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

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4 1 **Motivating factors on performance of primary care workers in**
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7 2 **China: A systematic review and meta-analysis**
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47 15 **Number of tables and figures:** 2 table, 3 figures are included in this article.
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19 Abstract

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

25 **Design:** Systematic review

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

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

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4 40 reaching a satisfied rating and varied in different regions.
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7 41 **Conclusions:** This study suggests low work satisfaction among PCWs in China, with
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10 42 financial incentives and career advancement being two most important motivating factors.
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12 43 Efforts to improve the work performance in PCWs should give priority to these motivating
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14 44 factors and systematically take into account the health policy's impacts on performance of
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16
17 45 PCWs.
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20 21 46 **Keywords**

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24 47 Primary health care, Primary care workers, Performance, Motivation, Health policy
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27 48 **Strengths and limitations of this study**

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30 49 ► This is the first comprehensive systematic review that identifies the motivating factors on
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33 50 performance of Chinses primary care workers including both individual level factors and
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36 51 health system level factors.
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39 52 ► Reliability of the study selection, data extraction and rating of the study quality was
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42 53 ensured using two independent reviewers.
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45 54 ► Studies providing job satisfaction data of primary care workers were systematically
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48 55 performed by a separate meta-analysis. In addition, three main primary health sector reform
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51 56 policies were comprehensively analyzed.
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53 57 ► Chinese articles were not included in this review.
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56 58 **Introduction**

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59 59 Primary health care (PHC) services in China including public health service and basic
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4 60 medical health service, are provided by urban community health centres (CHCs) and affiliated
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6 61 community health stations (CHSs), rural township health centres (THCs) and affiliated village
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9 62 clinics (VCs). These four types of primary health institutions (PHIs) act as the essential part
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11 63 of three-tertiary health care delivery network in China. Strengthening primary health care has
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13
14 64 been a central aim in China's health system reform initiated in 2009¹. However, the structure
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17 65 of health care delivery system in China still faced lots of challenges since the 2009 health
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20 66 system reform, and the low-performance of PHC delivery system is the bottleneck to
21
22 67 deepening the reform². Although the number of PCWs increased from 3.3 million in 2010 to
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25 68 3.7 million in 2016, the proportion of them in all health workers decreased from 40.0% to
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28 69 33.0%. The utilization of health services provided by PHIs had the same pattern that the
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31 70 proportion of PHIs' outpatient visits decreased from 61.9% (3.6 billion visits) to 55.1% (4.4
32
33 71 billion visits) and the proportion of PHIs' inpatient visits decreased from 27.9% (39.5 million
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35 72 hospitalizations) to 18.3% (41.7 million hospitalizations) between 2010 and 2016³. Under
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38 73 these circumstances, the strengthening of primary health system will still be the emphasis of
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41 74 health system reform in near future: the Outline of Healthy China 2030 Plan, a government
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44 75 blueprint for health system development, specially highlighted the important role of primary
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46 76 health care⁴.

47
48 77 Health workforce shortage is one of the major obstacles in the process of strengthening
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51 78 primary health care services in China⁵. The primary health workforce is facing serious
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54 79 challenges including low education level, lack of qualifications, aging, high turnover and poor
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57 80 working performance⁶. In all determinants of performance of PCWs, improving work
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59 81 motivation is a crucial channel to change the behavior of health providers, as motivation in
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4 82 the work context can be defined as an individual's degree of willingness to exert and maintain
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7 83 an effort towards organizational goals⁷. It has been demonstrated that work motivation can
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10 84 influence job satisfaction, and then influence job performance^{8 9}. In this review, we aim to
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12 85 synthesize and analyze the motivating factors of PCWs and provide evidence-based policy
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15 86 implication on how to improve the performance of PCWs in China.
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18 87 **Methods**

22 88 **Search strategy and eligibility criteria**

25 89 We searched the PubMed and MEDLINE on June 2, 2018 to identify relevant studies
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27
28 90 using MeSH and free-text words, including all their possible synonyms and spellings terms⁶,
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31 91 in conjunction to increase sensitivity to potentially appropriate literature published. Full
32
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34 92 search terms are provided in the Supplementary Appendix 1. Search results were exported to
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36
37 93 EndNote X7 to be organized and duplicates records were removed firstly. Two authors
38
39
40 94 exported the citations to Microsoft Excel and independently conducted the literature screening
41
42
43 95 and selection. Divergent judgments were solved by discussion. We searched for and included
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45
46 96 articles about the motivating factors on performance of PCWs who work in four kinds of
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49 97 PHIs, including rural THCs, VCs and urban CHCs and CHSs in China. This study defined
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52 98 motivation in the work context as an individual's degree of willingness to exert and maintain
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55 99 an effort towards organizational or system goals¹⁰, and we also regarded the degree of job
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58 100 satisfaction, work stress and turnover intention as the possible reflections of motivation which
59
60 101 may influence work performance. We also searched for relevant studies identified from
102 references of included articles and other sources. The study designs we included are any

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4 103 observational or experimental studies with primary quantitative or qualitative data. Only
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6 104 English language articles published between 2000 and 2018 were included. Records were
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9 105 excluded if the study did not address the motivating factors of PCWs, and of the participants
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11
12 106 of study were not PCWs or not belong to the four kinds of PHIs mentioned above.

107 **Data extraction and synthesis**

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

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4 124 macro level. Firstly, authors began to aggregate data into motivating factors, extracted all
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6 125 original motivating factors in each articles and classified them to one of the four relevance
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9 126 themes. Then we identified correlations between the different factors, refined them through
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11
12 127 discussion and synthesized the familiar factors into a higher level theme.

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14
15 128 We used meta-analysis to synthesize the 16 articles providing job satisfaction data of
16
17 129 PCWs. We pooled the study-specific estimates using a random effects meta-analysis model to
18
19
20 130 obtain an overall summary job satisfaction scores across studies in China¹². We analyzed data
21
22
23 131 using Stata version 14.0 for Windows.

132 **Role of the funding source**

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29
30 133 The funders of the study had no role in study design; collection, analysis, and interpretation
31
32 134 of data; writing the report; or the decision to submit the paper for publication.

135 **Results**

136 **Characteristics of reviewed studies**

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43 137 We firstly screened 5466 titles and abstracts, and then 348 full-texts of potential
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46 138 relevant studies were retrieved and screened to evaluate their eligibility (Figure 1). After full
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49 139 text screening, 119 studies relevant to the human resources of primary health care in China
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52 140 were included for us to understand the current status of PCWs. To obtain sufficient
53
54 141 information related to motivation of PCWs, 1 additional article from reference search was
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57 142 also identified and included after applying the eligibility criteria. Finally, from 119 studies, 83
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59 143 studies which did not contain specific motivating factors were excluded and 36 studies closely
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4 144 related to motivation of PCWs were selected for data extraction and synthesis. A list of
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7 145 included articles' basic characteristics can be found in Supplementary Appendix 2. This
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9 146 review covered at least 27 provinces of China. 25 quantitative, 7 qualitative, and 4 mixed
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11 147 methods primary studies were included. All of 36 articles are cross-sectional study. 17 studies
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14 148 took place in rural areas of China, 11 took place in urban areas, and 8 in both urban and rural
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17 149 areas. Among the 17 studies about rural areas, 8 articles only included village doctors in
18
19 150 village clinics as participants, 5 articles only studied health workers in THCs and 4 articles
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21
22 151 are about rural PCWs in both village clinics and THCs. The 11 studies in urban areas are
23
24 152 about urban PCWs in community health centers/stations. 4 articles studied all types of PCWs
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26
27 153 in different kinds of rural and urban PHIs. Included studies analyzed the motivation of PCWs
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29 154 from different perspectives: some directly using job satisfaction as measurement tool¹³⁻²⁸,
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31 155 some explored the motivation factors' influence on attrition and retention^{16 20 29-33}, some
32
33 156 studied the impact of some policies or interventions on motivation factors of health workers²⁹
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35 157 ^{34-38 39-44}.

158 **Motivating factors for PCWs**

159 **Existence need factors**

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

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4 165 including the income and fringe benefits were significantly associated with job satisfaction¹³
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6 166^{15 28} and difficulties in recruitment of PCWs^{30 32 33}. Moreover, both financial incentives and
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9 167 working conditions were the most important motivating factors for PCWs to improve
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12 168 performance^{19 31}.

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15 169 Another part of literatures explored different health system reform policies on this kind
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17 170 of motivation factors. For example, in a qualitative study, administrators and frontline
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20 171 healthcare workers in PHIs mentioned that the increased income after the 2009 health system
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22
23 172 reforms did not fully reflect the increased workload, and those who worked mostly hardly did
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25
26 173 not necessarily get paid the most, which led to some health workers becoming demotivated³⁵.

174 **Relatedness need factors**

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

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

184 13 of selected studies reported recognition from society including understanding by
185 society, physical-patient relationships (Table 1). Satisfaction with social status, relationship

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4 186 with patients were significantly associated with job satisfaction^{13,28}. There are some
5
6 187 significant rural–urban differences, with rural PCWs were slightly more satisfied with
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9 188 patients' respect than their urban counterparts ²¹. However, few rural PCWs expressed
10
11 189 satisfaction with their current relationships and indicated that the patients could not
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14 190 understand the doctor's work⁴⁵. In addition, the increasing workplace violence had negative
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17 191 effects on the job performance and quality of life of PCWs ⁴⁶ and become a major contributor
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20 192 to doctors' low morale in recent years ¹⁴.

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23 193 6 studies reported the living environment as a relatedness need motivator (Table 1).
24
25 194 Studies revealed that there were greater needs for improvement in rural areas than needs in
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28 195 urban settings, especially in living environment ^{19,31}. The young health workers' sense of
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31 196 belonging and responsibility to their hometown is gradually disappearing, which results in
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34 197 more difficulties in recruiting young health workers born in local areas³⁰.

198 **Growth need factors**

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39 199 Career advancement, training, rewards, management and autonomy relating to a
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42 200 person's needs of personal development were considered as growth need factors in this
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45 201 review.

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48 202 19 out of 36 articles reported the factor of career advancement (Table 1), which was
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51 203 considered as the one of top three items leading to dissatisfaction ^{13,14,17,18,20,21,27}. The gap
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54 204 between desired and actual professional development was one of the main sources of job
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57 205 satisfaction ¹⁵. Limited opportunities for job promotion was also a way to describe how this
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60 206 factor contributing to lower work passion ¹⁷ and the turnover intention of village doctors ^{16,20}.

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4 207 The main causes might be few positions and opportunities for the health professionals in PHIs
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6 208 to get higher professional titles on the regular payroll, especially compared with the
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9 209 opportunities in higher level health institutions even with the same education background and
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11 210 technical carder.

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15 211 Training was mentioned as a motivating factor by 13 out of 36 articles (Table 1).
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17 212 Learning and training were significantly associated with work passion¹⁷, job satisfaction¹³
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19 213 ²⁷and turnover intention²⁰. Along with career advancement, training was also considered as
20
21 214 one of the most important motivating factors for PCWs to improve performance ¹⁹. However,
22
23 215 the training arrangements and needs of China's PCWs were segmented and inadequate ^{32 47 48}.
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25 216 Health workers wanted to extend the training time, converted the training method from
26
27 217 knowledge-focus to practice-focused training (on-site guidance from senior doctors, clinical
28
29 218 further education), and had more needs for training content of clinical skills, preventive
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31 219 healthcare and medication knowledge education ⁴⁷. Consequently, although training was
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33 220 reported to be an effective form of incentive for recruitment, it has not acted as an effective
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35 221 motivator to attract young doctors to rural areas in China ³².

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44 222 There are 9, 9 and 14 selected studies reported the motivation factors of rewards,
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46 223 management and autonomy, respectively (Table 1). Most articles reported that PCWs were
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48 224 relatively satisfied with the decision-making ability of their superiors, contingent reward and
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50 225 opportunities to do work by making own decisions and utilize professional skills and talents ¹³
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52 226 ²⁰.

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58 227 **System and policy factors**
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4 228 Motivation is not only influenced by individual level motivators but also by the whole
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6 229 range of health sector reforms and specific incentive schemes targeting workers ⁷.

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9 230 Theoretically, any health sector reforms would directly influence the motivation factors the
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11 231 health workers will feel or have influences on how the health organizations designed their
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13 232 institutions, which in turn would have an impact on what health workers will get from their
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15 233 works. 18 out of 36 articles reported the macro-level factors (Table 1), health system and
16
17 234 policy factors, like National Essential Medicines System (NEMS), National Basic Public
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19 235 Health Service Program (NBPHSP) and Township and Village Health Services Integration
20
21 236 Management (TVHSIM). The gap between desired and actual policies' implementation
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23 237 consequences was one of the main determinants of job satisfaction ¹⁵. The comprehensive
24
25 238 reform of PHC in Anhui has changed their compensation patterns and improved the income
26
27 239 and work efficiency of PCWs, but decreased their work enthusiasm because of
28
29 240 inappropriately designed performance-based evaluation system³⁵. Different economic status
30
31 241 and health reform processes may lead to different consequences. PCWs under the
32
33 242 comprehensive reform of PHC in Shandong perceived their job as more trivial, heavy
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35 243 workload, blurred job description, unsatisfactory income, and a lack of professional
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37 244 development, but satisfied with the relationship with community and low work pressure³⁹.

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48 245 The NEMS uses a new National Essential Drugs List to ensure free access to safe,
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50 246 effective medication for the patients, and also includes a series polices on drug production,
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52 247 pricing and distribution to encourage rational prescribing by changing their reliance on drug
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54 248 sales and profit seeking behaviors. The impacts of the NEMP vary by region, professional
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56 249 practice and the income level⁴⁰. In a survey most PCWs perceived no change in their income
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4 250 and had a high level of satisfaction towards NEMS⁴³. However, according to another in-depth
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6 251 interviews with village doctors³⁴, the introduction of an essential drug list for PHIs, in which
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9 252 only drugs on the list were allowed to be prescribed in VCs and providers were forbidden to
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11 253 add a profit (zero mark-up) in drug prices, dramatically decreased their medical income in
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14 254 most areas with limited amounts of drug subsidies from the government to supplement their
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17 255 incomes. At the same time, they also complained that they had lost patients' trust and work
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19 256 enthusiasm as the species and total amount of essential medicines were not enough for daily
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22 257 treatment needs. ^{40 43}

25 258 The NBPHSP starting from 2009 provides a package of basic public health services for
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28 259 all residents, with a focus on the management of non-communicable disease. To motivate
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31 260 PCWs to provide preventive health services, the government pays the subsidies based on the
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34 261 number of covered residents. At the beginning of this reform, due to the broad scope of basic
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36 262 public health services and limited financial incentives, providers felt that they were under
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39 263 great stress because of many competing demands for their time and complained about the
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41 264 heavy workload, insufficient remuneration, staff shortage, lack of formal professional identity
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43
44 265 and ineffective performance appraisal, in addition to distrust and disrespect from some
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46 266 residents ^{38 44}, especially those only working for public health works being regarded as having
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49 267 lower levels of knowledge and skill than specialists³⁷. Providers who received more subsidies,
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51 268 training opportunities and integrated management had better performance in service provision
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54 269 ⁴².

57 270 The TVHSIM regarding a vertical integrated management which requires upper-level
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59 271 health institutions, THCs, to direct and supervise VCs in their works on medicine, personnel

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4 272 management, financing, facilities upgrading and maintaining and other routine works, had
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6 273 complex influences on village doctors. Under the integrated management, most village
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9 274 doctors felt more respected because they were more recognized as health workers in formal
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11 275 health system under integrated management instead of private drug salesmen. Nevertheless
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14 276 they were not allowed to perform agricultural or other side activities for other income^{24,34},
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17 277 which had a negative impact on the financial resources.

