health services during the same period of time: PHC institutions' proportion has dropped from 61.9% (3.6 billion visits) to 55.1% (4.4 billion visits) in terms of the outpatient visits and from 27.9% (39.5 million hospitalizations) to 18.3% (41.7 million hospitalizations) in terms of the inpatient visits[3]. Against this backdrop, the strengthening of primary health system will remain as the focus of health system reform in the near future, which can be seen from the fact that *the Outline of Healthy China 2030 Plan*, the government's blueprint for health system development, has underscored the importance of primary health care[4].

Health workforce shortage is one of the major obstacles to strengthen China's primary health care services[5]. To make matters worse, the primary health workforce is confronted with

serious challenges such as low education level, lack of qualifications, aging, high turnover and poor working performance[6]. Of all the determinants of PCWs' performance, work motivation, defined as an individual's degree of willingness to exert and maintain an effort towards organizational goals[7], plays a crucial role in changing the behavior of health providers. It has been demonstrated that work motivation can influence job satisfaction, hence influencing job performance[8 9]. There has been an expanding body of studies exploring the motivating factors for PCWs through qualitative, quantitative or mixed methods, but the study sites and methodological quality of these studies varied. Synthesizing these motivating factors in different areas of China could help identify the most important motivating factors and appreciate the overall job satisfaction level of PHWs in China. In addition, synthesizing the motivating factors for PCWs and analyzing the complexity pathway between motivating factors and performance hold general and applicable implications for improving the motivation and performance of China's PCWs. In light of this, this review aims to synthesize and analyze the motivating factors for PCWs and provide evidence-based policy implication on how to improve the performance of China's PCWs.

Methods

Search strategy and eligibility criteria

We searched the PubMed and MEDLINE on June 2, 2018 to identify relevant studies using MeSH terms in conjunction with free-text words including all the possible synonyms, alternative terms and spellings[6] to increase sensitivity to any potentially eligible literature. All the search terms were provided in the Supplementary Appendix 1. Search results were

exported to EndNote X7 to be organized and duplicate records were removed in the first place. Then two authors exported the citations to Microsoft Excel and conducted the literature screening and selection independently. Divergent judgments were settled through discussion. We searched for and included articles about the motivating factors on performance of the PCWs who work in four types of China's PHC institutions: rural THCs, rural VCs, urban CHCs and urban CHSs. In this study, motivation in the work context is defined as an individual's degree of willingness to exert and maintain an effort towards organizational or system goals [10], and the degree of job satisfaction, work stress and turnover intention seen as possible reflections of motivation which may influence work performance. Therefore, all the studies that explored the level of work motivation, job satisfaction, work stress, turnover intention and the influencing factors of these motivation expressions were included. We also searched for relevant studies found in the references of the included articles and other sources. The included studies adopted either observational or experimental design, and presented primary quantitative or qualitative data. All the included articles were in English language and published between 2000 and 2018. Studies were excluded if they did not address the motivating factors for PCWs, or if the participants were not PCWs or did not work in the four types of PHC institutions mentioned above.

Assessment of risk of bias

Methodological quality of the included studies was evaluated using Hoy's risk of bias tool which is adapted from the one developed by Leboeuf-Yde and Lauritsen[11]. Based on a total score, studies are put into three categories: low risk of bias (8-10), moderate risk of bias

(5-7) and high risk of bias (0-4).

Data extraction and synthesis

Extracted data included study design, year or years of study, settings, participants, sample sizes, measurement of motivation, objective, key motivation, conclusions and motivating factors. Data extraction and analysis were guided by Alderfer's ERG theory, which proposes three core human needs in organizational settings: existence (the desire for material things), relatedness (the desire for cordial interpersonal relations), and growth (the desire for opportunities to be creative and to develop one's skills)[12]. A thematic synthesis approach was adopted for data analysis to capture the evidence illustrating PCWs' motivation. Motivating factors extracted from the included articles were grouped into four themes: 1) factors concerning the existence needs, including payment, fringe benefits and physical working conditions; 2) factors concerning the relatedness needs, which are concerned with social environment and relationship; 3) factors concerning the growth needs, referring to career or self-development and management environment; 4) factors concerning the health policy context and organizational context that could influence one or more needs categories mentioned above（Supplementary Appendix 2）. The first three themes of motivating factors represented, at an individual level, three different dimensions of human needs in PHC institutions based on the ERG framework and the last theme was singled out because different health policies had complex impacts on the performance by influencing more than one dimension of human needs at a macro level. First, authors aggregated data into motivating factors and extracted all original motivating factors in each article to put them into one of the

four themes. Then we identified correlations between the different factors, refined them through discussion and synthesized similar factors into a higher level theme.

As job satisfaction was positively associated with job performance[13] and nearly half of the selected articles studied job satisfaction with quantitative measurement, we resorted to meta-analysis to synthesize the 16 articles that provide data of PCWs' job satisfactions. We unified the measurement of overall job satisfaction by transforming different calculations into a 5-point rating scale and pooled the study-specific estimates using a random effects meta-analysis model to obtain an overall summary of the job satisfaction scores across studies [14]. We analyzed the data using Stata version 14.0 for Windows.

Patient and public involvement

Patients and public were not involved in this study.

Role of the funding source

The funders of the study had no role in study design; data collection, analysis and interpretation; writing of the report; and the decision to submit the paper for publication.

Results

Characteristics of reviewed studies

We firstly screened 5466 titles and abstracts, and then retrieved and screened the full-texts of 348 potential relevant studies to evaluate their eligibility (Figure 1). After the full text screening, 119 studies relevant to the human resources of PHC in China were included

for us to appreciate the current status of PCWs. To obtain sufficient information related to the motivation of PCWs, 1 additional article from reference search was also identified and included after applying the eligibility criteria. Finally, of the 119 studies, 83 articles that did not contain specific motivating factors were excluded; 36 articles that were closely relevant to PCWs' motivation for were selected for data extraction and synthesis. A list of the basic characteristics of the included articles can be found in Supplementary Appendix 3. 25 quantitative, 7 qualitative, and 4 mixed methods primary studies were included, covering at least 27 provinces of China. All of the 36 articles were cross-sectional studies, with 17 studies taking place in rural China, 11 in urban China and 8 in both China's urban and rural areas. Of the 17 studies concerning rural areas, 8 articles only included village doctors in village clinics as participants, 5 articles only studied health workers in THCs and 4 articles were concerned with rural PCWs in both village clinics and THCs. The 11 studies that were concerned with urban areas addressed urban PCWs in community health centers/stations. 4 articles studied all types of PCWs in different kinds of rural and urban PHC institutions. As for the risk of bias, more than half of the included studies presented a low risk of bias, with the total score ranging from six points to ten points (in Supplementary Appendix 3). Included studies analyzed the motivation of PCWs from different perspectives: some measured job satisfaction [15-30]; some explored the motivating factors' influence on attrition and retention[18 22 31-35]; some studied the impact of some policies or interventions on the motivating factors for health workers [31 36-40 41-46].

Motivating factors for PCWs

Factors concerning existence needs

Financial incentives, workload and the work conditions related to a person's physical needs such as food, clothing, and shelter were clustered into factors concerning existence needs. In this review, we found that work conditions, payment and the mandatory workload were considered as significant factors of PCWs' satisfaction [15 19 20 22 23 25 30 47] and turnover intention[18 22]. 26 out of the 36 articles reported financial incentives (Table 1) and found that the financial incentives such as income and fringe benefits were significantly associated with job satisfaction [15 17 30]and difficulties in PCW recruitment [32 34 35]. Moreover, financial incentives and working conditions were the top two motivating factors for PCWs to improve performance [21 33].

Another line of inquiry explored the impact of different health system reform policies on motivating factors. For example, in a qualitative study, administrators and frontline healthcare workers in PHC institutions mentioned that the increased income after the 2009 health system reforms did not fully reflect the increased workload, and those who worked the most were not necessarily rewarded the most, constituting a demotivating factor for some health workers[37].

Factors concerning relatedness needs

Relatedness needs refer to a person's interpersonal needs in his personal and professional settings and in this review, factors concerning relatedness needs were deemed as a person's relationships with the living environment, the society, the coworkers and the nature of work.