21 278 **Job satisfaction for PCWs**

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24 279 The performance of healthcare delivery system is critically dependent on worker
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26 280 motivation directly mediated by workers' willingness⁷. And satisfaction is one of the
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28
29 281 important indicators to measure the workers' willingness to exert efforts and has important
30
31 282 implications for sustainable development of primary healthcare in China. 17 included articles
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33 283 assessed the job satisfaction as one of the important dimensions reflecting providers'
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35 284 motivation (Supplementary Appendix 3). As 2 articles^{22,37} provided data of 2 provinces/cities
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37 285 and 1 article¹⁸ represented data of two years, there is totally 20 investigation samples
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39 286 extracted from these 17 cross-sectional study design articles, representing more than half of
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41 287 the provinces in China. The overall job satisfaction score ranged from 1.82 to 4.49. The
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43 288 satisfaction level varied from region to region (Figure 2). The satisfaction scores of most
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45 289 samples from more than three provinces were stable between 3.37 and 3.55. The scores of
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47 290 samples from the middle areas were lower than the eastern areas and the score of Xinjiang
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49 291 representing the western areas was the highest among the included samples.

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51 292 Meta-analysis methods of combining results weighted by sample size showed that the
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4 293 overall job satisfaction score among PCWs was 3.30, equivalent 0.66 ([95% CI 0.61–0.71];
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6 294 $I^2=98.7\%$; $P<0.001$; Figure 3), just reaching a satisfied rating. But the overall satisfaction
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9 295 mean of rural health workers was lower than the urban workers (Table 2).
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13 296 **Discussion**

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17 297 **Financial incentives and career advancement were the most important**
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19 298 **motivating factors for PCWs in China.** The balance between remuneration and
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22 299 workload, and career promotion opportunities were most frequently mentioned in the
23
24 300 included articles as critical motivating factors on performance of PCWs. Though in recent
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26
27 301 years, China government has input a lot to improve the income security of health workers in
28
29 302 PHIs, with increasing urbanization and life costs, the gaps between actual and expected
30
31 303 income have been increasing. Performance-related salary was mentioned by some doctors in
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33 304 THCs as a policy which was supposed to account for 30-40% of the salary based on their
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35 305 workload, quality of service and patients' satisfaction, but with limitation of overall revenue
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37 306 level and its structure, in order to only reward well-performed health worked by reducing the
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39 307 income levels of those poorly performed. Actually this payment method was rarely operated
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41 308 well in practice for motivating health workers at this moment ^[33]. How to improve the income
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43 309 level of health workers in primary health delivery system is a crucial but very hard policy
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45 310 problem in the near future.
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54 311 Besides, according to our analysis from Figure 2, financial incentives are no longer the sole
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56 312 means for stimulating motivation, improving job satisfaction and work performance. Other
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58 313 factors, particularly professional development, work characteristics and training has been
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4 314 equally, if not more, important for PCWs in China. In particular, the lack of chances for
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6 315 professional title promotion and limited career development space are important reasons that
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9 316 lead to turnover intention. This is in line with other studies published internationally and
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11 317 highlights the importance of packaging financial and non-financial incentives^{7 49}. The ERG
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14 318 framework implies that the fulfillment of human needs has an important role in PCWs'
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17 319 motivation and the order of importance of the existence need, relatedness needs and growth
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20 320 needs may vary from each individual. In this review, we find that Chinese PCWs are at the
21
22 321 stage where barriers exist in fulfillment of all three levels human needs. Income security has
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25 322 increased, but far lower than the expected level; the recognition and cooperation of residents
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28 323 on the public health works of PCWs have played negative role in influencing the motivation
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30
31 324 and behaviors of health workers; career promotion system and training arrangements did not
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34 325 meet their growth need neither. Policy makers must recognize that a health worker has
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37 326 multiple needs to satisfy simultaneously and priority measures in improving the motivation
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40 327 should be selected based on local institutional environments and personal preference.
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43 328 Focusing exclusively on one kind of need at a time will not effectively work for motivating
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46 329 PCWs.

47 330 **The overall job satisfaction score among PCWs was still low, especially in rural**
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49 331 **areas.** The overall job satisfaction score was considered as the predictors of job satisfaction,
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52 332 reflecting the PCWs' emotional situation and status of human needs satisfaction. There is
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55 333 considerable room for improvement in Chinese PCWs' performance by identifying
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58 334 motivating factors and increasing their work satisfaction. The most prominent factor causing
59
60 335 general dissatisfaction of PCWs, especially of those from rural areas is the financial rewards

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4 336 from work The annual income of 84.06% village doctors was less than 30 000 renminbi
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6 337 (RMB), which is still much lower than the average income for a doctor in higher level health
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9 338 institutions of Jiangxi Province in 2014 (56 394 RMB) and nearly half the village doctors
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11 339 thought their income level was lower compared with other people in the local area¹³. In
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14 340 addition, the health system reform policies also have indirect and negative consequences on
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17 341 PCWs' income level and are further damaging their job satisfaction, which is discussed in the
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20 342 following paragraphs. These findings have significant implications for policy makers and
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22 343 managers of PHIs regarding their efforts to improve workers' job satisfaction ^{15 26}. Another
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25 344 finding of the synthesis was the significant differences of satisfaction scores among eastern,
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28 345 western and middle areas of China. It is no doubt that there is imbalance existing among all
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31 346 levels of areas in China. Provinces in the eastern areas were more developed in economy and
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34 347 health facilities there are better equipped than other areas, so the job satisfaction of PCWs
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37 348 was higher than it in the middle areas China under better environments. However, the job
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40 349 satisfaction score in western China was better than it in the eastern areas. Considering western
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43 350 areas of China are remote areas with less economic development status the higher job
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46 351 satisfaction of PCWs may due to the lower expectations of PCWs in western areas and more
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49 352 financial transfer subsidies and other supports from central government directing to remote
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52 353 western areas. The government should also considered the imbalance the development in
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55 354 different areas specially the middle areas China where the economic development and
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58 355 resources inputs are limited, and the central government's transfer subsidy are also neglected.
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61 356 **The health system reform and some specific policies have inevitable and indirect**
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64 357 **impacts on PCWs.** In 2009, China launched a landmark healthcare reform with the goal of

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4 358 providing affordable and equitable basic health care for all by 2020⁵. Strengthening the
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7 359 primary health system is one of the key reform aspects in the health system reform, so several
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10 360 policies directly targeted to PHIs or PCWs. The satisfaction of pay and contingent rewards
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12 361 has slightly improved, which may be attributed to the guarantee of the PCWs' basic wages by
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14 362 government finance¹⁸. However, with China making remarkable progress in strengthening
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17 363 the primary health system, some new problems or unintended consequences of related
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20 364 reforms appeared, for example, a brain drain of experienced health workers from THCs, and
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22 365 patients have flowed to county hospitals at greater cost^{6 29}. In the process of health system
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25 366 reforms, three policies and their impacts on motivation of health workers were frequently
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28 367 studied in literatures:

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31 368 The NEMS has had lasting impacts on PCWs' income structure since the policies'
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33 369 implementation in 2009³⁴. The essential drug list removed the incentives for overprescribing,
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36 370 but led to falls in income and loss of autonomy²⁹ because the government subsidies for public
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39 371 health works were not enough to offset the decline in revenue from drug prescriptions at
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42 372 PHIs. With problems in drug supply procurement, unintended consequences on motivation
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45 373 and related behavior of health workers emerged: a brain drain of experienced health workers
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48 374 from THCs have flowed to county hospitals because the limited supply of many medicines
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51 375 have restricted their prescription behavior and resulted in the loss of many patients. In
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54 376 conclusion, policy makers should consider how to reduce the adverse effects of essential drug
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57 377 policy on motivation of PCWs, including how to appropriately remunerate health workers and
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60 378 ensure the enough clinical autonomy, and to ensure a timely supplied, transparent and
379 accountable the drug supply procurement.

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4 380 At the beginning of the NBPHSP, PCWs - who were responsible for basic public health
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6 381 services held negative attitudes toward the sustainable provision of these basic public health
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9 382 services, because this policy increased their workload and the subsidy being insufficient
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11 383 remuneration for their efforts^{36 38 44 50}. To motivate PCWs to provide these health services, the
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14 384 government subsidies have increased from 15 RMB per person for 2009 to 50 RMB for 2017.
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17 385 However, the heavy workload, rigid performance assessment procedure and lack of
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19 386 professional knowledge still exist, resulting in a negative effect on PCWs' job satisfaction and
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22 387 performance. We would suggest shifting the evaluation of PCWs' performance from faults
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24 388 seeking to supportive directions, improving ability of public health providers or strengthening
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27 389 the team work between clinical doctors with public health workers in order to strengthen the
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30 390 overall capacity on delivery of these public health services.
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33 391 After the implementing of TVHSIM, village doctors were managed just as the same
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35 392 role as staff of THCs and no longer the self-employed status that was not integrated in to
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38 393 formal health delivery system. Their income structure had gradually transformed as
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41 394 government subsidy has become an increasing source of income. They were motivated not
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44 395 only by the more stable financial subsidy from government, but also enjoyed good reputation
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46 396 and respect from local residents as a health provider with formal status. However, the income
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49 397 level and fringe benefit village doctors obtained are still lower than the regular employee in
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51 398 THCs, which still be an demotivating factor for village doctors³². A well-rounded social
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54 399 insurance model for village doctors is urgently needed further promotion⁴¹.
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57 400 The findings of this review adds value to the current literature, as it included
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59 401 qualitative, quantitative and mix methods studies to present an overview on the motivation of
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4 402 primary health workers in China, but it should be interpreted with caution because of several
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6 403 limitations. First, this review only focuses on the motivating factors of PCWs' work
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9 404 performance, and other relevant articles on motivation factors for attracting or retaining
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11 405 PCWs had been excluded by the search strategy. Secondly, all included studies analyzed
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14 406 PCWs' motivation from the perspective of negative problems and critics, which could lead to
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17 407 some bias because of few positive thoughts on current motivation status of PCWs being
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19 408 found.
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26 410 **Conclusions**

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29 411 Low motivation of PCWs is a bottleneck for promoting work performance of
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31 412 on-service PCWs in China. Policy makers should take account of all level of human needs
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33 413 influencing motivation of PCWs based on local reality, and consider firstly ensuring PCWs'
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35 414 appropriate remuneration level and career development space as priorities. We also suggest
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37 415 that countries undergoing health system level reform should consider the views of different
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39 416 stakeholders and analyze the potential side effects on health providers of some specific
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41 417 policies who are not directly targeted, in order to achieve benefits for both providers and
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43 418 demanders¹³
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54 420 **Abbreviations**

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57 421 PCW: Primary care worker; PHC: Primary health care; CHC: Community health
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59 422 centre; CHS: Community health station; THC: Township health centre; VC: Village clinic;
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4 423 PHI: Primary health institution; NEMS: National Essential Medicines System; NBPHSP:
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7 424 National Basic Public Health Service Program; TVHSIM: Township and Village Health
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9 425 Services Integration Management; RMB: renminbi
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14
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26 431 inclusion criteria.
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32 433 All authors proposed the hypothesis and idea for the systematic review and take
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35 434 responsibility for all aspects of it. QM, BY and HL discussed and contributed to
36
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38 435 conceptualization of this review and development of review protocol. BY applied the
39
40
41 436 inclusion criteria. HL and DW applied data extraction. HL was a major contributor in writing
42
43
44 437 the manuscript. All authors read and approved the final manuscript.
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51
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53
54

55 441 **Competing interests**

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57
58 442 The authors declare that they have no competing interests.
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443 Patient and Public Involvement

444 Not required.

445 Provenance and peer review

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448 There are no additional data available.

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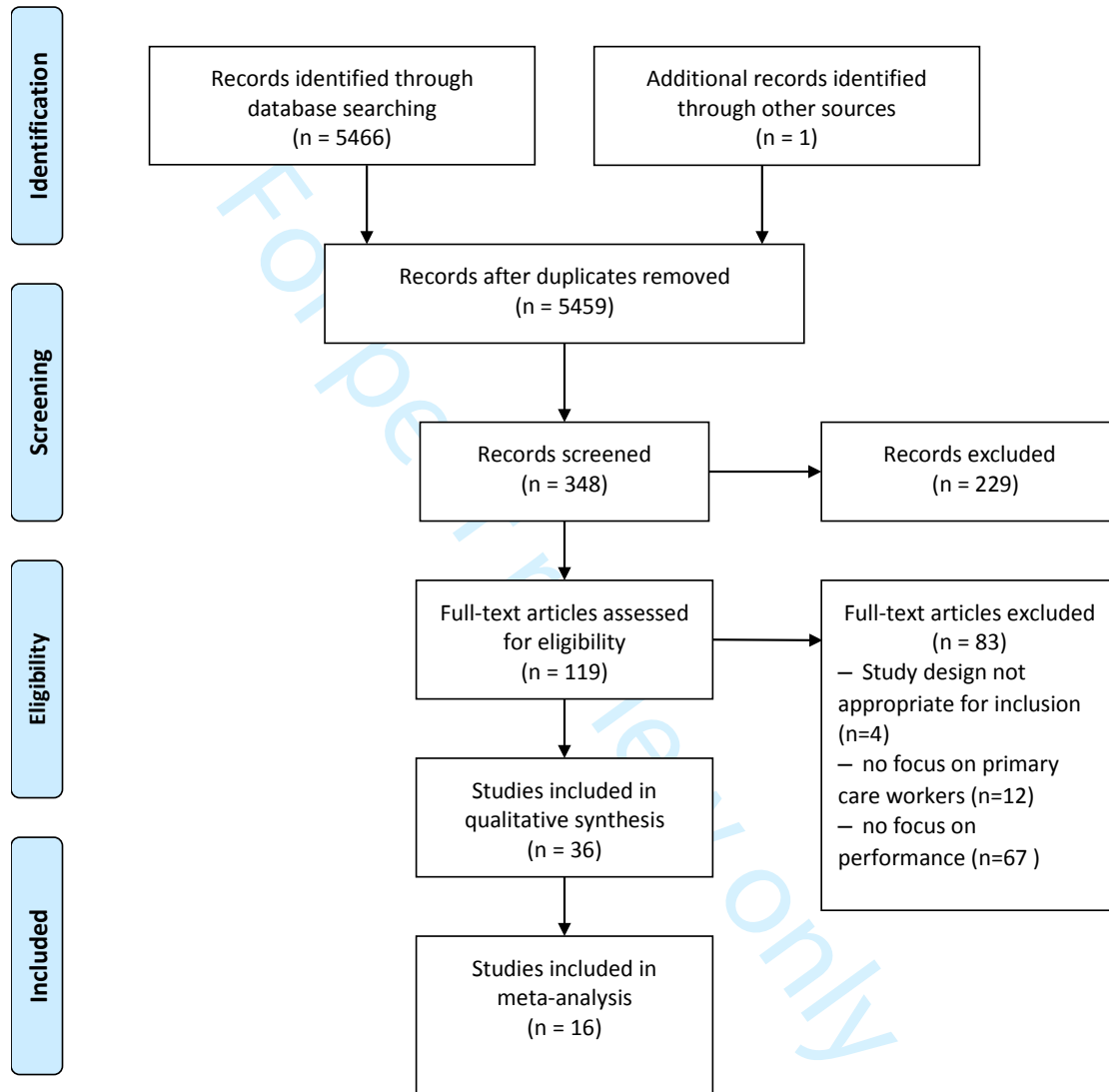
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602 **Figure legends**

603 **Figure 1.** PRISMA diagram.



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

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

607 **Tables**608 **Table 1.** Motivating factors for primary care workers609 **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

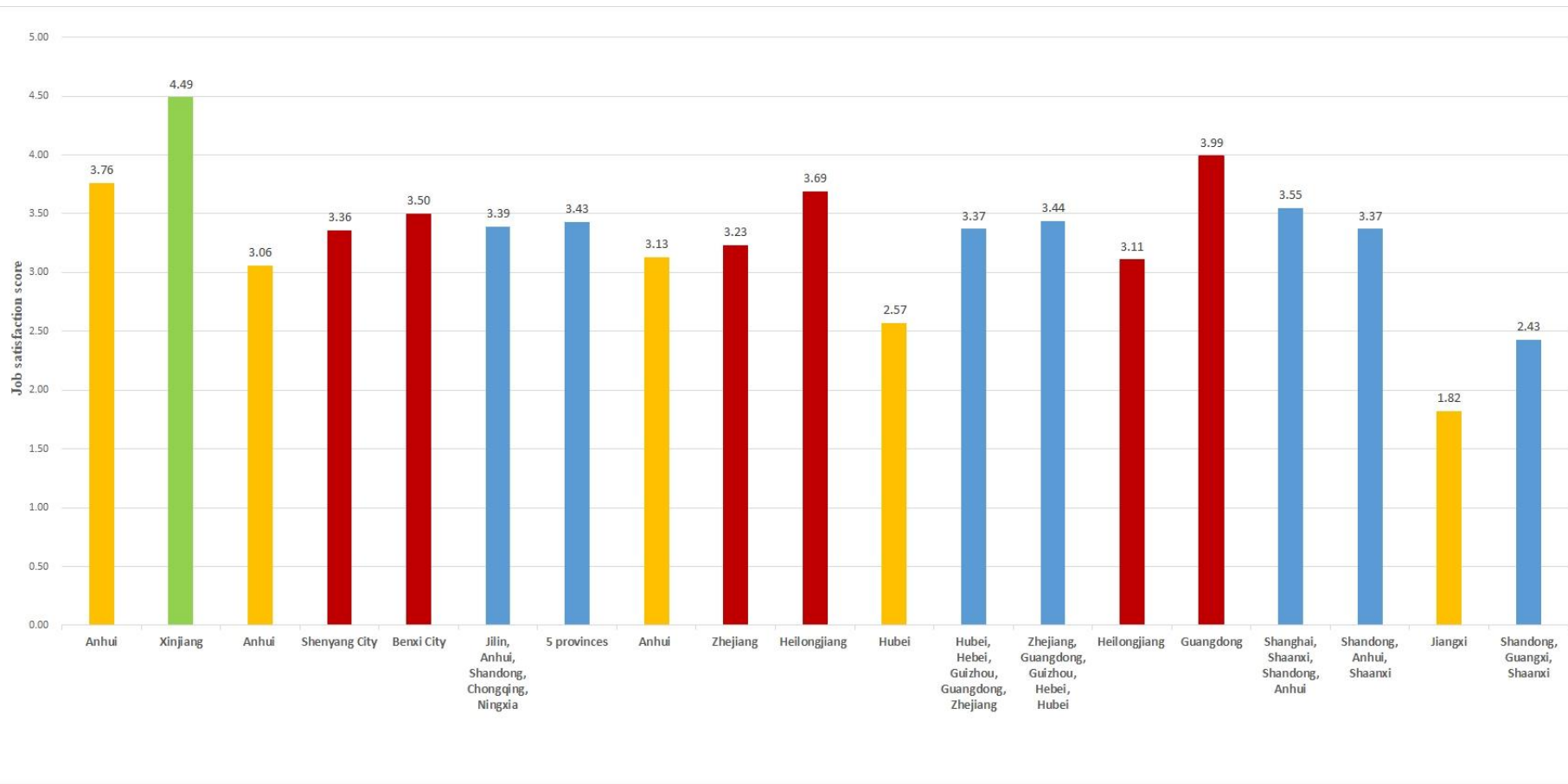
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Table 1

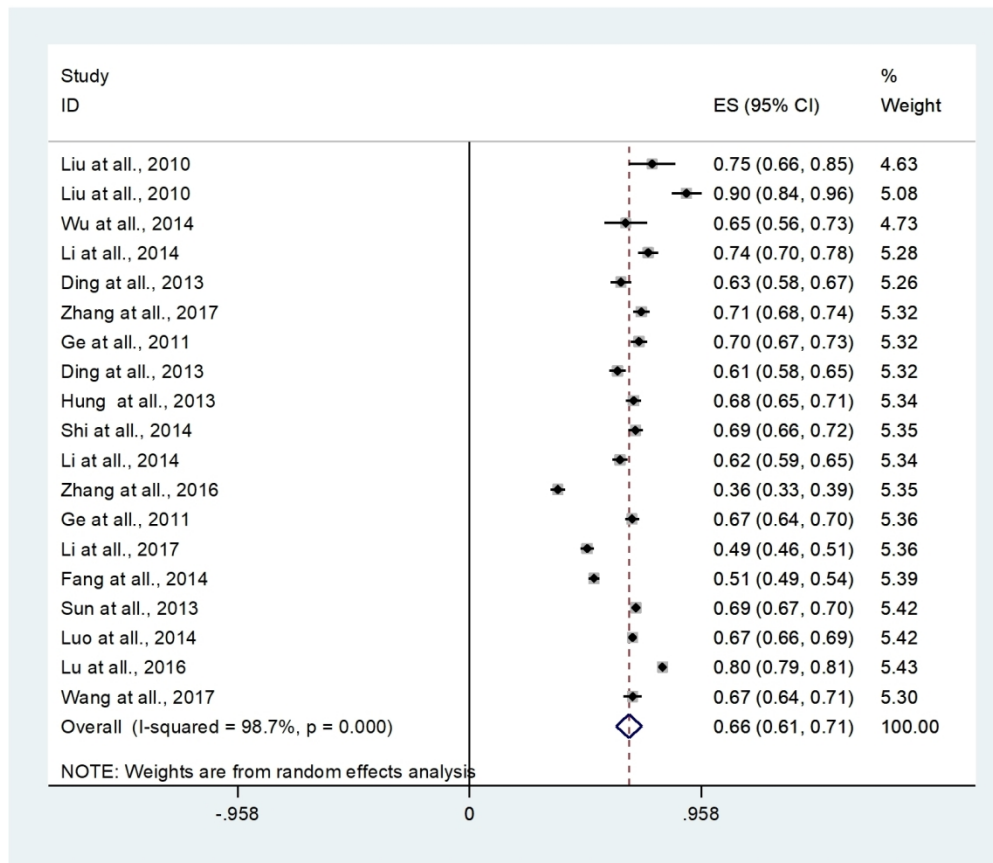
Motivating factor	Definition	Motivation to stay	Motivation to join/leave	Number of selected studies reporting the factors
Existence				
Financial incentives	Basic salary, bonus, benefits (insurances, vacation, etc.)	22	5	26
Workload	Hours of work, the amount of work done, flexibility in scheduling	12	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

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

35 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].

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2. List of included studies' general characteristics

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors
Zhang <i>et al.</i> , 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 <i>et al.</i> , 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.

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5	Zhang	2013.8-	Qualitative	Jiangsu,	Rural	Village	To investigate the	The health-care reform	Several policies such as
6	<i>at all.</i> ,	2014.1	Study	Henan,		Clinic	village doctors'	policies have had lasting	the National Essential
7	2015			Jiangxi,			income structure and	impacts on village	Medicines System,
8				Heilongjiang,			analyze how these	doctors' income	Integrated management,
9				Sichuan,			health policies	structure since the	National Basic Public
10				Gansu.			influenced it.	policies' implementation	Health Services, New
11								in 2009.	Rural Cooperative
12									Medical Scheme had
13									major impact on village
14									doctors.
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18	Wu <i>at</i>	2012	Quantitative	Zhejiang	Both	Community	To explore the	Low job satisfaction.	Doctors in the provincial
19	<i>all.</i> ,		study			Health	factors influencing	Primary care doctors	hospital appeared to be
20	2014					Centre;	doctors' job	were the least	the most dissatisfied
21						Township	satisfaction and	dissatisfied with the	group, and primary care
22						Health	morale in China, in	income and	physicians were most
23						Centre	the context of the	opportunities for	satisfied with their work
24							ongoing health	promotion.	and the causes of
25							system reforms and	Patients were becoming	dissatisfaction fall into
26							the deteriorating	more aggressive in their	three main areas: low
27							doctor-patient	demands and there was	income, heavy workload
28							relationship.	an increasing trend of	and patient aggression.
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Li <i>at all.</i> , 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 <i>at all.</i> , 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.

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5	Zhou	2013.1-	Qualitative	Zhejiang,	Rural	Township	To explore the	Some elements of the	The health workers'
6	<i>at all.</i> ,	3	Study	Yunnan		Health	impacts of these	reforms may actually be	intention was mostly
7	2014					Centre	reforms on health	undermining primary	blamed on the loss of
8							workers and service	care. While the new	income and incentives
9							users at township	health insurance system	and in the larger hospitals,
10							level, which has been	was popular among	on the essential drug list,
11							the major target of	service-users, it was	and the way it limits
12							the first phase of the	criticized for	clinical autonomy and the
13							reforms.	contributing to	provision of specialist
14								fast-growing medical	services.
15								costs, and for an	
16								imbalance of benefits	
17								between outpatient and	
18								inpatient services. Salary	
19								reform has guaranteed	
20								health workers' income,	
21								but greatly reduced their	
22								incentives. The essential	
23								drug list removed	
24								perverse incentives to	
25								overprescribe, but led to	
26								falls in income for health	
27								workers, and loss of	
28								autonomy for doctors.	
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Liu <i>et al.</i> , 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.
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5	Luo <i>at</i>	maybe	Quantitative	Hubei ,	Urban	Community	To analyze and	Low passion for current	The related factors that
6	<i>all.</i> ,	2012	study	Guizhou,		Health	determine the main	work.	influence CHS workers'
7	2014			Hebei ,		Centre	related factors that	Workers were most	work passion are
8				Guangdong ,			influence work	dissatisfied with the	socio-demographic
9				Zhejiang			passion of CHS	balance between	factors such as age, and
10							workers by	remuneration and	years of employment, and
11							investigating CHS	workload, job promotion	other work-related factors
12							workers from five	opportunities and most	such as learning and
13							Chinese provinces.	dissatisfied with the	training opportunities,
14								balance between	compensation packages,
15								remuneration and	work stress, and personal
16								workload, job promotion	development
17								opportunities.	opportunities.
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Ding <i>at all.</i> , 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.
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5	Hung	2011	Quantitative	Jilin,	Both	Township	To provide an	There were greater needs	The most important
6	<i>at all.</i> ,		study	Shandong,		Health	overview of major	for improvement in rural	motivating factors for
7	2013			Anhui,		Centre;	performance	than urban settings,	PCPs to improve
8				Chongqing,		Village	motivating factors	especially in living	performance were
9				Ningxia		Clinic;	for primary care	environment.	professional development,
10						Community	providers (PCPs) in	Types of PCPs were	training opportunities,
11						Health	China and examine	associated with needs for	living environment,
12						Centre/	associations between	improvement in different	benefits, working
13						Station	these factors and	factors. There were more	conditions and income.
14							individual and	needs from nurses and	
15							practice setting	village doctors.	
16							characteristics.		
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21	Sun <i>at</i>	Maybe	Quantitative	Zhejiang,	Urban	Community	To ascertain the key	38.7 % community	The influencing factors
22	<i>all.</i> ,	2012	study	Guangdong,		Health	factors that influence	health workers intended	that result in CHS worker
23	2013			Guizhou,		Centre	the CHS worker	to quit.	turnover intention are
24				Hebei, and			turnover intention to	CHS workers were less	socio-demographic
25				Hubei			increase their work	satisfied with the	factors such as age, post
26							satisfaction and	balance between	of duty, professional title,
27							stability.	payment and work	and working seniority,
28								quantity, promotion	and other work-related
29								opportunity, and	factors such as pay
30								working conditions.	packets, learning and
31									training opportunities,
32									promotion and personal
33									development space, and
34									working stress.
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5 Ding 2011.3- Quantitative Hubei, Jiangxi Rural Township To improve the early Village doctors prioritize Factors to consider in
6 *at all.*, 6 study Hubei, Jiangxi Rural Township Health detection of medical services but future activities to
7 2013 Centre; epidemics in rural they do their best to improve the quality and
8 Village China by integrating manage their time to extent of public health
9 Clinic syndromic services. The willingness services provided by
10 surveillance with the of township health village doctors include
11 existing case report centre directors and actual and potential
12 system. village doctors to income (i.e. medical
13 provide public health services, social pension
14 since the introduction of and other government
15 the package and a support), the relationship
16 minimum subsidy, but between village clinics
17 village doctors do not and township health
18 find the subsidy to be centres and the amount of
19 sufficient remuneration public health subsidy.
20 for their efforts.
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5	Li <i>at</i>	2009.12	Quantitative	Beijing,	Rural	Township	To analyze the	Rural health	Rural doctors wanted to
6	<i>all.</i> ,	-2010.1	study	Jiangsu,		Health	educational status	professionals in China	extend the training time,
7	2013	2		Zhejiang,		Centre;	and future training	who have relatively low	preferred to
8				Hainan ,Guang		Village	needs of China's	healthcare education	practice-focused training
9				xi , Shanxi,		Clinic	rural doctors and	should be focused on.	(on-site guidance from
10				Jiangxi,			provide a basis to	Rural doctors the	senior doctors, clinical
11				Guizhou,			improve their future	training status and needs	further education), and
12				Yunnan,			training.	of China's rural doctors	had greater desire for
13				Gansu				are still disjointed in	clinical skills, preventive
14								terms of the training	healthcare and medication
15								time, training method	knowledge education.
16								and training content.	
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20	Shi <i>at</i>	2011	Quantitative	5 provinces	Both	Township	To provide a	Low job satisfaction	Lower income and higher
21	<i>all.</i> ,		study	representing		Health	snapshot of the	PCW are least satisfied	workload are the two
22	2014			Eastern,		Centre;	current state of	with their income level	major contributing factors
23				Central, and		Village	primary care	(only 8.6% are either	toward job dissatisfaction.
24				Western China		Clinic;	workforce (PCW)	satisfied or very	
25						Community	serving China's	satisfied), benefits	
26						Health	grassroots	(12.8%), and	
27						Centre/	communities and	professional	
28						Station	examine the factors	development (19.5%).	
29							associated with their		
30							job satisfaction.		
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Ge <i>et al.</i> , 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 <i>et al.</i> , 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.

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5	Liu <i>at</i>	2007	Quantitative	Anhui,	Rural	Township	To measure job	Moderate job	Township health centers
6	<i>all.</i> ,		study	Xinjiang		Health	satisfaction level of	satisfactions in poor	employees are more
7	2010					Centre	THC employees in	areas. Job satisfaction	satisfied with the work
8							poor rural China and	scores reflecting job	significance and
9							to identify relevant	significance, job	cooperation with
10							features in order to	competency and team	colleagues, while less
11							provide policy advice	work were highest, while	satisfied with work
12							on human resource	work conditions and	conditions, reward and
13							development of	atmosphere and job	promotion opportunities.
14							health service	reward were lowest.	
15							institutions in poor		
16							regions.		
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21	Zhou	2013	Qualitative	Jiangxi	Rural	Township	To explore the	The contract service	Most health providers
22	<i>at all.</i> ,		Study			Health	perspectives of	actually promoted the	complained about the
23	2015					Centre;	health providers on	supply side to provide	heavy workload,
24	Feb					Village	the contract service	more public health	insufficient remuneration,
25						Clinic	policy, and	services to the villagers	staff shortage, lack of
26							investigate the	and contracted patients	official identity and
27							demand side's	felt satisfied with the	ineffective performance
28							attitude toward the	doctor-patient	appraisal, in addition to
29							public health services	relationship.	contempt from some
30							delivered under the		villagers and supervisors
31							contract policy.		after the implementation
32									of the contract service.
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Chen <i>at all.</i> , 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 <i>at all.</i> , 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.