17 studies reported work itself and 11 studies reported work relationships (Table 1). Compared with factors concerning existence needs, the PCWs were more satisfied with the nature of work and work relationships [20 25 30]. This finding indicated that most workers got along well with their colleagues and believed that their jobs were to be of value, which can act as a motivating factor in case of poor physical environment.

13 of the selected studies reported recognition from society including being understood by society and physician-patient relationships (Table 1). Satisfaction with social status and relationship with patients was significantly associated with job satisfaction[15 30]. In terms of patients' respect, there seemed to be an urban-rural difference, with the rural PCWs being slightly more satisfied than their urban counterparts [23]. However, few rural PCWs expressed satisfaction with their current relationships and indicated that the patients could not understand the doctor's work[47]. In addition, the growing workplace violence negatively affected the PCWs' job performance and quality of life [48] and emerged as a major contributor to doctors' low morale in recent years [16].

6 studies reported living environment as a factor concerning relatedness needs (Table 1) and showed that compared with urban areas, rural areas had greater needs to improve the living environment [21 33]. In addition, young health workers' weakening sense of belonging and responsibility to their hometown has made it more difficult to recruit young health workers born in local areas[32].

Factors concerning growth need factors

Career advancement, training, rewards, management and autonomy relating to a

person's needs of personal development were considered as factors concerning growth needs in this review.

19 out of the 36 articles reported the factor of career advancement (Table 1), which was considered as the one of top three contributors to satisfaction [15 16 19 20 22 23 29]. The gap between the expected and actual professional development was one of the main sources of job dissatisfaction [17]. Limited opportunities for job promotion was another factor contributing to the low levels of work passion [19] and turnover intentions of village doctors [18 22]. The main causes might be that few positions and opportunities were available for the health professionals in PHC institutions to get higher professional titles on the regular payroll, especially compared with the opportunities that their counterparts in higher level health institutions can enjoy.

Training was mentioned as a motivating factor by 13 out of the 36 articles (Table 1). Learning and training were significantly associated with work passion[19], job satisfaction[15] [29]and turnover intention[22]. Along with career advancement, training was also considered as one of the most important motivating factors for PCWs to improve performance [21]. However, training arrangements were inadequate [34 49 50] to address the fragmented needs of China's PCWs. Health workers preferred more training time for practice-focused training (on-site guidance from senior doctors and further clinical education) over knowledge-focused training, and favoured such training contents as clinical skills, preventive healthcare and medication knowledge education [49]. As a result, although training was reported as an effective incentive in recruitment, it failed to act as an effective motivating factor to attract young doctors to rural areas in China [34].

Among the selected studies, the number of studies that reported the motivating factors of rewards, management and autonomy stood at 9, 9 and 14, respectively (Table 1). According to most of the selected articles, PCWs were relatively satisfied with the decision-making ability of their superiors, the contingent rewards and the opportunities to do work by making decisions on their own and to utilize their professional skills and talents [15 22].

System and policy factors

Motivation was not only influenced by the motivating factors at the individual level, but also by the health sector reforms and specific incentive schemes that target workers [7]. Theoretically, any health sector reform would directly influence the motivating factors that the health workers feel or that affect the structure of health organizations, thus in turn affecting the work rewards of the health workers. 18 out of the 36 articles reported macro-level factors (Table 1), namely, the health system and policy factors such as National Essential Medicines System (NEMS), National Basic Public Health Service Program (NBPHSP) and Township and Village Health Services Integration Management (TVHSIM)（Supplementary Appendix 4）. The gap between the intended and actual consequences of the policies was one of the main determinants of job satisfaction [17]. The comprehensive reform of PHC in Anhui has changed PCWs' compensation structure and improved their income and work efficiency, but dampened their work enthusiasm because of the poorly designed performance-based evaluation system[37]. Different economic status and health reform processes may lead to different consequences. Take the comprehensive reform of PHC in Shandong as an example. PCWs there on the one hand complained about increased trivialities at work, heavier workload, blurry job description, unsatisfactory income and a lack of

professional development, but on the other hand were satisfied with the relationships with the community and low work pressure[41].

The NEMS included a new National Essential Drugs List to ensure free access to safe and effective medication for the patients, and introduced a series of polices on drug production, pricing and distribution in the hope of promoting the rational use of medications by reducing the reliance on drug sales and profit seeking behaviors. To be more specific, only drugs on the list were allowed to be prescribed in VCs and price mark-ups were forbidden. The impacts of the NEMS varied by region, professional practice and income level[42]. In one survey, most PCWs perceived no change in their income and reported a high level of satisfaction towards NEMS[45]. However, according to another in-depth interview with village doctors[36], the introduction of the essential drug list for PHC institution dramatically reduced their medical income as most areas had limited government subsidies to supplement their incomes. At the same time, they also complained that they had lost patients' trust and work enthusiasm as the classes and total amount of essential medicines were not enough to meet daily treatment needs [42 45].

The NBPHSP starting from 2009 provided a package of basic public health services for all residents, with a focus on the management of non-communicable disease. To motivate PCWs to provide preventive health services, the government grants subsidies based on the number of covered residents. At the beginning of this reform, due to the broad scope of basic public health services and limited financial incentives, providers felt that they were under great stress due to the competing demands for their time and complained about the heavy workload, insufficient remuneration, staff shortage, lack of formal professional identity and

ineffective performance appraisal. In addition, providers had to deal with the distrust and disrespect from some residents [40 46], especially those public health workers who were dismissed as having lower levels of knowledge and skill than specialists[39]. Providers with more subsidies, training opportunities and integrated management had better performance in service provision [44].

The TVHSIM required THCs, the upper-level health institutions, to direct and supervise VCs in their routine work and their work in medicine, personnel management, financing, and the upgrade and maintenance of facilities, resulting in mixed impacts on village doctors. On the one hand, most village doctors felt more respected under this integrated management because they were more recognized as health workers in a formal health system rather than private drug salesmen. On the other hand, they were not allowed to perform agricultural or any other side activity for extra money [26 36], which negatively affected their financial conditions.

Job satisfaction for PCWs

The performance of healthcare delivery system is critically dependent on workers' motivation which is directly mediated by workers' willingness[7]. As an important indicator to measure workers' willingness to exert efforts, satisfaction is highly relevant for the sustainable development of PHC in China. 16 included articles assessed job satisfaction as an important dimension reflecting providers' motivation (See supplementary Appendix 5). A total of 19 investigation samples were extracted from these 16 articles with cross-sectional study design, representing more than half of the provinces in China. In particular, 2 articles[24]

[25] provided data of 2 provinces/cities and 1 article[20] represented data of two years. The overall job satisfaction score ranged from 1.82 to 4.49 and also varied from region to region (Figure 2). To be more specific, for most samples drawn from more than three provinces, the satisfaction scores leveled off between 3.37 and 3.55, but the samples from the middle area samples scored lower than those from the eastern area. Besides, the score of Xinjiang, the representative of the western areas, was the highest among the included samples.

Meta-analysis was approached by combining results weighted by sample size and showed that the overall job satisfaction score among PCWs was 3.30, equivalent 0.66 ([95% CI 0.61–0.71]; I^2=98.7%; P<0.001; Figure 3), just reaching a level indicating satisfaction. But the overall satisfaction mean of rural health workers was lower than that of the urban health workers (Table 2).

Discussion

Financial incentives and career advancement were the top two motivating factors for PCWs in China. In the included articles, the balance between remuneration, workload, and career promotion opportunities was most frequently mentioned as a critical motivating factor on PCW's performance. In spite of Chinese government's considerable investments in recent years to improve the income of the health workers in PHC institutions, the gap between the actual and expected income continued to widen due to increasing urbanization and ever growing living costs. According to some doctors in THCs, the performance-based salary means that 30-40% of the salary was based on their workload, quality of service and patients' satisfaction, but due to the limit of overall revenue and revenue

structure, the well-performing health workers can only be rewarded by reducing the income of their co-workers with poor performance. This payment method did not work well in reality as to motivate health workers. How to improve the income level of health workers in primary health delivery system will remain a crucial but tricky issue in the near future. Besides, as shown in our analysis in Figure 2, financial incentives were no longer the sole means to promote motivation, improve job satisfaction and enhance work performance. Other factors, in particular, professional development, work characteristics and training, have been equally, if not more, important for China's PCWs. More specifically, the lack of chances for professional title promotion and limited career development opportunities were important reasons that lead to turnover intention. This finding is in line with other internationally published studies and underscores the importance of the non-financial as well as the financial incentives[7 51]. The ERG framework implies that the fulfillment of human needs plays an important role in PCWs' motivation, but each individual prioritizes the existence needs, relatedness needs and growth needs differently. In this review, we found that the PCWs in China are confronted with barriers in fulfilling all of the three levels of human needs. Income security has increased, but still far lower than the expected level; the residents' recognition of and cooperation with the PCWs have played a negative role in influencing the motivation and behaviors of health workers; career promotion system and training arrangements did not meet their growths need neither. Policy makers must realize that a health worker has multiple needs to be met simultaneously. In addition, motivation improvement should be prioritized in a way that suits local institutional environments and personal preference. A sole focus on one type of need at a time cannot effectively motivate PCWs [52].

The overall job satisfaction score among PCWs was still low, especially in rural areas. As the predictor of job satisfaction, the overall job satisfaction score reflects PCWs' emotional status and to what extent their human needs are satisfied. PCWs' performance can be considerably improved by identifying the motivating factors so as to increase their work satisfaction. The most prominent factor causing the general dissatisfaction of PCWs, especially the PCWs in rural areas, was the financial rewards from work. In 2014, the annual income of 84.06% village doctors was less than 30 000 RMB, much lower than the average income (56 394 RMB) of the doctors in Jiangxi province's higher level health institutions, and nearly half of the village doctors thought that they earned less than other people in the local area[15]. In addition, as discussed above, the health system reform policies also had indirect and negative impacts on PCWs' income level and further reduced their job satisfactions. These findings hold significant implications for policy makers and PHC institution managers who make efforts to improve workers' job satisfaction [17 28]. Another finding of the synthesis was the significant differences of satisfaction scores among eastern, western and middle regions of China. There is no doubt that imbalance exist among these regions at all levels. As for the satisfactions of PCWs, provinces in the eastern region, with more developed economy and better health facilities, scored higher than provinces in the middle region and lower than provinces in the western region. Considering western China are remote areas with less economic development, the higher job satisfaction of PCWs may be explained by the lower expectations of PCWs, more government subsidies and other central government supports that target remote western areas. In light of this, the government should take into account the imbalanced development of China's different areas, especially China's

middle area where the economic development and resources are limited and the central government's subsidies are also absent.

The health system reform and some specific policies have inevitable and indirect impacts on PCWs. In 2009, China launched a landmark healthcare reform which aims at providing affordable and equitable basic health care for all by 2020[5]. As strengthening the primary health system is central to the health system reform, several policies have directly targeted PHC institutions or PCWs. As a result, the satisfaction of pay and contingent rewards have improved slightly, which may be attributed to the fact that PCWs' basic wages are guaranteed by government finance [20]. However, despite of the progress China has made in enhancing the primary health system, new problems and unintended consequences of related reforms have surfaced. For example, the brain drain of experienced health workers and the loss of patients from THCs to county hospitals have incurred a great cost[6 31]. As for the health system reforms, three policies and their respective impacts on health workers' motivation were most studied in the literature.

Since its introduction in 2009[36], the NEMS has exerted a lasting impact on PCWs' income structure. The essential drug list removed the incentives for over-prescribing, resulting in a drop in income and a loss of autonomy [31] because government subsidies for public health workers were not enough to compensate the decline in PHC institutions' revenue from drug prescriptions. Along with the problems in drug supply procurement, unintended consequences on health workers' motivation and related behaviors also emerged: THCs has suffered a brain drain of experienced health workers who have flowed to county

hospitals because their prescriptions have been restricted due to a limited supply of medicines and they have lost many patients as a result. In conclusion, policy makers should consider how to reduce the policy's adverse effects on the motivation of PCWs, including how to appropriately remunerate health workers, ensure enough clinical autonomy and supply the drugs in a timely, transparent and accountable manner.

At the beginning of the NBPHSP, the PCWs responsible for basic public health services held negative attitudes toward the sustainable provision of these services because it was accompanied by a heavier workload and insufficient subsidy to compensate their efforts [38 40 46 53]. To motivate PCWs, the government has increased the subsidies from 15 RMB per person in 2009 to 50 RMB in 2017. However, the combination of heavy workload, rigid performance assessment procedure and lack of professional knowledge remained unchanged, resulting in a negative effect on PCWs' job satisfaction and performance. We suggest that the evaluation of PCWs' performance be shifted from being fault-finding oriented to being support-providing oriented, such as improving the ability of public health providers or strengthening the teamwork between clinical doctors and the public health workers in order to enhance the overall delivery of these public health services.

After the implementation of TVHSIM, the village doctors who had been previously self-employed and not integrated into the formal health delivery system, were managed in the same way as THC staffs and experienced a transformation of their income structure as government subsidy has become an increasing source of income. They were motivated not only by the more stable financial subsidy from government, but also by the good reputation and respect from local residents as health providers with formal status. However, their income

and fringe benefits still lagged behind the regular employees in THCs, which remained an demotivating factor for village doctors[34]. A well-rounded social insurance model for village doctors is urgently needed [43].

The rationale for using ERG theory to guide the analysis lies in the fact that this needs-based theory generally encompasses work motivation, provides a useful conceptualization of what PCWs care about (motivating factors) and explains their performance in organizations. The findings of this review suggest that PCWs can be encouraged to perform well by positive motivations responding to satisfying ERG needs, but it should be interpreted with caution because of several limitations. First, this review only focuses on the motivating factors of PCWs' work performance, therefore, other relevant articles on motivating factors influencing the attraction of PCWs were excluded by the search strategy. Second, all the included studies analyzed PCWs' motivation from the perspective of problems and critics, which could lead to some bias because few positive thoughts on PCW's current motivation status have been reported. Third, factors related to personal sociodemographic characteristics and mental state were not analyzed as motivating factors. They were only exacted from the original article and presented as influencing factors, as shown in the Supplementary Appendix 3.

Conclusions

Low motivation is at the crux of promoting the work performance of China's on-service PCWs. Policy makers should take into account all level of human needs that

influence PCWs' motivation and start from the local reality to set priorities to ensure of PCWs' appropriate remuneration and career development opportunities. Just as illustrated by the *Global Strategy on Human Resources for Health*, efforts should be made to improve deployment strategies, working conditions, reward systems, continuous professional development opportunities and career pathways by adopting and implementing evidence-based health workforce policies that are tailored to the local context so as to make the best possible use of limited resources and enhance both capacity and motivation for improved performance[52]. We also suggest that countries undergoing health system reform should consider the views of different stakeholders and analyze the potential side effects of some specific policies on health providers who are not directly targeted in order to benefit both providers and demanders[15].

Abbreviations

PCW: Primary care worker; PHC: Primary health care; CHC: Community health centre; CHS: Community health station; THC: Township health centre; VC: Village clinic;; NEMS: National Essential Medicines System; NBPHSP: National Basic Public Health Service Program; TVHSIM: Township and Village Health Services Integration Management; RMB: renminbi

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Contributors

All authors proposed the hypothesis and idea for the systematic review and take responsibility for all aspects of it. QM, BY and HL discussed and contributed to the conceptualization of this review and the development of review protocol. BY applied the inclusion criteria. HL and DW extracted the data. HL was a major contributor to the draft of the manuscript. All authors read and approved the final manuscript.

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The authors declare that they have no competing interests.