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5	Li <i>at</i>	2014.4	Mixed	Shandong,	Rural	Village	To describe village	Low job satisfaction.	From interviews, most
6	<i>all.</i> ,		method study	Guangxi,		Clinic	doctors' job	Village doctors who	workers believed that age,
7	2017			Shaanxi			satisfaction under the	earned the top level of	income, and integrated
8							context of health	monthly income felt	management had a
9							sector reform and	more satisfied, while on	positive influence on the
10							investigate the	the county level, those	job satisfaction, while
11							associated factors.	who lived in counties	pension plan and basic
12								with the highest GDP	public health care policies
13								felt less satisfied.	exhibited negative effects.
14									Also, the increasing in
15									availability of healthcare
16									and health resources
17									along with local economic
18									development had negative
19									effects on village doctors'
20									job satisfaction.
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25	Zhang	2013	Quantitative	Shanghai,	Urban	Community	To examine the	The effect of P-O fit on	P-O fit was directly
26	<i>at all.</i> ,		study	Shaanxi,		Health	mediation effect of	turnover intention was	related to job satisfaction
27	2017			Shandong,		Centre	job satisfaction on	partially mediated	and inversely related to
28				Anhui			the relationship	through job satisfaction.	turnover intention.
29							between		
30							person-organization		
31							fit (P-O fit) and		
32							turnover intention		
33							based on data from		
34							China.		
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Li <i>at all.</i> , 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 <i>at all.</i> , 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.

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5	Wang	2013	Quantitative	Shandong,	Rural	Township	To investigate the	The minority of	Low job satisfaction was
6	at all.,		study	Anhui,		Health	association between	health-care staff belong	associated with specialty,
7	2017			Shaanxi		Centre	the latent clusters	to the “satisfied class”.	training opportunity, and
8							and health-care	Three among four	income inequality.
9							staff’s personal and	subgroups are not	
10							professional features.	satisfied with income,	
11								benefit, training, and	
12								career development.	
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16	Chen	After	Qualitative	Guangxi	Rural	Township	To understand the	Increasing the incomes	The main concerns related
17	at all.,	2009	study			Health	level of job	and fringe benefits of	to job satisfaction
18	2017					Centre	satisfaction as felt by	healthcare workers,	included working
19							primary health care	improving their work	conditions, financial
20							providers.	conditions, and	rewards, and the doctor’s
21								providing training and	relationships with
22								continuing education	patients.
23								opportunities would help	
24								rural clinics retain	
25								doctors and eliminate the	
26								current unsatisfactory	
27								conditions.	
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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.
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5	Song	2011	Quantitative	Jilin,	Both	Township	To find out which	Policymakers need to	Though income was
6	at all.,		study	Shandong,		Health	job attributes affect	improve primary care	important, Chinese
7	2015			Anhui,		Centre;	Chinese primary care	providers' income,	primary care providers
8				Chongqing,		Community	providers' choice of	benefits and working	also had strong
9				Shaanxi		Health	job and whether	conditions to fulfil their	preferences for sufficient
10						Centre	there are any	basic needs, invest in	welfare benefits,
11							differences in these	infrastructure and	sufficient essential
12							job preferences	strengthen training	equipment and respect
13							between doctors and	programmes in order to	from the community.
14							nurses.	raise the community's	
15								confidence in the	
16								services.	
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21	Mo at	2014	Quantitative	Guangxi	Rural	Township	To explore the	A decentralized	Mismatch between
22	all.,		study			Health	current health	degree-linked training	current health training
23	2017					Centre	training status of	program in which	initiatives and desired
24							nurses working in	medical universities and	programs in terms of
25							rural Chinese	city hospitals collaborate	training setting, content,
26							township health	would be an appropriate	and delivery mode
27							centers and to	mode of delivery.	
28							ascertain their		
29							perceived needs.		
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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.

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5	Feng	2014	Quantitative	Qinghai,	Rural	Village	To examine the	Low satisfaction with	Social insurance, essential
6	at all.,		study	Inner		Clinic	satisfaction of village	the TVHSIM.	medical knowledge, year
7	2017			Mongolia,			doctors with the	A well-rounded social	of practice significantly
8				Xinjiang			Township and	insurance model for	influenced satisfaction of
9							Village Health	village doctors is	village doctors on human
10							Services Integration	urgently needed and	resources management,
11							Management	enhancing essential	drug and medical device
12							(TVHSIM).	medical training should	management, and
13								be carefully considered.	financing management.
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19	Li at	2014	Quantitative	Shandong,	Rural	Village	To identify factors	There is considerable	Increasing public health
20	all.,		study	Guangxi,		Clinic	associated with	room for improvement	care subsidies received by
21	2016			Shaanxi			village doctors' basic	regarding the factors	individual village doctors,
22							public health services	associated with village	availability and
23							provision and to	doctors' basic public	attendance of training
24							formulate targeted	health services	opportunities, and
25							interventions in rural	provision.	integrated management
26							China.		and NCMS contracting of
27									village clinics are
28									important factors in
29									increasing basic public
30									health services revision in
31									rural areas.
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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 <i>at all.</i> , 2010	2007	Anhui	rural	77	Likert 5 point	Sum of dimension	3.76*	-
Liu <i>at all.</i> , 2010	2007	Xinjiang	rural	95	Likert 5 point	Sum of dimension	4.49*	-
Ding <i>at all.</i> , 2013	2009	Anhui	urban	765	Likert 5 point	Sum of dimension	3.06	0.497
Ge <i>at all.</i> , 2011 ²²	2009-2010	Shenyang City	urban	1010	Likert 5 point	Sum of dimension	3.36*	-
Ge <i>at all.</i> , 2011 ²²	2009-2010	Benxi City	urban	684	Likert 5 point	Sum of dimension	3.50*	-
Shi <i>at all.</i> , 2014	2011	5 provinces	both	863	Likert 5 point	Sum of dimension	3.43	0.77
Hung <i>at all.</i> , 2013	2011	Jilin, Anhui, Shandong, Chongqing, Ningxia	both	823	Likert 5 point	Sum of dimension	3.39	-
Wu <i>at all.</i> , 2014	2012	Zhejiang	both	111	Likert 5 point	Sum of dimension	3.23	0.06
Li <i>at all.</i> , 2014	2012	Heilongjiang	urban	448	Likert 5 point	Sum of dimension	3.69	-
Ding <i>at all.</i> , 2013	2012	Anhui	urban	495	Likert 5 point	Sum of dimension	3.13	0.643
Luo <i>at all.</i> , 2014	2012	Hubei, Hebei, Guizhou, Guangdong, Zhejiang	urban	3220	Likert 5 point	Sum of dimension	3.37	-

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5	Sun <i>at all.</i> , 2013	2013	Zhejiang, Guangdong, Guizhou, Hebei, Hubei	urban	3212	Likert 5 point	Sum of dimension	3.44	-
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9	Fang <i>at all.</i> , 2014	2012	Hubei	rural	1889	Likert 5 point	Sum of dimension	2.57	-
10									
11	Zhang <i>at all.</i> , 2017	2013	Shanghai, Shaanxi, Shandong, Anhui	urban	656	Likert 5 point	Standalone item	3.55	0.74
12									
13									
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15	Li <i>at all.</i> , 2014	2013	Heilongjiang	urban	930	4 point	Sum of dimension	3.11	0.68
16									
17	Zhang <i>at all.</i> , 2016	2014	Jiangxi	rural	935	Likert 5 point	Standalone item	1.82	0.63
18									
19	Li <i>at all.</i> , 2017	2014	Shandong, Guangxi, Shaanxi	rural	1221	4 point	Standalone item	2.43*	-
20									
21									
22	Lu <i>at all.</i> , 2016	2013	Guangdong	both	5845	Likert 6 point	Sum of dimension	3.99	0.99
23									
24									
25	Wang <i>at all.</i> , 2017	2013	Shandong, Anhui, Shaanxi	rural	603	Likert 5 point	Sum of dimension	3.37	-
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29	* We converted these scores from the sum of percentage scores into 5-grade score: Overall satisfaction = summed score/maximum total score × 5								
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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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BMJ Open

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

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Manuscript ID	bmjopen-2018-028619.R1
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Primary Subject Heading:	Public health
Secondary Subject Heading:	Health services research, Health policy, General practice / Family practice
Keywords:	Primary health care, Primary health worker, Motivation, Performance, Health policy < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

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4 **1 Motivating factors on performance of primary care workers in China:**
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7 **2 A systematic review and meta-analysis**
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15 **Number of tables and figures:** 2 tables and 3 figures are included in this article.

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19 Abstract

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

25 **Design:** Systematic review

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

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

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4 40 reaching a satisfied rating and varied in different regions.
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7 41 **Conclusions:** This study suggests low work satisfaction among PCWs in China, with
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10 42 financial incentives and career advancement being two most important motivating factors.
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12 43 Efforts to improve the work performance in PCWs should give priority to these motivating
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15 44 factors and systematically take into account the health policy's impacts on performance of
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17 45 PCWs.
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20 46 **Keywords**

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24 47 Primary health care, Primary care worker, Performance, Motivation, Health policy
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27 48 **Strengths and limitations of this study**

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30 49 ► A myriad of potentially eligible articles were screened and included using a comprehensive
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33 50 search strategy.
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36 51 ► Reliability of the study selection, data extraction and quality assessment was ensured by
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39 52 involving two independent reviewers.
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42 53 ► This review contributes to the current literature as it included studies that adopted
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45 54 qualitative, quantitative or mix methods to present a comprehensive overview of the
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48 55 motivating factors on performance of China's primary care workers.
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50 56 ► This study benefited from summarizing all the motivating factors on performance of
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53 57 China's primary care workers in a systematical way, namely, at both an individual level and a
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56 58 health system level.
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59 59 ► Chinese articles were not included in this review.
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60 Introduction

61 In China, the primary health care (PHC) services that include public health services and basic
62 medical health services are provided by community health centres (CHCs) and their affiliated
63 community health stations (CHSs) in the urban areas and by township health centres (THCs)
64 and their affiliated village clinics (VCs) in the rural areas. These four types of PHC
65 institutions constitute the essential part of China's three-tertiary health care delivery network.
66 Administered by CHCs and THCs respectively, CHSs and VCs function as the satellite sites
67 of their superior institutions. As is central to China's health system reform initiated in 2009¹,
68 the strengthening of the primary health care has been hindered by the grave challenges
69 concerning the structure of China's health care delivery system, in particular, the
70 low-performance of PHC delivery system². From 2010 to 2016, China's PCWs have
71 experienced a rise in their number from 3.3 million to 3.7 million, but a decrease in their
72 proportion in health workers, from 40.0% to 33.0%. This trend is mirrored by the utilization
73 of health services during the same period of time: PHC institutions' proportion has dropped
74 from 61.9% (3.6 billion visits) to 55.1% (4.4 billion visits) in terms of the outpatient visits
75 and from 27.9% (39.5 million hospitalizations) to 18.3% (41.7 million hospitalizations) in
76 terms of the inpatient visits³. Against this backdrop, the strengthening of primary health
77 system will remain as the focus of health system reform in the near future, which can be seen
78 from the fact that *the Outline of Healthy China 2030 Plan*, the government's blueprint for
79 health system development, has underscored the importance of primary health care⁴.
80 Health workforce shortage is one of the major obstacles to strengthen China's primary health
81 care services⁵. To make matters worse, the primary health workforce is confronted with

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4 82 serious challenges such as low education level, lack of qualifications, aging, high turnover
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6 83 and poor working performance⁶. Of all the determinants of PCWs' performance, work
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9 84 motivation, defined as an individual's degree of willingness to exert and maintain an effort
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11 85 towards organizational goals⁷, plays a crucial role in changing the behavior of health
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14 86 providers. It has been demonstrated that work motivation can influence job satisfaction, hence
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17 87 influencing job performance^{8 9}. There has been an expanding body of studies exploring the
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20 88 motivating factors for PCWs through qualitative, quantitative or mixed methods, but the study
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23 89 sites and methodological quality of these studies varied. Synthesizing these motivating factors
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25 90 in different areas of China could help identify the most important motivating factors and
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27 91 appreciate the overall job satisfaction level of PHWs in China. In addition, synthesizing the
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30 92 motivating factors for PCWs and analyzing the complexity pathway between motivating
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33 93 factors and performance hold general and applicable implications for improving the
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35 94 motivation and performance of China's PCWs. In light of this, this review aims to synthesize
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38 95 and analyze the motivating factors for PCWs and provide evidence-based policy implication
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41 96 on how to improve the performance of China's PCWs.

97 **Methods**

98 **Search strategy and eligibility criteria**

99 We searched the PubMed and MEDLINE on June 2, 2018 to identify relevant studies
100 using MeSH terms in conjunction with free-text words including all the possible synonyms,
101 alternative terms and spellings⁶ to increase sensitivity to any potentially eligible literature. All
102 the search terms were provided in the Supplementary Appendix 1. Search results were

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4 103 exported to EndNote X7 to be organized and duplicate records were removed in the first
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6 104 place. Then two authors exported the citations to Microsoft Excel and conducted the literature
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9 105 screening and selection independently. Divergent judgments were settled through discussion.
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11 106 We searched for and included articles about the motivating factors on performance of the
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13 107 PCWs who work in four types of China's PHC institutions: rural THCs, rural VCs, urban
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16 108 CHCs and urban CHSs. In this study, motivation in the work context is defined as an
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19 109 individual's degree of willingness to exert and maintain an effort towards organizational or
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22 110 system goals¹⁰, and the degree of job satisfaction, work stress and turnover intention seen as
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25 111 possible reflections of motivation which may influence work performance. Therefore, all the
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28 112 studies that explored the level of work motivation, job satisfaction, work stress, turnover
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31 113 intention and the influencing factors of these motivation expressions were included. We also
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33 114 searched for relevant studies found in the references of the included articles and other sources.
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35 115 The included studies adopted either observational or experimental design, and presented
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38 116 primary quantitative or qualitative data. All the included articles were in English language
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41 117 and published between 2000 and 2018. Studies were excluded if they did not address the
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44 118 motivating factors for PCWs, or if the participants were not PCWs or did not work in the four
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47 119 types of PHC institutions mentioned above.