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Figure legends

Figure 1. PRISMA diagram

Figure 2. Job satisfaction score among primary care workers across different regions in China

Figure 3. Forest plot of the job satisfaction score among primary care workers

Tables

Table 2 Means of overall job satisfaction score among primary care workers

Study	No. of included studies	Mean
All included studies	19	3.30
Studies in urban areas	9	3.35
Studies in rural areas	7	3.06

Table 1. Motivating factors for primary care workers

Motivating factor	Definition	Motivation to stay	Motivation to join/leave	Number of selected studies reporting the factors
Individual-level factors				
Existence				
Financial incentives	Basic salary, bonus, benefits (insurances, vacation, etc.)	22	5	26
Workload	Hours of work, the amount of work done, flexibility in scheduling	12	1	13
Work conditions	Work environment, job stability, job security	14	2	15
Relatedness				
Living environment	Geographical location and socioeconomic level of workplace	4	2	6
Recognition in society	Patients' respect, workplace violence, social status	11	2	13
Work itself	Nature of work (interest, meaningfulness, enjoyment), job fullfilment, job achievement, work enthusiasm	17	1	17
Working relationships	Relationships with coworkers/subordinates/nurses, communication	11	0	11
Growth				
Career advancement	Opportunities for professional development	17	3	19
Training	Support for training and education, opportunity to learn new skills and new knowledge	11	2	13
Rewards	Recognition, appreciation, contingent rewards,	9	0	9
Management	Supervision (level of competence, fairness, interest in subordinates), relationship with superior	8	1	9
Autonomy	Opportunities to do work by making decisions on their own. opportunity to utilize your professional skills and talents	14	0	14
Macro-level factors				
System and policy				
The health-care reform policies	Putting organizational policies into practice e.g. NEMS, NBPHSP and TVHSIM.	18	1	18

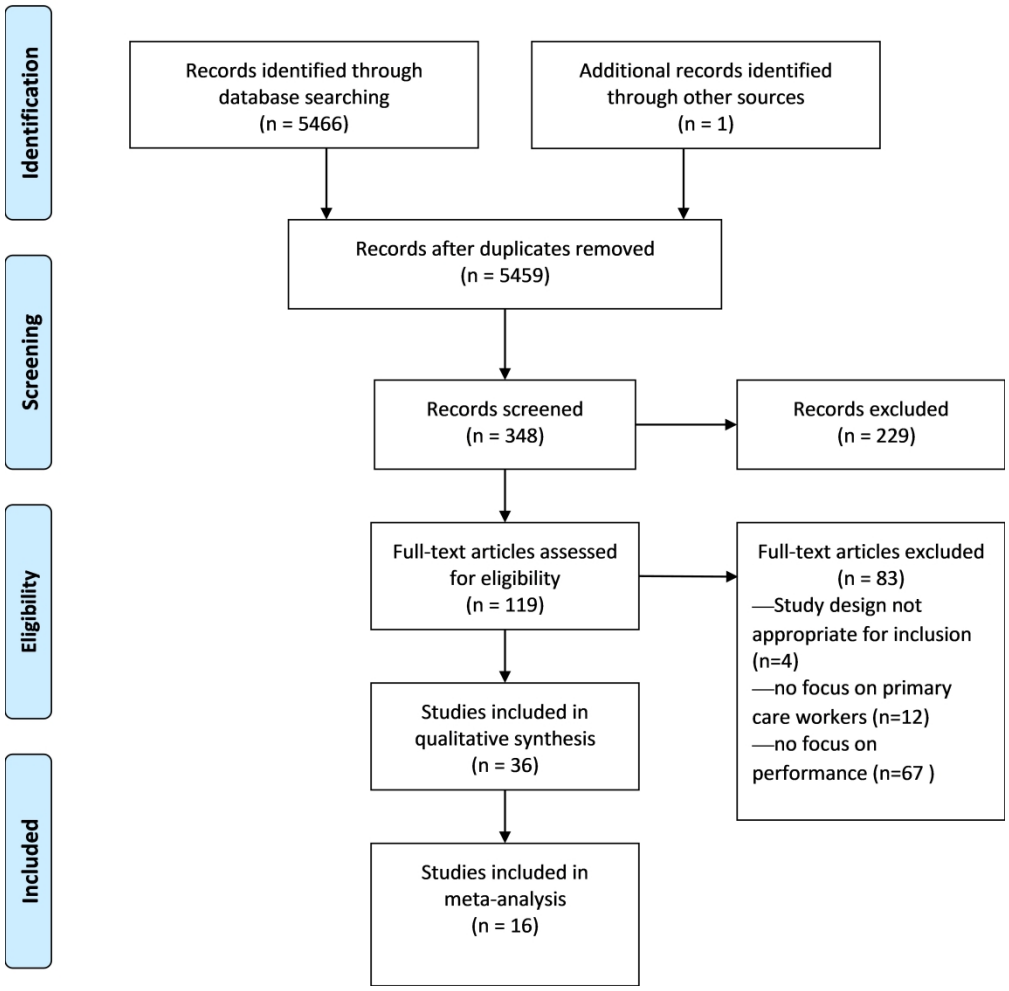

Figure 1. PRISMA diagram

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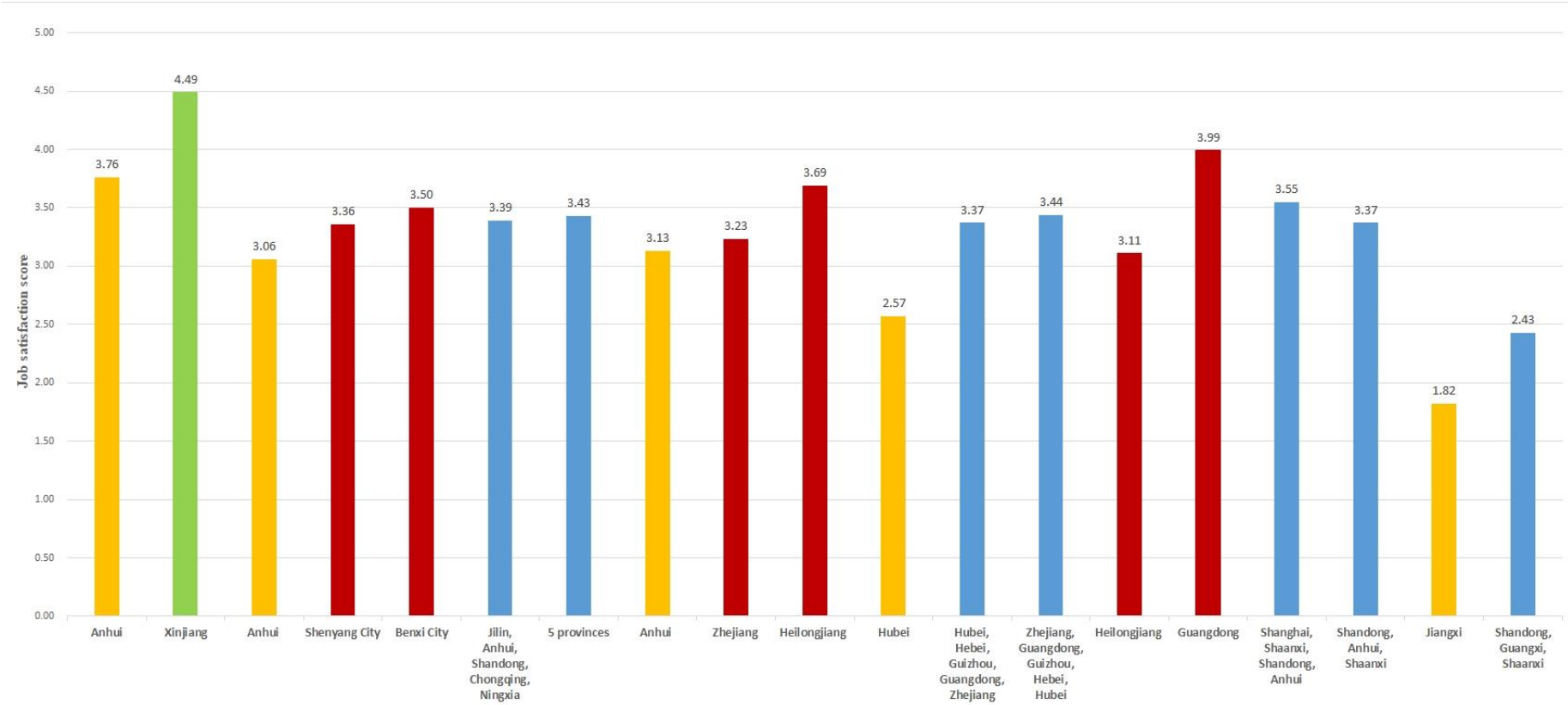

Job satisfaction score
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
3.76
4.49
3.06
3.36
3.50
3.39
3.43
3.13
3.23
3.69
2.57
3.37
3.44
3.11
3.99
3.55
3.37
1.82
2.43
Anhui
Xinjiang
Anhui
Shenyang City
Benxi City
Jilin, Anhui, Shandong, Chongqing, Ningxia
5 provinces
Anhui
Zhejiang
Heilongjiang
Hubei
Hubei, Hebei, Guizhou, Guangdong, Zhejiang
Zhejiang, Guangdong, Guizhou, Hebei, Hubei
Heilongjiang
Guangdong
Shanghai, Shaanxi, Shandong, Anhui
Shandong, Anhui, Shaanxi
Jiangxi
Shandong, Guangxi, Shaanxi