120 **Assessment of risk of bias**

121 Methodological quality of the included studies was evaluated using Hoy's risk of bias
122 tool which is adapted from the one developed by Leboeuf-Yde and Lauritsen¹¹. Based on a
123 total score, studies are put into three categories: low risk of bias (8-10), moderate risk of bias

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4 124 (5-7) and high risk of bias (0-4).
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8 125 **Data extraction and synthesis**
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11 126 Extracted data included study design, year or years of study, settings, participants,
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13 127 sample sizes, measurement of motivation, objective, key motivation, conclusions and
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16 128 motivating factors. Data extraction and analysis were guided by Alderfer's ERG theory, which
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18 129 proposes three core human needs in organizational settings: existence (the desire for material
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20 130 things), relatedness (the desire for cordial interpersonal relations), and growth (the desire for
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22 131 opportunities to be creative and to develop one's skills)¹². A thematic synthesis approach was
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24 132 adopted for data analysis to capture the evidence illustrating PCWs' motivation. Motivating
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26 133 factors extracted from the included articles were grouped into four themes: 1) factors
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28 134 concerning the existence needs, including payment, fringe benefits and physical working
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30 135 conditions; 2) factors concerning the relatedness needs, which are concerned with social
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32 136 environment and relationship; 3) factors concerning the growth needs, referring to career or
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34 137 self-development and management environment; 4) factors concerning the health policy
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36 138 context and organizational context that could influence one or more needs categories
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38 139 mentioned above. The first three themes of motivating factors represented, at an individual
39
40 140 level, three different dimensions of human needs in PHC institutions based on the ERG
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42 141 framework and the last theme was singled out because different health policies had complex
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44 142 impacts on the performance by influencing more than one dimension of human needs at a
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46 143 macro level. First, authors aggregated data into motivating factors and extracted all original
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48 144 motivating factors in each article to put them into one of the four themes. Then we identified
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4 145 correlations between the different factors, refined them through discussion and synthesized
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7 146 similar factors into a higher level theme.
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10 147 As job satisfaction was positively associated with job performance¹³ and nearly half of
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12 148 the selected articles studied job satisfaction with quantitative measurement, we resorted to
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15 149 meta-analysis to synthesize the 16 articles that provide data of PCWs' job satisfactions. We
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18 150 unified the measurement of overall job satisfaction by transforming different calculations into
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21 151 a 5-point rating scale and pooled the study-specific estimates using a random effects
22
23 152 meta-analysis model to obtain an overall summary of the job satisfaction scores across studies
24
25
26 153 ¹⁴. We analyzed the data using Stata version 14.0 for Windows.
27
28

29 154 **Patient and public involvement**

30
31
32 155 Patients and public were not involved in this study.
33
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35

36 156 **Role of the funding source**

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40 157 The funders of the study had no role in study design; data collection, analysis and
41
42 158 interpretation; writing of the report; and the decision to submit the paper for publication.
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46 159 **Results**

50 160 **Characteristics of reviewed studies**

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53 161 We firstly screened 5466 titles and abstracts, and then retrieved and screened the
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56 162 full-texts of 348 potential relevant studies to evaluate their eligibility (Figure 1). After the full
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59 163 text screening, 119 studies relevant to the human resources of PHC in China were included
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4 164 for us to appreciate the current status of PCWs. To obtain sufficient information related to the
5
6 165 motivation of PCWs, 1 additional article from reference search was also identified and
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8
9 166 included after applying the eligibility criteria. Finally, of the 119 studies, 83 articles that did
10
11 167 not contain specific motivating factors were excluded; 36 articles that were closely relevant to
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13
14 168 PCWs' motivation for were selected for data extraction and synthesis. A list of the basic
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16
17 169 characteristics of the included articles can be found in Supplementary Appendix 2. 25
18
19 170 quantitative, 7 qualitative, and 4 mixed methods primary studies were included, covering at
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21
22 171 least 27 provinces of China. All of the 36 articles were cross-sectional studies, with 17 studies
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24
25 172 taking place in rural China, 11 in urban China and 8 in both China's urban and rural areas. Of
26
27 173 the 17 studies concerning rural areas, 8 articles only included village doctors in village clinics
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29
30 174 as participants, 5 articles only studied health workers in THCs and 4 articles were concerned
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32
33 175 with rural PCWs in both village clinics and THCs. The 11 studies that were concerned with
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36 176 urban areas addressed urban PCWs in community health centers/stations. 4 articles studied all
37
38 177 types of PCWs in different kinds of rural and urban PHC institutions. As for the risk of bias,
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41 178 more than half of the included studies presented a low risk of bias, with the total score
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43 179 ranging from six points to ten points (in Supplementary Appendix 2). Included studies
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45
46 180 analyzed the motivation of PCWs from different perspectives: some measured job satisfaction
47
48 181 ¹⁵⁻³⁰; some explored the motivating factors' influence on attrition and retention^{18 22 31-35}; some
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50
51 182 studied the impact of some policies or interventions on the motivating factors for health
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54 183 workers ^{31 36-40 41-46}.

184 **Motivating factors for PCWs**

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4 185 **Factors concerning existence needs**

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6
7 186 Financial incentives, workload and the work conditions related to a person's physical
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10 187 needs such as food, clothing, and shelter were clustered into factors concerning existence
11
12 188 needs. In this review, we found that work conditions, payment and the mandatory workload
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14
15 189 were considered as significant factors of PCWs' satisfaction^{15 19 20 22 23 25 30 47} and turnover
16
17 190 intention^{18 22}. 26 out of the 36 articles reported financial incentives (Table 1) and found that
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19
20 191 the financial incentives such as income and fringe benefits were significantly associated with
21
22 192 job satisfaction^{15 17 30} and difficulties in PCW recruitment^{32 34 35}. Moreover, financial
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25 193 incentives and working conditions were the top two motivating factors for PCWs to improve
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28 194 performance^{21 33}.

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31 195 Another line of inquiry explored the impact of different health system reform policies
32
33 196 on motivating factors. For example, in a qualitative study, administrators and frontline
34
35 197 healthcare workers in PHC institutions mentioned that the increased income after the 2009
36
37 198 health system reforms did not fully reflect the increased workload, and those who worked the
38
39 199 most were not necessarily rewarded the most, constituting a demotivating factor for some
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41
42 200 health workers³⁷.

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47 201 **Factors concerning relatedness needs**

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50 202 Relatedness needs refer to a person's interpersonal needs in his personal and
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52
53 203 professional settings and in this review, factors concerning relatedness needs were deemed as
54
55 204 a person's relationships with the living environment, the society, the coworkers and the nature
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58 205 of work.

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4 206 17 studies reported work itself and 11 studies reported work relationships (Table 1).
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6 207 Compared with factors concerning existence needs, the PCWs were more satisfied with the
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8
9 208 nature of work and work relationships^{20 25 30}. This finding indicated that most workers got
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11
12 209 along well with their colleagues and believed that their jobs were to be of value, which can
13
14 210 act as a motivating factor in case of poor physical environment.

17
18 211 13 of the selected studies reported recognition from society including being understood
19
20 212 by society and physician-patient relationships (Table 1). Satisfaction with social status and
21
22 213 relationship with patients was significantly associated with job satisfaction^{15 30}. In terms of
23
24 214 patients' respect, there seemed to be an urban-rural difference, with the rural PCWs being
25
26 215 slightly more satisfied than their urban counterparts²³. However, few rural PCWs expressed
27
28 216 satisfaction with their current relationships and indicated that the patients could not
29
30 217 understand the doctor's work⁴⁷. In addition, the growing workplace violence negatively
31
32 218 affected the PCWs' job performance and quality of life⁴⁸ and emerged as a major contributor
33
34 219 to doctors' low morale in recent years¹⁶.

40
41 220 6 studies reported living environment as a factor concerning relatedness needs (Table
42
43 221 1) and showed that compared with urban areas, rural areas had greater needs to improve the
44
45 222 living environment^{21 33}. In addition, young health workers' weakening sense of belonging and
46
47 223 responsibility to their hometown has made it more difficult to recruit young health workers
48
49 224 born in local areas³².

225 **Factors concerning growth need factors**

56
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58 226 Career advancement, training, rewards, management and autonomy relating to a
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4 227 person's needs of personal development were considered as factors concerning growth needs
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6 228 in this review.
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10 229 19 out of the 36 articles reported the factor of career advancement (Table 1), which was
11
12 230 considered as the one of top three contributors to satisfaction^{15 16 19 20 22 23 29}. The gap between
13
14 231 the expected and actual professional development was one of the main sources of job
15
16 232 dissatisfaction¹⁷. Limited opportunities for job promotion was another factor contributing to
17
18 233 the low levels of work passion¹⁹ and turnover intentions of village doctors^{18 22}. The main
19
20 234 causes might be that few positions and opportunities were available for the health
21
22 235 professionals in PHC institutions to get higher professional titles on the regular payroll,
23
24 236 especially compared with the opportunities that their counterparts in higher level health
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26 237 institutions can enjoy.
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33 238 Training was mentioned as a motivating factor by 13 out of the 36 articles (Table 1).
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35 239 Learning and training were significantly associated with work passion¹⁹, job satisfaction¹⁵
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37 240 ²⁹and turnover intention²². Along with career advancement, training was also considered as
38
39 241 one of the most important motivating factors for PCWs to improve performance²¹. However,
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41 242 training arrangements were inadequate^{34 49 50} to address the fragmented needs of China's
42
43 243 PCWs. Health workers preferred more training time for practice-focused training (on-site
44
45 244 guidance from senior doctors and further clinical education) over knowledge-focused training,
46
47 245 and favoured such training contents as clinical skills, preventive healthcare and medication
48
49 246 knowledge education⁴⁹. As a result, although training was reported as an effective incentive
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51 247 in recruitment, it failed to act as an effective motivating factor to attract young doctors to rural
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53 248 areas in China³⁴.
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4 249 Among the selected studies, the number of studies that reported the motivating factors
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6 250 of rewards, management and autonomy stood at 9, 9 and 14, respectively (Table 1).
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9 251 According to most of the selected articles, PCWs were relatively satisfied with the
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11 252 decision-making ability of their superiors, the contingent rewards and the opportunities to do
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14 253 work by making decisions on their own and to utilize their professional skills and talents ^{15 22}.

254 **System and policy factors**

255 Motivation was not only influenced by the motivating factors at the individual level,
256 but also by the health sector reforms and specific incentive schemes that target workers ⁷.
257 Theoretically, any health sector reform would directly influence the motivating factors that
258 the health workers feel or that affect the structure of health organizations, thus in turn
259 affecting the work rewards of the health workers. 18 out of the 36 articles reported
260 macro-level factors (Table 1), namely, the health system and policy factors such as National
261 Essential Medicines System (NEMS), National Basic Public Health Service Program
262 (NBPHSP) and Township and Village Health Services Integration Management (TVHSIM).
263 The gap between the intended and actual consequences of the policies was one of the main
264 determinants of job satisfaction ¹⁷. The comprehensive reform of PHC in Anhui has changed
265 PCWs' compensation structure and improved their income and work efficiency, but
266 dampened their work enthusiasm because of the poorly designed performance-based
267 evaluation system³⁷. Different economic status and health reform processes may lead to
268 different consequences. Take the comprehensive reform of PHC in Shandong as an example.
269 PCWs there on the one hand complained about increased trivialities at work, heavier
270 workload, blurry job description, unsatisfactory income and a lack of professional

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4 271 development, but on the other hand were satisfied with the relationships with the community
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6 272 and low work pressure⁴¹.
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10 273 The NEMS included a new National Essential Drugs List to ensure free access to safe
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12 274 and effective medication for the patients, and introduced a series of polices on drug
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14
15 275 production, pricing and distribution in the hope of promoting the rational use of medications
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17 276 by reducing the reliance on drug sales and profit seeking behaviors. To be more specific, only
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19
20 277 drugs on the list were allowed to be prescribed in VCs and price mark-ups were forbidden.
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22
23 278 The impacts of the NEMP varied by region, professional practice and income level⁴². In one
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25 279 survey, most PCWs perceived no change in their income and reported a high level of
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27
28 280 satisfaction towards NEMS⁴⁵. However, according to another in-depth interview with village
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30 281 doctors³⁶, the introduction of the essential drug list for PHC institution dramatically reduced
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33 282 their medical income as most areas had limited government subsidies to supplement their
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36 283 incomes. At the same time, they also complained that they had lost patients' trust and work
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38 284 enthusiasm as the classes and total amount of essential medicines were not enough to meet
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41 285 daily treatment needs^{42 45}.
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44 286 The NBPSP starting from 2009 provided a package of basic public health services for
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46
47 287 all residents, with a focus on the management of non-communicable disease. To motivate
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49 288 PCWs to provide preventive health services, the government grants subsidies based on the
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52 289 number of covered residents. At the beginning of this reform, due to the broad scope of basic
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55 290 public health services and limited financial incentives, providers felt that they were under
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57 291 great stress due to the competing demands for their time and complained about the heavy
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60 292 workload, insufficient remuneration, staff shortage, lack of formal professional identity and

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4 293 ineffective performance appraisal. In addition, providers had to deal with the distrust and
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6 294 disrespect from some residents^{40 46}, especially those public health workers who were
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9 295 dismissed as having lower levels of knowledge and skill than specialists³⁹. Providers with
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11 296 more subsidies, training opportunities and integrated management had better performance in
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14 297 service provision⁴⁴.

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17 298 The TVHSIM required THCs, the upper-level health institutions, to direct and
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19 299 supervise VCs in their routine work and their work in medicine, personnel management,
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21 300 financing, and the upgrade and maintenance of facilities, resulting in mixed impacts on
22
23 301 village doctors. On the one hand, most village doctors felt more respected under this
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25 302 integrated management because they were more recognized as health workers in a formal
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27 303 health system rather than private drug salesmen. On the other hand, they were not allowed to
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29 304 perform agricultural or any other side activity for extra money^{26 36}, which negatively affected
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31 305 their financial conditions.
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40 306 **Job satisfaction for PCWs**

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43 307 The performance of healthcare delivery system is critically dependent on workers'
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45 308 motivation which is directly mediated by workers' willingness⁷. As an important indicator to
46
47 309 measure workers' willingness to exert efforts, satisfaction is highly relevant for the
48
49 310 sustainable development of PHC in China. 16 included articles assessed job satisfaction as an
50
51 311 important dimension reflecting providers' motivation (See supplementary Appendix 3). A
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53 312 total of 19 investigation samples were extracted from these 16 articles with cross-sectional
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55 313 study design, representing more than half of the provinces in China. In particular, 2 articles²⁴
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4 314 ²⁵ provided data of 2 provinces/cities and 1 article²⁰ represented data of two years. The overall
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7 315 job satisfaction score ranged from 1.82 to 4.49 and also varied from region to region (Figure
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9 316 2). To be more specific, for most samples drawn from more than three provinces, the
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11 317 satisfaction scores leveled off between 3.37 and 3.55, but the samples from the middle area
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14 318 samples scored lower than those from the eastern area. Besides, the score of Xinjiang, the
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16
17 319 representative of the western areas, was the highest among the included samples.

20 320 Meta-analysis was approached by combining results weighted by sample size and
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22
23 321 showed that the overall job satisfaction score among PCWs was 3.30, equivalent 0.66 ([95%
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25 322 CI 0.61–0.71]; I²=98.7%; P<0.001; Figure 3), just reaching a level indicating satisfaction. But
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27
28 323 the overall satisfaction mean of rural health workers was lower than that of the urban health
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31 324 workers (Table 2).

34 325 **Discussion**

36 326 **Financial incentives and career advancement were the top two motivating factors**

37 327 **for PCWs in China.** In the included articles, the balance between remuneration,

38 328 workload, and career promotion opportunities was most frequently mentioned as a critical

39 329 motivating factor on PCW's performance. In spite of Chinese government's considerable

40 330 investments in recent years to improve the income of the health workers in PHC institutions,

41 331 the gap between the actual and expected income continued to widen due to increasing

42 332 urbanization and ever growing living costs. According to some doctors in THCs, the

43 333 performance-based salary means that 30-40% of the salary was based on their workload,

44 334 quality of service and patients' satisfaction, but due to the limit of overall revenue and revenue

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4 335 structure, the well-performing health workers can only be rewarded by reducing the income
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6 336 of their co-workers with poor performance. This payment method did not work well in reality
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9 337 as to motivate health workers. How to improve the income level of health workers in primary
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11 338 health delivery system will remain a crucial but tricky issue in the near future. Besides, as
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14 339 shown in our analysis in Figure 2, financial incentives were no longer the sole means to
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17 340 promote motivation, improve job satisfaction and enhance work performance. Other factors,
18
19 341 in particular, professional development, work characteristics and training, have been equally,
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22 342 if not more, important for China's PCWs. More specifically, the lack of chances for
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25 343 professional title promotion and limited career development opportunities were important
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27 344 reasons that lead to turnover intention. This finding is in line with other internationally
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30 345 published studies and underscores the importance of the non-financial as well as the financial
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32 346 incentives^{7 51}. The ERG framework implies that the fulfillment of human needs plays an
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35 347 important role in PCWs' motivation, but each individual prioritizes the existence needs,
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38 348 relatedness needs and growth needs differently. In this review, we found that the PCWs in
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40 349 China are confronted with barriers in fulfilling all of the three levels of human needs. Income
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43 350 security has increased, but still far lower than the expected level; the residents' recognition of
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46 351 and cooperation with the PCWs have played a negative role in influencing the motivation and
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48 352 behaviors of health workers; career promotion system and training arrangements did not meet
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51 353 their growths need neither. Policy makers must realize that a health worker has multiple needs
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54 354 to be met simultaneously. In addition, motivation improvement should be prioritized in a way
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56 355 that suits local institutional environments and personal preference. A sole focus on one type
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58 356 of need at a time cannot effectively motivate PCWs⁵².

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4 357 **The overall job satisfaction score among PCWs was still low, especially in rural**
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6 358 **areas.** As the predictor of job satisfaction, the overall job satisfaction score reflects PCWs'
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9 359 emotional status and to what extent their human needs are satisfied. PCWs' performance can
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12 360 be considerably improved by identifying the motivating factors so as to increase their work
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14 361 satisfaction. The most prominent factor causing the general dissatisfaction of PCWs,
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16
17 362 especially the PCWs in rural areas, was the financial rewards from work. In 2014, the annual
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19 363 income of 84.06% village doctors was less than 30 000 RMB, much lower than the average
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22 364 income (56 394 RMB) of the doctors in Jiangxi province's higher level health institutions,
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24 365 and nearly half of the village doctors thought that they earned less than other people in the
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27 366 local area¹⁵. In addition, as discussed above, the health system reform policies also had
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30 367 indirect and negative impacts on PCWs' income level and further reduced their job
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33 368 satisfactions. These findings hold significant implications for policy makers and PHC
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35 369 institution managers who make efforts to improve workers' job satisfaction ^{17 28}. Another
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38 370 finding of the synthesis was the significant differences of satisfaction scores among eastern,
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41 371 western and middle regions of China. There is no doubt that imbalance exist among these
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43 372 regions at all levels. As for the satisfactions of PCWs, provinces in the eastern region, with
44
45 373 more developed economy and better health facilities, scored higher than provinces in the
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48 374 middle region and lower than provinces in the western region. Considering western China are
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51 375 remote areas with less economic development, the higher job satisfaction of PCWs may be
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53 376 explained by the lower expectations of PCWs, more government subsidies and other central
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56 377 government supports that target remote western areas. In light of this, the government should
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59 378 take into account the imbalanced development of China's different areas, especially China's
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4 379 middle area where the economic development and resources are limited and the central
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6 380 government's subsidies are also absent.
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11 381 **The health system reform and some specific policies have inevitable and indirect**

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13 382 **impacts on PCWs.** In 2009, China launched a landmark healthcare reform which aims at
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15 383 providing affordable and equitable basic health care for all by 2020⁵. As strengthening the
16
17 384 primary health system is central to the health system reform, several policies have directly
18
19 385 targeted PHC institutions or PCWs. As a result, the satisfaction of pay and contingent rewards
20
21 386 have improved slightly, which may be attributed to the fact that PCWs' basic wages are
22
23 387 guaranteed by government finance²⁰. However, despite of the progress China has made in
24
25 388 enhancing the primary health system, new problems and unintended consequences of related
26
27 389 reforms have surfaced. For example, the brain drain of experienced health workers and the
28
29 390 loss of patients from THCs to county hospitals have incurred a great cost^{6,31}. As for the health
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31 391 system reforms, three policies and their respective impacts on health workers' motivation
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33 392 were most studied in the literature.
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42 393 Since its introduction in 2009³⁶, the NEMS has exerted a lasting impact on PCWs'
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44 394 income structure. The essential drug list removed the incentives for over-prescribing,
45
46 395 resulting in a drop in income and a loss of autonomy³¹ because government subsidies for
47
48 396 public health workers were not enough to compensate the decline in PHC institutions'
49
50 397 revenue from drug prescriptions. Along with the problems in drug supply procurement,
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52 398 unintended consequences on health workers' motivation and related behaviors also emerged:
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54 399 THCs has suffered a brain drain of experienced health workers who have flowed to county
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4 400 hospitals because their prescriptions have been restricted due to a limited supply of medicines
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7 401 and they have lost many patients as a result. In conclusion, policy makers should consider
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9 402 how to reduce the policy's adverse effects on the motivation of PCWs, including how to
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11 403 appropriately remunerate health workers, ensure enough clinical autonomy and supply the
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14 404 drugs in a timely, transparent and accountable manner.

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16
17 405 At the beginning of the NBPHSP, the PCWs responsible for basic public health
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19 406 services held negative attitudes toward the sustainable provision of these services because it
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22 407 was accompanied by a heavier workload and insufficient subsidy to compensate their efforts
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25 408 ^{38 40 46 53}. To motivate PCWs, the government has increased the subsidies from 15 RMB per
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28 409 person in 2009 to 50 RMB in 2017. However, the combination of heavy workload, rigid
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31 410 performance assessment procedure and lack of professional knowledge remained unchanged,
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33 411 resulting in a negative effect on PCWs' job satisfaction and performance. We suggest that the
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36 412 evaluation of PCWs' performance be shifted from being fault-finding oriented to being
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39 413 support-providing oriented, such as improving the ability of public health providers or
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42 414 strengthening the teamwork between clinical doctors and the public health workers in order to
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45 415 enhance the overall delivery of these public health services.

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47 416 After the implementation of TVHSIM, the village doctors who had been previously
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49 417 self-employed and not integrated into the formal health delivery system, were managed in the
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52 418 same way as THC staffs and experienced a transformation of their income structure as
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55 419 government subsidy has become an increasing source of income. They were motivated not
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58 420 only by the more stable financial subsidy from government, but also by the good reputation
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60 421 and respect from local residents as health providers with formal status. However, their income

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4 422 and fringe benefits still lagged behind the regular employees in THCs, which remained an
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6 423 demotivating factor for village doctors³⁴. A well-rounded social insurance model for village
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9 424 doctors is urgently needed ⁴³.

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12 425 The rationale for using ERG theory to guide the analysis lies in the fact that this
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15 426 needs-based theory generally encompasses work motivation, provides a useful
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17 427 conceptualization of what PCWs care about (motivating factors) and explains their
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20 428 performance in organizations. The findings of this review suggest that PCWs can be
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23 429 encouraged to perform well by positive motivations responding to satisfying ERG needs, but
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25 430 it should be interpreted with caution because of several limitations. First, this review only
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28 431 focuses on the motivating factors of PCWs' work performance, therefore, other relevant
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31 432 articles on motivating factors influencing the attraction of PCWs were excluded by the search
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34 433 strategy. Second, all the included studies analyzed PCWs' motivation from the perspective of
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36 434 problems and critics, which could lead to some bias because few positive thoughts on PCW's
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39 435 current motivation status have been reported. Third, factors related to personal
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41 436 sociodemographic characteristics and mental state were not analyzed as motivating factors.
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44 437 They were only exacted from the original article and presented as influencing factors, as
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46 438 shown in the Supplementary Appendix 2.

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50 51 52 53 440 **Conclusions**

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56 441 Low motivation is at the crux of promoting the work performance of China's
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58 442 on-service PCWs. Policy makers should take into account all level of human needs that

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4 443 influence PCWs' motivation and start from the local reality to set priorities to ensure of
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6 444 PCWs' appropriate remuneration and career development opportunities. Just as illustrated by
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9 445 the *Global Strategy on Human Resources for Health*, efforts should be made to improve
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11 446 deployment strategies, working conditions, reward systems, continuous professional
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13 447 development opportunities and career pathways by adopting and implementing
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15 448 evidence-based health workforce policies that are tailored to the local context so as to make
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17 449 the best possible use of limited resources and enhance both capacity and motivation for
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19 450 improved performance⁵². We also suggest that countries undergoing health system reform
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21 451 should consider the views of different stakeholders and analyze the potential side effects of
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23 452 some specific policies on health providers who are not directly targeted in order to benefit
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25 453 both providers and demanders¹⁵.

454

455 **Abbreviations**

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

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3
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5
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10 466 **Contributors**

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13 467 All authors proposed the hypothesis and idea for the systematic review and take
14
15 468 responsibility for all aspects of it. QM, BY and HL discussed and contributed to the
16
17
18 469 conceptualization of this review and the development of review protocol. BY applied the
19
20
21 470 inclusion criteria. HL and DW extracted the data. HL was a major contributor to the draft of
22
23
24 471 the manuscript. All authors read and approved the final manuscript.
25

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31
32
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34

35 475 **Competing interests**

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39 476 The authors declare that they have no competing interests.
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42 477 **Provenance and peer review**

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45 478 Not commissioned; externally peer reviewed.
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48 479 **Data sharing statement**

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52 480 There are no additional data available.
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7 642 **Figure 1.** PRISMA diagram
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9 643 **Figure 2.** Job satisfaction score among primary care workers across different regions in China
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12 644 **Figure 3.** Forest plot of the job satisfaction score among primary care workers
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For peer review only

645 **Tables**646 **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

647 **Table 1.** Motivating factors for primary care workers

For peer review only

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 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 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

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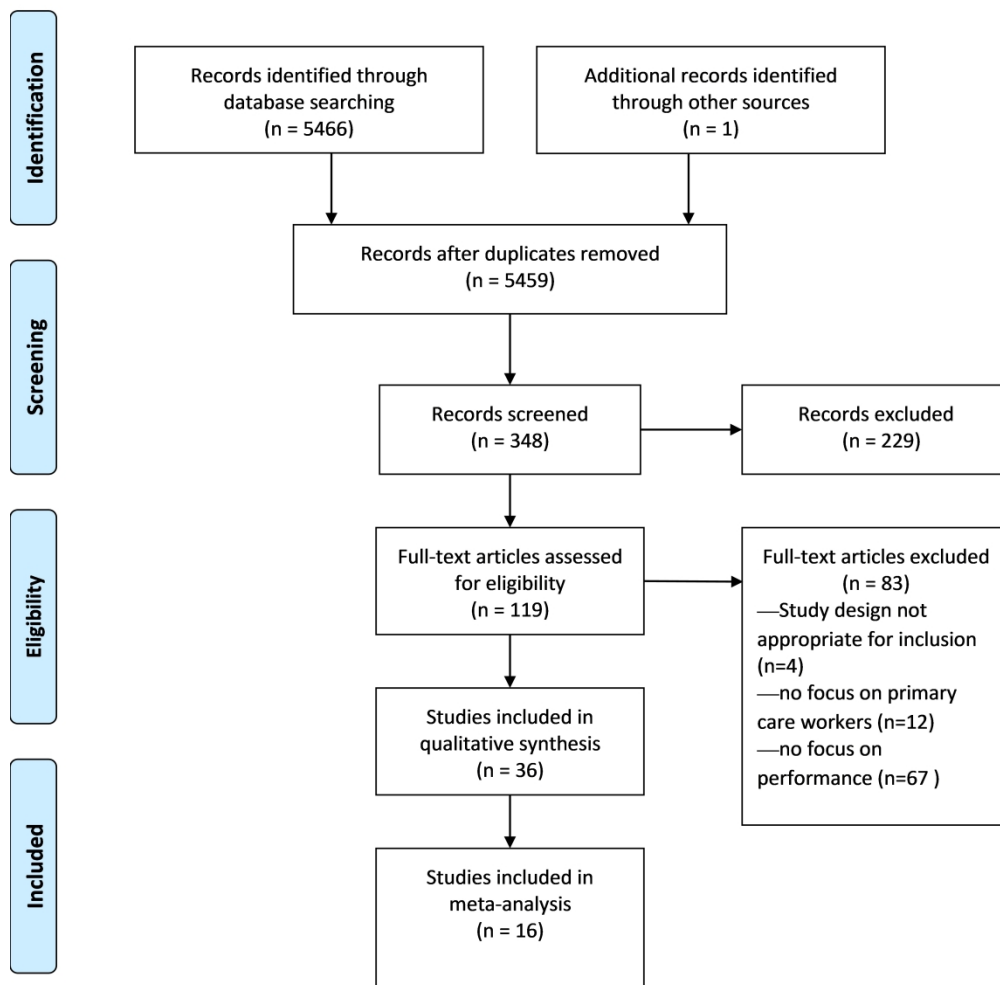
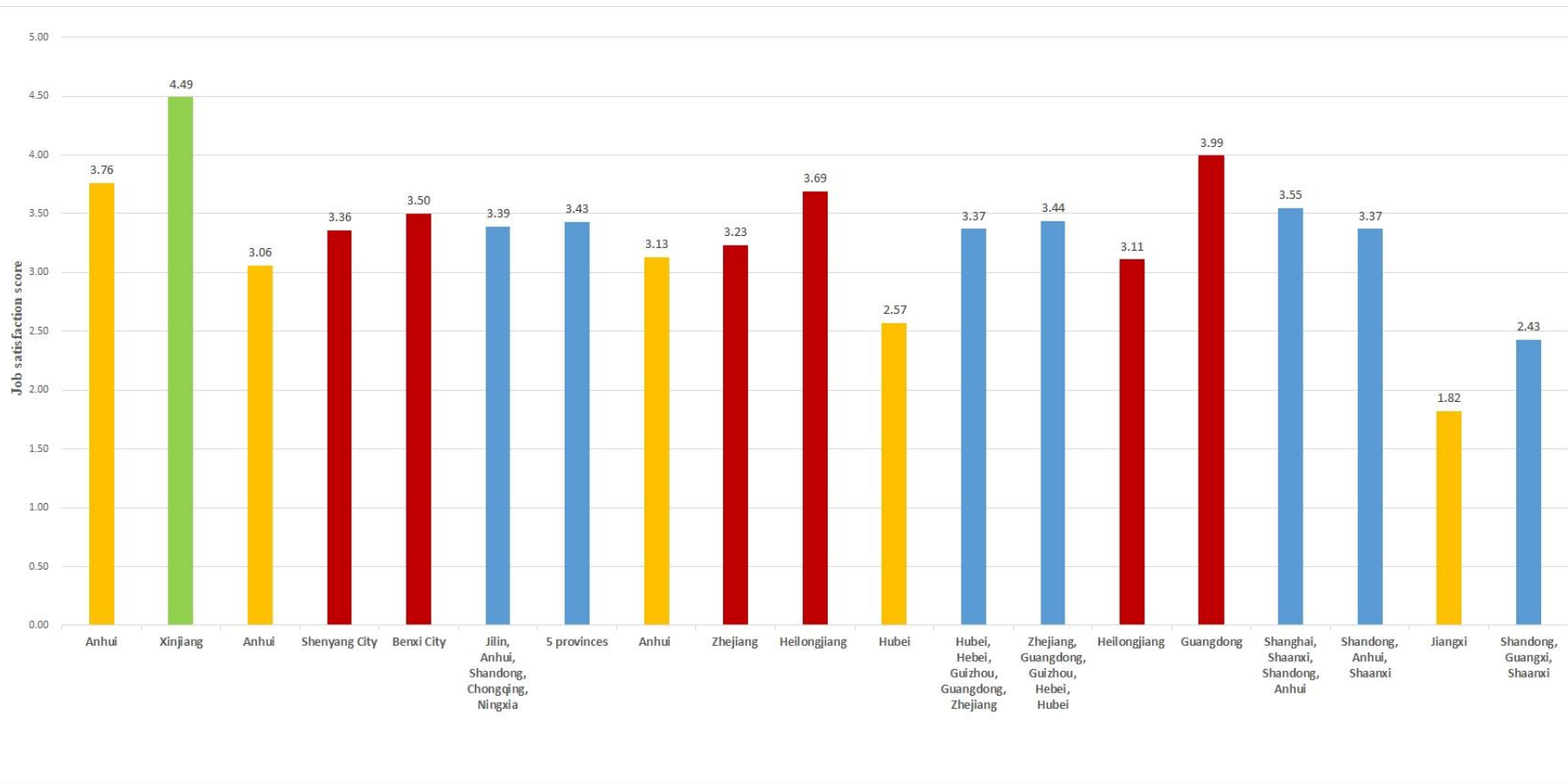