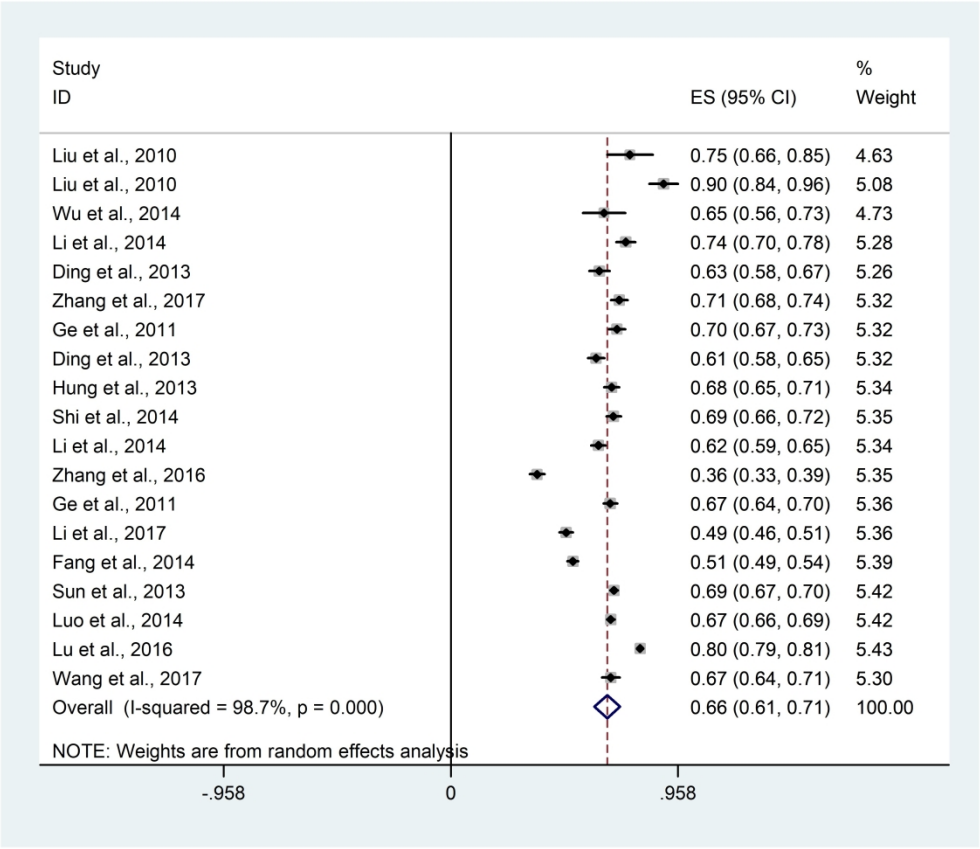


Figure 3. Forest plot of the Job satisfaction score among primary care workers

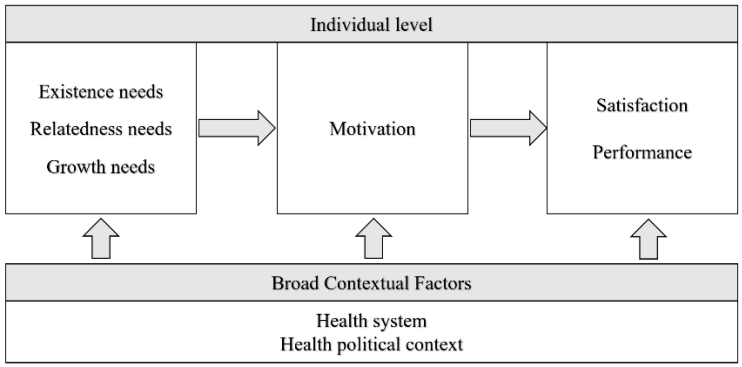
333x288mm (288 x 288 DPI)

Supplementary Appendix

1. Search terms

(China[Title/Abstract] OR Chinese[Title/Abstract]) AND ("primary health care"[Mesh] OR "General Practice"[Mesh] OR "General Practitioners"[Mesh] OR "Physicians, Family "[Mesh] OR "Community Health Services"[Mesh] OR "Delivery of Health Care"[Mesh] OR "township hospital"[Title/Abstract] OR "township health center"[Title/Abstract] OR "township health centre"[Title/Abstract] OR "community health station"[Title/Abstract] OR "village clinic"[Title/Abstract] OR "community health center"[Title/Abstract] OR "community health centre"[Title/Abstract]) AND (“manpower"[Mesh] OR “Education, Public Health Professional"[Mesh] OR “Education, Professional"[Mesh] OR “Education, Medical, Continuing"[Mesh] OR “Professionalism"[Mesh] OR “Career Choice"[Mesh] OR “Career Mobility"[Mesh] OR "human resources"[Title/Abstract] OR "retention"[Title/Abstract] OR "incentives"[Title/Abstract] OR "salary"[Title/Abstract] OR "professional medical master"[Title/Abstract] OR Motivation[Mesh] OR “Salaries and Fringe Benefits”[Mesh] OR “Staff Development”[Mesh] OR recruit[Title/Abstract] OR recruited[Title/Abstract] OR recruits[Title/Abstract] OR migration[Title/Abstract] OR migrate[Title/Abstract] OR migrating[Title/Abstract] OR migrated[Title/Abstract] OR migrates[Title/Abstract] OR immigration[Title/Abstract] OR immigrate[Title/Abstract] OR immigrating[Title/Abstract] OR immigrated[Title/Abstract] OR immigrates[Title/Abstract] OR emigration[Title/Abstract] OR emigrate[Title/Abstract] OR emigrating[Title/Abstract] OR emigrated[Title/Abstract] OR emigrates[Title/Abstract] OR mobility[Title/Abstract] OR turnover[Title/Abstract] OR "brain drain"[Title/Abstract]) AND ((eng[Language]) OR chi[Language]) NOT “Autobiography”[ptyp] NOT “Bibliography”[ptyp] NOT “Biography”[ptyp] NOT “Consensus Development Conference”[ptyp] NOT “Consensus Development Conference, NIH”[ptyp] NOT “Corrected and Republished Article”[ptyp] NOT “Dataset”[ptyp] NOT “Dictionary”[ptyp] NOT “Directory”[ptyp] NOT “Duplicate Publication”[ptyp] NOT “Electronic Supplementary Materials”[ptyp] NOT “Festschrift” [ptyp] NOT “Interactive Tutorial”[ptyp] NOT “Legal Cases”[ptyp] NOT “Letter”[ptyp] NOT “News”[ptyp] NOT “Patient Education Handout”[ptyp] NOT “Periodical Index”[ptyp] NOT “Personal Narratives”[ptyp] NOT “Portraits”[ptyp] NOT “Published Erratum”[ptyp] NOT “Retracted Publication”[ptyp] NOT “Retraction of Publication”[ptyp] NOT “Twin Study”[ptyp] NOT “Video-Audio Media”[ptyp] NOT “Webcasts”[ptyp].

2. Preliminary conceptual framework of motivating factors influencing PCW's performance



3. List of included studies' general characteristics

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhang *et al.*, 2016	2014	Quantitative study	Jiangxi	Rural	Village Clinic	To assess village doctors' job satisfaction during the reforms and to explore factors affecting job satisfaction.	Low job satisfaction. The top three items leading to dissatisfaction were pay and the amount of work that had to be done, opportunities for job promotion and work conditions.	Marriage, income, intention to leave, satisfaction with learning and training, social status, relationship with patients and satisfaction with the new healthcare reforms were significantly associated with job satisfaction.	Low
Lin *et al.*, 2015	2013.9-2014.4	Quantitative study	Guangdong	Urban	Community Health Centre	To explore the impact of workplace violence on job performance and quality of life of community healthcare workers in China, especially the relationship of these three variables.	Workplace violence among community healthcare workers is prevalent in China.	The workplace violence had negative effects on the job performance and quality of life of CHCs' workers.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhang *et al.*, 2015	2013.8-2014.1	Qualitative Study	Jiangsu, Henan, Jiangxi, Heilongjiang, Sichuan, Gansu.	Rural	Village Clinic	To investigate the village doctors' income structure and analyze how these health policies influenced it.	The health-care reform policies have had lasting impacts on village doctors' income structure since the policies' implementation in 2009.	Several policies such as the National Essential Medicines System, Integrated management, National Basic Public Health Services, New Rural Cooperative Medical Scheme had major impact on village doctors.	Moderate
Wu *et al.*, 2014	2012	Quantitative study	Zhejiang	Both	Community Health Centre; Township Health Centre	To explore the factors influencing doctors' job satisfaction and morale in China, in the context of the ongoing health system reforms and the deteriorating doctor–patient relationship.	Low job satisfaction. Primary care doctors were the least dissatisfied with the income and opportunities for promotion. Patients were becoming more aggressive in their demands and there was an increasing trend of violence against doctors.	Doctors in the provincial hospital appeared to be the most dissatisfied group, and primary care physicians were most satisfied with their work and the causes of dissatisfaction fall into three main areas: low income, heavy workload and patient aggression.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Li *et al.*, 2014	2012	Quantitative study	Heilongjiang	Urban	Community Health Centre	To assess the determinants of job satisfaction in community health workers in one Chinese province.	Overall job satisfaction was higher than extrinsic job satisfaction and lower than intrinsic job satisfaction. All desired workplace characteristics were higher than the associated actual workplace characteristics.	The main determinants of job satisfaction were occupation, years worked in health service institution, and five subscales representing the gap between desired and actual workplace characteristics, which were system and policy; fringe benefits; working relationship; professional development; and remuneration.	Low
Fang *et al.*, 2014	2012.07 -08	Quantitative study	Hubei	Rural	Village Clinic	To analyzes the factors that influence the turnover intention of village doctors by investigating village clinic workers in rural areas, particularly in Xiangyang City, Hubei Province.	Village doctors were most dissatisfied with my pay and the amount of work I do, the chances for advancement on this job, and the work conditions. Highlight the influence of job satisfaction on turnover intention of village doctors	Income satisfaction, the way organization policies are put into practice, my pay and the amount of work I do, the chances for advancement on this job and the work conditions were significantly related to the turnover intention of village doctors.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhou *et al.*, 2014	2013.1-3	Qualitative Study	Zhejiang, Yunnan	Rural	Township Health Centre	To explore the impacts of these reforms on health workers and service users at township level, which has been the major target of the first phase of the reforms.	Some elements of the reforms may actually be undermining primary care. While the new health insurance system was popular among service-users, it was criticized for contributing to fast-growing medical costs, and for an imbalance of benefits between outpatient and inpatient services. Salary reform has guaranteed health workers' income, but greatly reduced their incentives. The essential drug list removed perverse incentives to overprescribe, but led to falls in income for health workers, and loss of autonomy for doctors.	The health workers' intention was mostly blamed on the loss of income and incentives and in the larger hospitals, on the essential drug list, and the way it limits clinical autonomy and the provision of specialist services.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Liu *et al.*, 2014	2009-2010	Mixed method study	Anhui	Both	Township Health Centre; Village Clinic; Community Health Centre/ Station	To conduct an initial assessment of the effects of specific parts of the reforms in Anhui.	The reform of primary healthcare institutions in Anhui has improved the personnel structures surrounding frontline healthcare workers, increased their incomes, improved work efficiency, and changed the compensation patterns of primary healthcare institutions, improved hardware, reduced drug prices, and, to some extent, improved the diagnosis and treatment structure. However, the reforms have not radically changed the behavior of medical workers or the visit patterns of patients.	Two problems emerged from the reforms.First, the enthusiasm of medical staff decreased, and second, the supply of drugs could not adequately meet the demand.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Luo *et al.*, 2014	maybe 2012	Quantitative study	Hubei , Guizhou, Hebei , Guangdong , Zhejiang	Urban	Community Health Centre	To analyze and determine the main related factors that influence work passion of CHS workers by investigating CHS workers from five Chinese provinces.	Low passion for current work. Workers were most dissatisfied with the balance between remuneration and workload, job promotion opportunities and most dissatisfied with the balance between remuneration and workload, job promotion opportunities.	The related factors that influence CHS workers' work passion are socio-demographic factors such as age, and years of employment, and other work-related factors such as learning and training opportunities, compensation packages, work stress, and personal development opportunities.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Ding *et al.*, 2013	2009 v.s. 2012	Quantitative study	Anhui	Urban	Community Health Centre	To compare the job satisfaction (JS) of community health workers (CHWs) before and after the local comprehensive medical care reform (LCMR) in Anhui Province to provide evidence for improving the LCMR policy to increase the JS of CHWs.	After two years' implementation of the LCMR, CHWs' total JS have a small improvement. CHWs have lower satisfaction in the dimensions of pay, promotion and benefits dimensions before and after the LCMR.	The average scores of total JS and satisfaction with pay, contingent rewards, operating procedures and communication in the effect evaluation survey were statistically significantly higher than those of the baseline survey. The average score of satisfaction with promotion in the effect evaluation survey was statistically significantly lower than that in the baseline survey.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Hung *et al.*, 2013	2011	Quantitative study	Jilin, Shandong, Anhui, Chongqing, Ningxia	Both	Township Health Centre; Village Clinic; Community Health Centre/ Station	To provide an overview of major performance motivating factors for primary care providers (PCPs) in China and examine associations between these factors and individual and practice setting characteristics.	There were greater needs for improvement in rural than urban settings, especially in living environment. Types of PCPs were associated with needs for improvement in different factors. There were more needs from nurses and village doctors.	The most important motivating factors for PCPs to improve performance were professional development, training opportunities, living environment, benefits, working conditions and income.	Low
Sun *et al.*, 2013	Maybe 2012	Quantitative study	Zhejiang, Guangdong, Guizhou, Hebei, and Hubei	Urban	Community Health Centre	To ascertain the key factors that influence the CHS worker turnover intention to increase their work satisfaction and stability.	38.7 % community health workers intended to quit. CHS workers were less satisfied with the balance between payment and work quantity, promotion opportunity, and working conditions.	The influencing factors that result in turnover intention are socio-demographic factors such as age, post of duty, professional title, and working seniority, and other work-related factors such as pay packets, learning and training opportunities, promotion and personal development space, and working stress.	