Figure 1. PRISMA diagram

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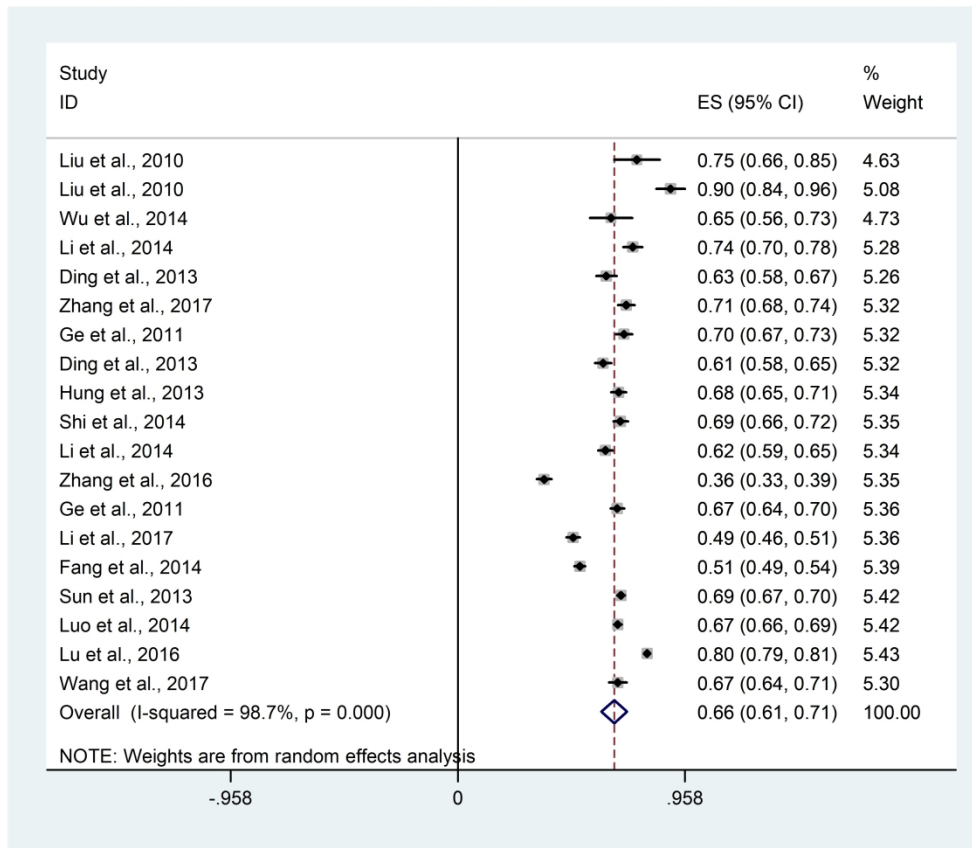


Figure 3. Forest plot of the Job satisfaction score among primary care workers

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 <i>et al.</i> , 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 <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhang <i>et al.</i> , 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 <i>et al.</i> , 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 <i>et al.</i> , 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 <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhou <i>et al.</i> , 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 <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Luo <i>et al.</i> , 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 <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Hung <i>et al.</i> , 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 <i>et al.</i> , 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 <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Li <i>et al.</i> , 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 <i>et al.</i> , 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 <i>et al.</i> , 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 <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Liu <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhou <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Chen <i>et al.</i> , 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 <i>et al.</i> , 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 <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhang <i>et al.</i> , 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 <i>et al.</i> , 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 <i>et al.</i> , 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 <i>et al.</i> , 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

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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

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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

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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

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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 provision 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 <i>et al.</i> , 2010	2007	Anhui	rural	77	Likert 5 point	Sum of dimension	3.76*	-
Liu <i>et al.</i> , 2010	2007	Xinjiang	rural	95	Likert 5 point	Sum of dimension	4.49*	-
Ding <i>et al.</i> , 2013	2009	Anhui	urban	765	Likert 5 point	Sum of dimension	3.06	0.497
Ge <i>et al.</i> , 2011	2009-2010	Shenyang City	urban	1010	Likert 5 point	Sum of dimension	3.36*	-
Ge <i>et al.</i> , 2011	2009-2010	Benxi City	urban	684	Likert 5 point	Sum of dimension	3.50*	-
Shi <i>et al.</i> , 2014	2011	5 provinces	both	863	Likert 5 point	Sum of dimension	3.43	0.77
Hung <i>et al.</i> , 2013	2011	Jilin, Anhui, Shandong, Chongqing, Ningxia	both	823	Likert 5 point	Sum of dimension	3.39	-
Wu <i>et al.</i> , 2014	2012	Zhejiang	both	111	Likert 5 point	Sum of dimension	3.23	0.06
Li <i>et al.</i> , 2014	2012	Heilongjiang	urban	448	Likert 5 point	Sum of dimension	3.69	-
Ding <i>et al.</i> , 2013	2012	Anhui	urban	495	Likert 5 point	Sum of dimension	3.13	0.643

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5	Luo <i>et al.</i> , 2014	2012	Hubei, Hebei, Guizhou, Guangdong, Zhejiang	urban	3220	Likert 5 point	Sum of dimension	3.37	-
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8	Sun <i>et al.</i> , 2013	2013	Zhejiang, Guangdong, Guizhou, Hebei, Hubei	urban	3212	Likert 5 point	Sum of dimension	3.44	-
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13	Fang <i>et al.</i> , 2014	2012	Hubei	rural	1889	Likert 5 point	Sum of dimension	2.57	-
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15	Zhang <i>et al.</i> , 2017	2013	Shanghai, Shaanxi, Shandong, Anhui	urban	656	Likert 5 point	Standalone item	3.55	0.74
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19	Li <i>et al.</i> , 2014	2013	Heilongjiang	urban	930	4 point	Sum of dimension	3.11	0.68
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21	Zhang <i>et al.</i> , 2016	2014	Jiangxi	rural	935	Likert 5 point	Standalone item	1.82	0.63
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23	Li <i>et al.</i> , 2017	2014	Shandong, Guangxi, Shaanxi	rural	1221	4 point	Standalone item	2.43*	-
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26	Lu <i>et al.</i> , 2016	2013	Guangdong	both	5845	Likert 6 point	Sum of dimension	3.99	0.99
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29	Wang <i>et al.</i> , 2017	2013	Shandong, Anhui, Shaanxi	rural	603	Likert 5 point	Sum of dimension	3.37	-
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34	* We converted these scores from the sum of percentage scores into 5-grade score: Overall satisfaction = summed score/maximum total score × 5								
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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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Motivating factors on performance of primary care workers in China: A systematic review and meta-analysis

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Manuscripts

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4 **1 Motivating factors on performance of primary care workers in China:**
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7 **2 A systematic review and meta-analysis**
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15 **Number of tables and figures:** 2 tables and 3 figures are included in this article.

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18

19 Abstract

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

25 **Design:** Systematic review

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

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

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4 40 reaching a satisfied rating and varied in different regions.
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7 41 **Conclusions:** This study suggests low work satisfaction among PCWs in China, with
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10 42 financial incentives and career advancement being two most important motivating factors.
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12 43 Efforts to improve the work performance in PCWs should give priority to these motivating
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15 44 factors and systematically take into account the health policy's impacts on performance of
16
17 45 PCWs.
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20 21 46 **Keywords**

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24 47 Primary health care, Primary care worker, Performance, Motivation, Health policy
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27 48 **Strengths and limitations of this study**

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30 49 ► A myriad of potentially eligible articles were screened and included using a comprehensive
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33 50 search strategy.
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36 51 ► Reliability of the study selection, data extraction and quality assessment was ensured by
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39 52 involving two independent reviewers.
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42 53 ► This review contributes to the current literature as it included studies that adopted
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45 54 qualitative, quantitative or mix methods to present a comprehensive overview of the
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48 55 motivating factors on performance of China's primary care workers.
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50 56 ► This study benefited from summarizing all the motivating factors on performance of
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53 57 China's primary care workers in a systematical way, namely, at both an individual level and a
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56 58 health system level.
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59 59 ► Chinese articles were not included in this review.
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60 **Introduction**

61 In China, the primary health care (PHC) services that include public health services and basic
62 medical health services are provided by community health centres (CHCs) and their affiliated
63 community health stations (CHSs) in the urban areas and by township health centres (THCs)
64 and their affiliated village clinics (VCs) in the rural areas. These four types of PHC
65 institutions constitute the essential part of China's three-tertiary health care delivery network.
66 Administered by CHCs and THCs respectively, CHSs and VCs function as the satellite sites
67 of their superior institutions. As is central to China's health system reform initiated in 2009¹,
68 the strengthening of the primary health care has been hindered by the grave challenges
69 concerning the structure of China's health care delivery system, in particular, the
70 low-performance of PHC delivery system². From 2010 to 2016, China's PCWs have
71 experienced a rise in their number from 3.3 million to 3.7 million, but a decrease in their
72 proportion in health workers, from 40.0% to 33.0%. This trend is mirrored by the utilization
73 of health services during the same period of time: PHC institutions' proportion has dropped
74 from 61.9% (3.6 billion visits) to 55.1% (4.4 billion visits) in terms of the outpatient visits
75 and from 27.9% (39.5 million hospitalizations) to 18.3% (41.7 million hospitalizations) in
76 terms of the inpatient visits³. Against this backdrop, the strengthening of primary health
77 system will remain as the focus of health system reform in the near future, which can be seen
78 from the fact that *the Outline of Healthy China 2030 Plan*, the government's blueprint for
79 health system development, has underscored the importance of primary health care⁴.

80 Health workforce shortage is one of the major obstacles to strengthen China's primary health
81 care services⁵. To make matters worse, the primary health workforce is confronted with

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4 82 serious challenges such as low education level, lack of qualifications, aging, high turnover
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6 83 and poor working performance⁶. Of all the determinants of PCWs' performance, work
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9 84 motivation, defined as an individual's degree of willingness to exert and maintain an effort
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11 85 towards organizational goals⁷, plays a crucial role in changing the behavior of health
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14 86 providers. It has been demonstrated that work motivation can influence job satisfaction, hence
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17 87 influencing job performance^{8 9}. There has been an expanding body of studies exploring the
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20 88 motivating factors for PCWs through qualitative, quantitative or mixed methods, but the study
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23 89 sites and methodological quality of these studies varied. Synthesizing these motivating factors
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25 90 in different areas of China could help identify the most important motivating factors and
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27 91 appreciate the overall job satisfaction level of PHWs in China. In addition, synthesizing the
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30 92 motivating factors for PCWs and analyzing the complexity pathway between motivating
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33 93 factors and performance hold general and applicable implications for improving the
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35 94 motivation and performance of China's PCWs. In light of this, this review aims to synthesize
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38 95 and analyze the motivating factors for PCWs and provide evidence-based policy implication
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41 96 on how to improve the performance of China's PCWs.

97 **Methods**

98 **Search strategy and eligibility criteria**

99 We searched the PubMed and MEDLINE on June 2, 2018 to identify relevant studies
100 using MeSH terms in conjunction with free-text words including all the possible synonyms,
101 alternative terms and spellings⁶ to increase sensitivity to any potentially eligible literature. All
102 the search terms were provided in the Supplementary Appendix 1. Search results were

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4 103 exported to EndNote X7 to be organized and duplicate records were removed in the first
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6 104 place. Then two authors exported the citations to Microsoft Excel and conducted the literature
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9 105 screening and selection independently. Divergent judgments were settled through discussion.
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11 106 We searched for and included articles about the motivating factors on performance of the
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13 107 PCWs who work in four types of China's PHC institutions: rural THCs, rural VCs, urban
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15 108 CHCs and urban CHSs. In this study, motivation in the work context is defined as an
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17 109 individual's degree of willingness to exert and maintain an effort towards organizational or
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19 110 system goals¹⁰, and the degree of job satisfaction, work stress and turnover intention seen as
20
21 111 possible reflections of motivation which may influence work performance. Therefore, all the
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23 112 studies that explored the level of work motivation, job satisfaction, work stress, turnover
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25 113 intention and the influencing factors of these motivation expressions were included. We also
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27 114 searched for relevant studies found in the references of the included articles and other sources.
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29 115 The included studies adopted either observational or experimental design, and presented
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31 116 primary quantitative or qualitative data. All the included articles were in English language
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33 117 and published between 2000 and 2018. Studies were excluded if they did not address the
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35 118 motivating factors for PCWs, or if the participants were not PCWs or did not work in the four
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37 119 types of PHC institutions mentioned above.
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120 **Assessment of risk of bias**

121 Methodological quality of the included studies was evaluated using Hoy's risk of bias
122 tool which is adapted from the one developed by Leboeuf-Yde and Lauritsen¹¹. Based on a
123 total score, studies are put into three categories: low risk of bias (8-10), moderate risk of bias

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4 124 (5-7) and high risk of bias (0-4).
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8 125 **Data extraction and synthesis**
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11 126 Extracted data included study design, year or years of study, settings, participants,
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13 127 sample sizes, measurement of motivation, objective, key motivation, conclusions and
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16 128 motivating factors. Data extraction and analysis were guided by Alderfer's ERG theory, which
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18 129 proposes three core human needs in organizational settings: existence (the desire for material
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20 130 things), relatedness (the desire for cordial interpersonal relations), and growth (the desire for
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22 131 opportunities to be creative and to develop one's skills)¹². A thematic synthesis approach was
23
24 132 adopted for data analysis to capture the evidence illustrating PCWs' motivation. Motivating
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26 133 factors extracted from the included articles were grouped into four themes: 1) factors
27
28 134 concerning the existence needs, including payment, fringe benefits and physical working
29
30 135 conditions; 2) factors concerning the relatedness needs, which are concerned with social
31
32 136 environment and relationship; 3) factors concerning the growth needs, referring to career or
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34 137 self-development and management environment; 4) factors concerning the health policy
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36 138 context and organizational context that could influence one or more needs categories
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38 139 mentioned above (Supplementary Appendix 2) . The first three themes of motivating factors
39
40 140 represented, at an individual level, three different dimensions of human needs in PHC
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42 141 institutions based on the ERG framework and the last theme was singled out because different
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44 142 health policies had complex impacts on the performance by influencing more than one
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46 143 dimension of human needs at a macro level. First, authors aggregated data into motivating
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48 144 factors and extracted all original motivating factors in each article to put them into one of the
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4 145 four themes. Then we identified correlations between the different factors, refined them
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6 146 through discussion and synthesized similar factors into a higher level theme.
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10 147 As job satisfaction was positively associated with job performance¹³ and nearly half of
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12 148 the selected articles studied job satisfaction with quantitative measurement, we resorted to
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14 149 meta-analysis to synthesize the 16 articles that provide data of PCWs' job satisfactions. We
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16 150 unified the measurement of overall job satisfaction by transforming different calculations into
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18 151 a 5-point rating scale and pooled the study-specific estimates using a random effects
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20 152 meta-analysis model to obtain an overall summary of the job satisfaction scores across studies
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22 153 ¹⁴. We analyzed the data using Stata version 14.0 for Windows.
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29 154 **Patient and public involvement**