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Ding *et al.*, 2013	2011.3-6	Quantitative study	Hubei, Jiangxi	Rural	Township Health Centre; Village Clinic	To improve the early detection of epidemics in rural China by integrating syndromic surveillance with the existing case report system.	Village doctors prioritize medical services but they do their best to manage their time to include public health services. The willingness of township health centre directors and village doctors to provide public health services has improved since the introduction of the package and a minimum subsidy, but village doctors do not find the subsidy to be sufficient remuneration for their efforts.	Factors to consider in future activities to improve the quality and extent of public health services provided by village doctors include actual and potential sources of village doctor income (i.e. medical services, social pension and other government support), the relationship between village clinics and township health centres and the amount of public health subsidy.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Li *et al.*, 2013	2009.12 -2010.12	Quantitative study	Beijing, Jiangsu, Zhejiang, Hainan ,Guangxi , Shanxi, Jiangxi, Guizhou, Yunnan, Gansu	Rural	Township Health Centre; Village Clinic	To analyze the educational status and future training needs of China's rural doctors and provide a basis to improve their future training.	Rural health professionals in China who have relatively low healthcare education should be focused on. Rural doctors the training status and needs of China's rural doctors are still disjointed in terms of the training time, training method and training content.	Rural doctors wanted to extend the training time, preferred to practice-focused training (on-site guidance from senior doctors, clinical further education), and had greater desire for clinical skills, preventive healthcare and medication knowledge education.	Low
Shi *et al.*, 2014	2011	Quantitative study	5 provinces representing Eastern, Central, and Western China	Both	Township Health Centre; Village Clinic; Community Health Centre/ Station	To provide a snapshot of the current state of primary care workforce (PCW) serving China's grassroots communities and examine the factors associated with their job satisfaction.	Low job satisfaction PCW are least satisfied with their income level (only 8.6% are either satisfied or very satisfied), benefits (12.8%), and professional development (19.5%).	Lower income and higher workload are the two major contributing factors toward job dissatisfaction.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Ge *et al.*, 2011	2009.12 -2010.2	Quantitative study	Liaoning	Urban	Community Health Centre	To clarify the level of job satisfaction of Chinese community health workers between a metropolitan (Shenyang) and a small city (Benxi) in Liaoning province and explore its associated factors.	A moderate level of job satisfactions. Community health workers in a metropolitan had lower job satisfaction as compared to those in a small city.	Three significant predictors of intrinsic and extrinsic job satisfactions were the two dimensions (social support and decision latitude) of stress and cynicism of burnout.	Low
Zhao *et al.*, 2011	2008.12 - 2009.2	Qualitative study	Beijing	Urban	Community Health Centre	To understand the advancements in and barriers to the implementation of measures to improve basic public health services in an urban Chinese community.	The number of practitioners and their low levels of skill were insufficient to provide adequate services for community residents.	Due to the broad scope of basic public health services and limited financial incentives, providers felt that they were under great stress and often complained that community members for whom they were responsible did not trust them as these clinicians had lower levels of knowledge and skill than specialists.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Liu *et al.*, 2010	2007	Quantitative study	Anhui, Xinjiang	Rural	Township Health Centre	To measure job satisfaction level of THC employees in poor rural China and to identify relevant features in order to provide policy advice on human resource development of health service institutions in poor regions.	Moderate job satisfactions in poor areas. Job satisfaction scores reflecting job significance, job competency and team work were highest, while work conditions and atmosphere and job reward were lowest.	Township health centers employees are more satisfied with the work significance and cooperation with colleagues, while less satisfied with work conditions, reward and promotion opportunities.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhou *et al.*, 2015 Feb	2013	Qualitative Study	Jiangxi	Rural	Township Health Centre; Village Clinic	To explore the perspectives of health providers on the contract service policy, and investigate the demand side's attitude toward the public health services delivered under the contract policy.	The contract service actually promoted the supply side to provide more public health services to the villagers and contracted patients felt satisfied with the doctor-patient relationship.	Most health providers complained about the heavy workload, insufficient remuneration, staff shortage, lack of official identity and ineffective performance appraisal, in addition to contempt from some villagers and supervisors after the implementation of the contract service.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Chen *et al.*, 2015	2012.5-7	Mixed method study	Jiangsu	Rural	Township Health Centre; Village Clinic	To reveal the challenges of village doctors' survival and training in economically developed areas in eastern China.	The main challenges in Changzhou include an insufficient amount of village doctors, difficulties in obtaining professional qualification for village doctors, low salaries and benefits, and difficulties in recruitment.	The gap between expected and actual income is the primary factor affecting the attractiveness of a career as a village doctor. Changes to training have influenced the stability of village doctor teams. Declining attachment of young people to their hometown village has contributed to recruitment difficulties.	Moderate
Wang *et al.*, 2013	2009.9-11	Quantitative study	Beijing	Rural	Village Clinic	To explore the reasons for the poor recruitment and to propose possible strategies to improve the situation.	Rural doctors were generally older than average and considered the training strategy to be inadequate in in China.	In general, the initiatives identified by rural doctors as being of most value in the recruitment of doctors were those targeting retirement pension and income.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Li *et al.*, 2017	2014.4	Mixed method study	Shandong, Guangxi, Shaanxi	Rural	Village Clinic	To describe village doctors' job satisfaction under the context of health sector reform and investigate the associated factors.	Low job satisfaction. Village doctors who earned the top level of monthly income felt more satisfied, while on the county level, those who lived in counties with the highest GDP felt less satisfied.	From interviews, most workers believed that age, income, and integrated management had a positive influence on the job satisfaction, while pension plan and basic public health care policies exhibited negative effects. Also, the increasing in availability of healthcare and health resources along with local economic development had negative effects on village doctors' job satisfaction.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhang *et al.*, 2017	2013	Quantitative study	Shanghai, Shaanxi, Shandong, Anhui	Urban	Community Health Centre	To examine the mediation effect of job satisfaction on the relationship between person-organization fit (P-O fit) and turnover intention based on data from China.	The effect of P-O fit on turnover intention was partially mediated through job satisfaction.	P-O fit was directly related to job satisfaction and inversely related to turnover intention.	Low
Li *et al.*, 2014	2013.3.1 -10.31	Quantitative study	Heilongjiang	Urban	Community Health Centre	To examine levels of work stress and motivation and their contribution to job satisfaction among community health workers in Heilongjiang Province, China.	Levels of overall motivation perception and scores on the career development, responsibility and recognition motivation subscales were higher in satisfied respondents relative to dissatisfied respondents.	The main determinants of job satisfaction were occupation; age; title; income; the career development, and wages and benefits subscales of work stress; and the recognition, responsibility and financial subscales of work motivation.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Meng *et al.*, 2009	2006	Qualitative Study	10 provinces	Both	Township Health Centre; Community Health Centre	To analyze the mobility of health workers in township and community health centres.	Increased rate of workers leaving township and community health centres between 2000 and 2005, with the majority of the mobile health workers moving to higher-level health facilities; very few moving to other rural township health centres.	The main reasons for leaving were low salaries, limited opportunities for professional development and poor living conditions.	Moderate
Wang et al., 2017	2013	Quantitative study	Shandong, Anhui, Shaanxi	Rural	Township Health Centre	To investigate the association between the latent clusters and health-care staff's personal and professional features.	The minority of health-care staff belong to the "satisfied class". Three among four subgroups are not satisfied with income, benefit, training, and career development.	Low job satisfaction was associated with specialty, training opportunity, and income inequality.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Chen et al., 2017	After 2009	Qualitative study	Guangxi	Rural	Township Health Centre	To understand the level of job satisfaction as felt by primary health care providers.	Increasing the incomes and fringe benefits of healthcare workers, improving their work conditions, and providing training and continuing education opportunities would help rural clinics retain doctors and eliminate the current unsatisfactory conditions.	The main concerns related to job satisfaction included working conditions, financial rewards, and the doctor's relationships with patients.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Lu et al., 2016	2013	Quantitative study	Guangdong	Both	Township Health Centre; Village Clinic; Community Health Centre/ Station	To explore job satisfaction among healthcare staff in Guangdong following the health system reforms in 2009, and to investigate the association between job satisfaction and work stress, work–family conflict and doctor–patient relationship.	The overall job satisfaction exceeded slightly dissatisfied and approached slightly satisfied. Measures to enhance job satisfaction include the reduction of workload, increase of welfare, maintaining moderate stress and balancing work–family conflict.	The sociodemographic variables including occupation, educational background, professional status, years of service, annual income and night shift, work stress, work–family conflict and doctor–patient relationship frequency significantly influenced the level of job satisfaction.	Low

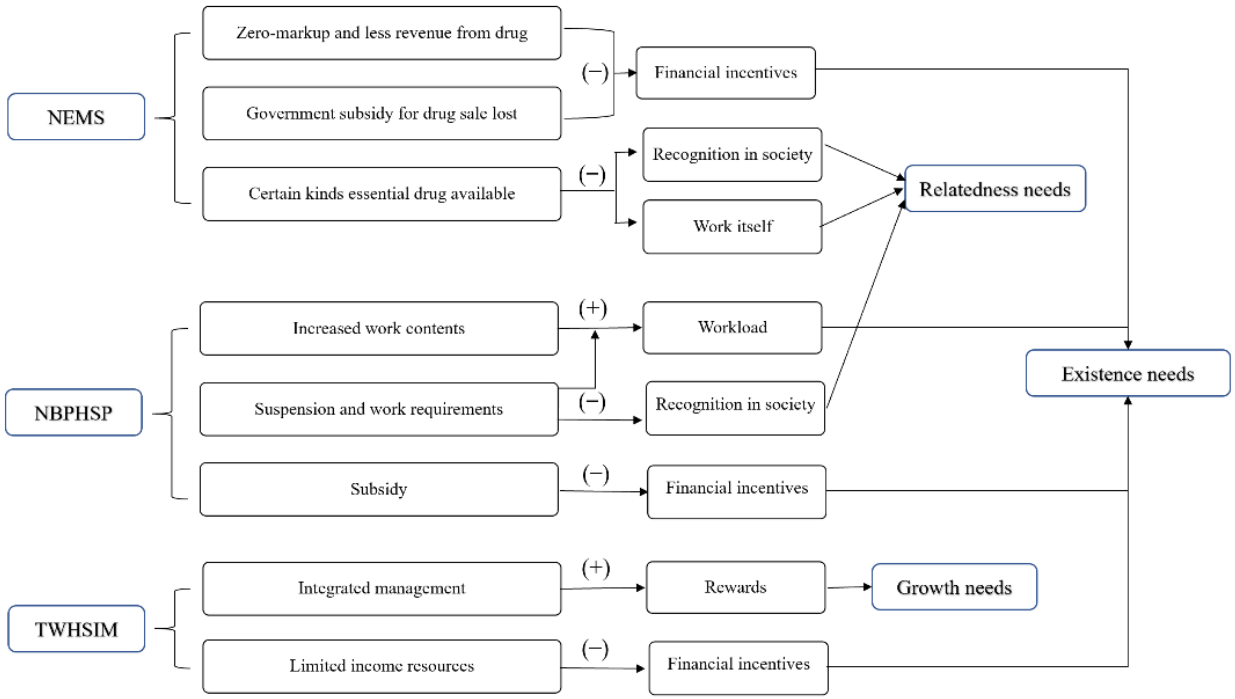
Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Song et al., 2015	2011	Quantitative study	Jilin, Shandong, Anhui, Chongqing, Shaanxi	Both	Township Health Centre; Community Health Centre	To find out which job attributes affect Chinese primary care providers' choice of job and whether there are any differences in these job preferences between doctors and nurses.	Policymakers need to improve primary care providers' income, benefits and working conditions to fulfil their basic needs, invest in infrastructure and strengthen training programmes in order to raise the community's confidence in the services.	Though income was important, Chinese primary care providers also had strong preferences for sufficient welfare benefits, sufficient essential equipment and respect from the community.	Low
Mo et al., 2017	2014	Quantitative study	Guangxi	Rural	Township Health Centre	To explore the current health training status of nurses working in rural Chinese township health centers and to ascertain their perceived needs.	A decentralized degree-linked training program in which medical universities and city hospitals collaborate would be an appropriate mode of delivery.	Mismatch between current health training initiatives and desired programs in terms of training setting, content, and delivery mode	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhang et al., 2017	2013	Qualitative Study	Shandong	Urban	Community Health Centre/ Station	To analyze how health reform of CHS led to changing job features for primary health providers.	The new model of primary health care significantly affected the nature of primary health work and triggered a range of PHC providers' coping processes.	Health workers perceived their job as less intensive than hospital medical work but often more trivial, characterized by heavy workload, blurred job description, unsatisfactory income, and a lack of professional development.	Moderate
Zhang et al., 2017	2014	Quantitative study	Zhejiang, Jiangxi, Shaanxi, Xinjiang	Urban	Community Health Centre	To investigate the perceptions of primary care workers about the impacts of the national essential medicines policy (NEMP).	The NEMP has significant impacts (as perceived by the health workers) on health services delivery in primary care settings.	The impacts of the NEMP vary by region, professional practice and the income level of health workers. It is important to maintain support from physicians through income subsidies (to compensate for potential loss) and training.	Moderate

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Feng et al., 2017	2014	Quantitative study	Qinghai, Inner Mongolia, Xinjiang	Rural	Village Clinic	To examine the satisfaction of village doctors with the Township and Village Health Services Integration Management (TVHSIM).	Low satisfaction with the TVHSIM. A well-rounded social insurance model for village doctors is urgently needed and enhancing essential medical training should be carefully considered.	Social insurance, essential medical knowledge, year of practice significantly influenced satisfaction of village doctors on human resources management, drug and medical device management, and financing management.	Low
Li et al., 2016	2014	Quantitative study	Shandong, Guangxi, Shaanxi	Rural	Village Clinic	To identify factors associated with village doctors' basic public health services provision and to formulate targeted interventions in rural China.	There is considerable room for improvement regarding the factors associated with village doctors' basic public health services provision.	Increasing public health care subsidies received by individual village doctors, availability and attendance of training opportunities, and integrated management and NCMS contracting of village clinics are important factors in increasing basic public health services rovision in rural areas.	Low

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Song et al., 2016	2011	Quantitative study	Ningxia	Both	Primary healthcare centers	To examine current understanding and opinions of China's National Essential Medicine System (NEMS) of primary care providers and patients.	High level of satisfaction towards NEMS among primary care providers, which is a reflection of the improvements in the health care system.	Overall there was a link between knowledge about NEMS and satisfaction with the program: the providers with greater knowledge of NEMS, reported higher satisfaction.	Moderate
Li et al., 2015	2012	Mixed method study	Jiangsu	Rural	Village Clinic	To identify specific factors of and potential solutions to the shortage in village doctors.	The shortage in village doctors presents a major obstacle toward the realization of China's policy of public health service equalization.	Many factors associated with the shortage of village doctors were payment related including low salaries and bonuses, heavy workload, few opportunities for continuing education, unattractive pension plans and poor working environments.	Moderate

4. A logical diagram of motivating factors influencing PCW's performance



5. Overall job satisfaction score among primary care workers

Study [Citation]	Study period	Province/city	Area	Sample size	Measurement of scales	Measurement of overall satisfaction	Job satisfaction score	Standard deviation
Liu *et al.*, 2010	2007	Anhui	rural	77	Likert 5 point	Sum of dimension	3.76*	-
Liu *et al.*, 2010	2007	Xinjiang	rural	95	Likert 5 point	Sum of dimension	4.49*	-
Ding *et al.*, 2013	2009	Anhui	urban	765	Likert 5 point	Sum of dimension	3.06	0.497
Ge *et al.*, 2011	2009-2010	Shenyang City	urban	1010	Likert 5 point	Sum of dimension	3.36*	-
Ge *et al.*, 2011	2009-2010	Benxi City	urban	684	Likert 5 point	Sum of dimension	3.50*	-
Shi *et al.*, 2014	2011	5 provinces	both	863	Likert 5 point	Sum of dimension	3.43	0.77
Hung *et al.*, 2013	2011	Jilin, Anhui, Shandong, Chongqing, Ningxia	both	823	Likert 5 point	Sum of dimension	3.39	-
Wu *et al.*, 2014	2012	Zhejiang	both	111	Likert 5 point	Sum of dimension	3.23	0.06
Li *et al.*, 2014	2012	Heilongjiang	urban	448	Likert 5 point	Sum of dimension	3.69	-
Ding *et al.*, 2013	2012	Anhui	urban	495	Likert 5 point	Sum of dimension	3.13	0.643
Luo *et al.*, 2014	2012	Hubei,Hebei, Guizhou, Guangdong, Zhejiang	urban	3220	Likert 5 point	Sum of dimension	3.37	-

Sun et al., 2013	2013	Zhejiang, Guangdong, Guizhou, Hebei, Hubei	urban	3212	Likert 5 point	Sum of dimension	3.44	-
Fang et al., 2014	2012	Hubei	rural	1889	Likert 5 point	Sum of dimension	2.57	-
Zhang *et al.*, 2017	2013	Shanghai, Shaanxi, Shandong, Anhui	urban	656	Likert 5 point	Standalone item	3.55	0.74
Li *et al.*, 2014	2013	Heilongjiang	urban	930	4 point	Sum of dimension	3.11	0.68
Zhang *et al.*, 2016	2014	Jiangxi	rural	935	Likert 5 point	Standalone item	1.82	0.63
Li *et al.*, 2017	2014	Shandong, Guangxi, Shaanxi	rural	1221	4 point	Standalone item	2.43*	-
Lu *et al.*, 2016	2013	Guangdong	both	5845	Likert 6 point	Sum of dimension	3.99	0.99
Wang *et al.*, 2017	2013	Shandong, Anhui, Shaanxi	rural	603	Likert 5 point	Sum of dimension	3.37	-

* We converted these scores from the sum of percentage scores into 5-grade score: Overall satisfaction = summed score/maximum total score × 5

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.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3-4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	5
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.	5
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.	5
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.	5
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	5
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).	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.	6
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	7
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.	N/A
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	7
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.	7

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).	N/A
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A
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.	7
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.	Supplementary Material
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).	N/A
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.	8-14
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	14-15
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A
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).	15-19
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).	19-20
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	20
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.	21

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(6): e1000097. doi:10.1371/journal.pmed1000097

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