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32 155 Patients and public were not involved in this study.
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36 156 **Role of the funding source**

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39 157 The funders of the study had no role in study design; data collection, analysis and
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41 158 interpretation; writing of the report; and the decision to submit the paper for publication.
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46 159 **Results**

47 48 49 160 **Characteristics of reviewed studies**

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52 161 We firstly screened 5466 titles and abstracts, and then retrieved and screened the
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54 162 full-texts of 348 potential relevant studies to evaluate their eligibility (Figure 1). After the full
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56 163 text screening, 119 studies relevant to the human resources of PHC in China were included
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4 164 for us to appreciate the current status of PCWs. To obtain sufficient information related to the
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6 165 motivation of PCWs, 1 additional article from reference search was also identified and
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9 166 included after applying the eligibility criteria. Finally, of the 119 studies, 83 articles that did
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11 167 not contain specific motivating factors were excluded; 36 articles that were closely relevant to
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14 168 PCWs' motivation for were selected for data extraction and synthesis. A list of the basic
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17 169 characteristics of the included articles can be found in Supplementary Appendix 3. 25
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19 170 quantitative, 7 qualitative, and 4 mixed methods primary studies were included, covering at
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22 171 least 27 provinces of China. All of the 36 articles were cross-sectional studies, with 17 studies
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24 172 taking place in rural China, 11 in urban China and 8 in both China's urban and rural areas. Of
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27 173 the 17 studies concerning rural areas, 8 articles only included village doctors in village clinics
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30 174 as participants, 5 articles only studied health workers in THCs and 4 articles were concerned
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33 175 with rural PCWs in both village clinics and THCs. The 11 studies that were concerned with
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36 176 urban areas addressed urban PCWs in community health centers/stations. 4 articles studied all
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38 177 types of PCWs in different kinds of rural and urban PHC institutions. As for the risk of bias,
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41 178 more than half of the included studies presented a low risk of bias, with the total score
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43 179 ranging from six points to ten points (in Supplementary Appendix 3). Included studies
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46 180 analyzed the motivation of PCWs from different perspectives: some measured job satisfaction
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48 181 ¹⁵⁻³⁰; some explored the motivating factors' influence on attrition and retention^{18 22 31-35}; some
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51 182 studied the impact of some policies or interventions on the motivating factors for health
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54 183 workers ^{31 36-40 41-46}.

184 **Motivating factors for PCWs**

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4 185 **Factors concerning existence needs**
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7 186 Financial incentives, workload and the work conditions related to a person's physical
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10 187 needs such as food, clothing, and shelter were clustered into factors concerning existence
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12 188 needs. In this review, we found that work conditions, payment and the mandatory workload
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15 189 were considered as significant factors of PCWs' satisfaction^{15 19 20 22 23 25 30 47} and turnover
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17 190 intention^{18 22}. 26 out of the 36 articles reported financial incentives (Table 1) and found that
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20 191 the financial incentives such as income and fringe benefits were significantly associated with
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22 192 job satisfaction^{15 17 30} and difficulties in PCW recruitment^{32 34 35}. Moreover, financial
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25 193 incentives and working conditions were the top two motivating factors for PCWs to improve
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28 194 performance^{21 33}.

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31 195 Another line of inquiry explored the impact of different health system reform policies
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33 196 on motivating factors. For example, in a qualitative study, administrators and frontline
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36 197 healthcare workers in PHC institutions mentioned that the increased income after the 2009
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39 198 health system reforms did not fully reflect the increased workload, and those who worked the
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42 199 most were not necessarily rewarded the most, constituting a demotivating factor for some
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44 200 health workers³⁷.

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47 201 **Factors concerning relatedness needs**
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50 202 Relatedness needs refer to a person's interpersonal needs in his personal and
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53 203 professional settings and in this review, factors concerning relatedness needs were deemed as
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56 204 a person's relationships with the living environment, the society, the coworkers and the nature
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59 205 of work.
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4 206 17 studies reported work itself and 11 studies reported work relationships (Table 1).
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6 207 Compared with factors concerning existence needs, the PCWs were more satisfied with the
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9 208 nature of work and work relationships^{20 25 30}. This finding indicated that most workers got
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12 209 along well with their colleagues and believed that their jobs were to be of value, which can
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14 210 act as a motivating factor in case of poor physical environment.

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18 211 13 of the selected studies reported recognition from society including being understood
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20 212 by society and physician-patient relationships (Table 1). Satisfaction with social status and
21
22 213 relationship with patients was significantly associated with job satisfaction^{15 30}. In terms of
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24 214 patients' respect, there seemed to be an urban-rural difference, with the rural PCWs being
25
26 215 slightly more satisfied than their urban counterparts²³. However, few rural PCWs expressed
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28 216 satisfaction with their current relationships and indicated that the patients could not
29
30 217 understand the doctor's work⁴⁷. In addition, the growing workplace violence negatively
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32 218 affected the PCWs' job performance and quality of life⁴⁸ and emerged as a major contributor
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34 219 to doctors' low morale in recent years¹⁶.

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41 220 6 studies reported living environment as a factor concerning relatedness needs (Table
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43 221 1) and showed that compared with urban areas, rural areas had greater needs to improve the
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45 222 living environment^{21 33}. In addition, young health workers' weakening sense of belonging and
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47 223 responsibility to their hometown has made it more difficult to recruit young health workers
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49 224 born in local areas³².

225 **Factors concerning growth need factors**

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58 226 Career advancement, training, rewards, management and autonomy relating to a
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4 227 person's needs of personal development were considered as factors concerning growth needs
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6 228 in this review.
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10 229 19 out of the 36 articles reported the factor of career advancement (Table 1), which was
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12 230 considered as the one of top three contributors to satisfaction^{15 16 19 20 22 23 29}. The gap between
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14 231 the expected and actual professional development was one of the main sources of job
15
16 232 dissatisfaction¹⁷. Limited opportunities for job promotion was another factor contributing to
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18 233 the low levels of work passion¹⁹ and turnover intentions of village doctors^{18 22}. The main
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20 234 causes might be that few positions and opportunities were available for the health
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22 235 professionals in PHC institutions to get higher professional titles on the regular payroll,
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24 236 especially compared with the opportunities that their counterparts in higher level health
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26 237 institutions can enjoy.
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33 238 Training was mentioned as a motivating factor by 13 out of the 36 articles (Table 1).
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35 239 Learning and training were significantly associated with work passion¹⁹, job satisfaction¹⁵
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37 240 ²⁹and turnover intention²². Along with career advancement, training was also considered as
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39 241 one of the most important motivating factors for PCWs to improve performance²¹. However,
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41 242 training arrangements were inadequate^{34 49 50} to address the fragmented needs of China's
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43 243 PCWs. Health workers preferred more training time for practice-focused training (on-site
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45 244 guidance from senior doctors and further clinical education) over knowledge-focused training,
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47 245 and favoured such training contents as clinical skills, preventive healthcare and medication
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49 246 knowledge education⁴⁹. As a result, although training was reported as an effective incentive
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51 247 in recruitment, it failed to act as an effective motivating factor to attract young doctors to rural
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53 248 areas in China³⁴.
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4 249 Among the selected studies, the number of studies that reported the motivating factors
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6 250 of rewards, management and autonomy stood at 9, 9 and 14, respectively (Table 1).
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9 251 According to most of the selected articles, PCWs were relatively satisfied with the
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11 252 decision-making ability of their superiors, the contingent rewards and the opportunities to do
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14 253 work by making decisions on their own and to utilize their professional skills and talents ^{15 22}.

254 **System and policy factors**

255 Motivation was not only influenced by the motivating factors at the individual level,
256 but also by the health sector reforms and specific incentive schemes that target workers ⁷.
257 Theoretically, any health sector reform would directly influence the motivating factors that
258 the health workers feel or that affect the structure of health organizations, thus in turn
259 affecting the work rewards of the health workers. 18 out of the 36 articles reported
260 macro-level factors (Table 1), namely, the health system and policy factors such as National
261 Essential Medicines System (NEMS), National Basic Public Health Service Program
262 (NBPHSP) and Township and Village Health Services Integration Management (TVHSIM)
263 (Supplementary Appendix 4) . The gap between the intended and actual consequences of
264 the policies was one of the main determinants of job satisfaction ¹⁷. The comprehensive
265 reform of PHC in Anhui has changed PCWs' compensation structure and improved their
266 income and work efficiency, but dampened their work enthusiasm because of the poorly
267 designed performance-based evaluation system³⁷. Different economic status and health reform
268 processes may lead to different consequences. Take the comprehensive reform of PHC in
269 Shandong as an example. PCWs there on the one hand complained about increased trivialities
270 at work, heavier workload, blurry job description, unsatisfactory income and a lack of

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4 271 professional development, but on the other hand were satisfied with the relationships with the
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6 272 community and low work pressure⁴¹.
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10 273 The NEMS included a new National Essential Drugs List to ensure free access to safe
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12 274 and effective medication for the patients, and introduced a series of polices on drug
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15 275 production, pricing and distribution in the hope of promoting the rational use of medications
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17 276 by reducing the reliance on drug sales and profit seeking behaviors. To be more specific, only
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20 277 drugs on the list were allowed to be prescribed in VCs and price mark-ups were forbidden.
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23 278 The impacts of the NEMS varied by region, professional practice and income level⁴². In one
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25 279 survey, most PCWs perceived no change in their income and reported a high level of
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28 280 satisfaction towards NEMS⁴⁵. However, according to another in-depth interview with village
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30 281 doctors³⁶, the introduction of the essential drug list for PHC institution dramatically reduced
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33 282 their medical income as most areas had limited government subsidies to supplement their
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36 283 incomes. At the same time, they also complained that they had lost patients' trust and work
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38 284 enthusiasm as the classes and total amount of essential medicines were not enough to meet
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41 285 daily treatment needs^{42 45}.
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44 286 The NBPSP starting from 2009 provided a package of basic public health services for
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46
47 287 all residents, with a focus on the management of non-communicable disease. To motivate
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49 288 PCWs to provide preventive health services, the government grants subsidies based on the
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52 289 number of covered residents. At the beginning of this reform, due to the broad scope of basic
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55 290 public health services and limited financial incentives, providers felt that they were under
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57 291 great stress due to the competing demands for their time and complained about the heavy
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60 292 workload, insufficient remuneration, staff shortage, lack of formal professional identity and

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4 293 ineffective performance appraisal. In addition, providers had to deal with the distrust and
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6 294 disrespect from some residents^{40 46}, especially those public health workers who were
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9 295 dismissed as having lower levels of knowledge and skill than specialists³⁹. Providers with
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11 296 more subsidies, training opportunities and integrated management had better performance in
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14 297 service provision⁴⁴.

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17 298 The TVHSIM required THCs, the upper-level health institutions, to direct and
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19 299 supervise VCs in their routine work and their work in medicine, personnel management,
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21 300 financing, and the upgrade and maintenance of facilities, resulting in mixed impacts on
22
23 301 village doctors. On the one hand, most village doctors felt more respected under this
24
25 302 integrated management because they were more recognized as health workers in a formal
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27 303 health system rather than private drug salesmen. On the other hand, they were not allowed to
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29 304 perform agricultural or any other side activity for extra money^{26 36}, which negatively affected
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31 305 their financial conditions.
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40 306 **Job satisfaction for PCWs**

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43 307 The performance of healthcare delivery system is critically dependent on workers'
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45 308 motivation which is directly mediated by workers' willingness⁷. As an important indicator to
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47 309 measure workers' willingness to exert efforts, satisfaction is highly relevant for the
48
49 310 sustainable development of PHC in China. 16 included articles assessed job satisfaction as an
50
51 311 important dimension reflecting providers' motivation (See supplementary Appendix 5). A
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53 312 total of 19 investigation samples were extracted from these 16 articles with cross-sectional
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55 313 study design, representing more than half of the provinces in China. In particular, 2 articles²⁴
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4 314 ²⁵ provided data of 2 provinces/cities and 1 article²⁰ represented data of two years. The overall
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7 315 job satisfaction score ranged from 1.82 to 4.49 and also varied from region to region (Figure
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9 316 2). To be more specific, for most samples drawn from more than three provinces, the
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11 317 satisfaction scores leveled off between 3.37 and 3.55, but the samples from the middle area
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14 318 samples scored lower than those from the eastern area. Besides, the score of Xinjiang, the
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17 319 representative of the western areas, was the highest among the included samples.

20 320 Meta-analysis was approached by combining results weighted by sample size and
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23 321 showed that the overall job satisfaction score among PCWs was 3.30, equivalent 0.66 ([95%
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25 322 CI 0.61–0.71]; I²=98.7%; P<0.001; Figure 3), just reaching a level indicating satisfaction. But
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28 323 the overall satisfaction mean of rural health workers was lower than that of the urban health
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31 324 workers (Table 2).

325 Discussion

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

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4 335 structure, the well-performing health workers can only be rewarded by reducing the income
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6 336 of their co-workers with poor performance. This payment method did not work well in reality
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9 337 as to motivate health workers. How to improve the income level of health workers in primary
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11 338 health delivery system will remain a crucial but tricky issue in the near future. Besides, as
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14 339 shown in our analysis in Figure 2, financial incentives were no longer the sole means to
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17 340 promote motivation, improve job satisfaction and enhance work performance. Other factors,
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19 341 in particular, professional development, work characteristics and training, have been equally,
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22 342 if not more, important for China's PCWs. More specifically, the lack of chances for
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25 343 professional title promotion and limited career development opportunities were important
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27 344 reasons that lead to turnover intention. This finding is in line with other internationally
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30 345 published studies and underscores the importance of the non-financial as well as the financial
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32 346 incentives^{7 51}. The ERG framework implies that the fulfillment of human needs plays an
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34
35 347 important role in PCWs' motivation, but each individual prioritizes the existence needs,
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38 348 relatedness needs and growth needs differently. In this review, we found that the PCWs in
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41 349 China are confronted with barriers in fulfilling all of the three levels of human needs. Income
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43 350 security has increased, but still far lower than the expected level; the residents' recognition of
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46 351 and cooperation with the PCWs have played a negative role in influencing the motivation and
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48 352 behaviors of health workers; career promotion system and training arrangements did not meet
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51 353 their growths need neither. Policy makers must realize that a health worker has multiple needs
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53 354 to be met simultaneously. In addition, motivation improvement should be prioritized in a way
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56 355 that suits local institutional environments and personal preference. A sole focus on one type
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58 356 of need at a time cannot effectively motivate PCWs⁵².

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4 357 **The overall job satisfaction score among PCWs was still low, especially in rural**
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6 358 **areas.** As the predictor of job satisfaction, the overall job satisfaction score reflects PCWs'
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9 359 emotional status and to what extent their human needs are satisfied. PCWs' performance can
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12 360 be considerably improved by identifying the motivating factors so as to increase their work
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14 361 satisfaction. The most prominent factor causing the general dissatisfaction of PCWs,
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16
17 362 especially the PCWs in rural areas, was the financial rewards from work. In 2014, the annual
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19 363 income of 84.06% village doctors was less than 30 000 RMB, much lower than the average
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22 364 income (56 394 RMB) of the doctors in Jiangxi province's higher level health institutions,
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24 365 and nearly half of the village doctors thought that they earned less than other people in the
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27 366 local area¹⁵. In addition, as discussed above, the health system reform policies also had
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30 367 indirect and negative impacts on PCWs' income level and further reduced their job
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33 368 satisfactions. These findings hold significant implications for policy makers and PHC
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35 369 institution managers who make efforts to improve workers' job satisfaction ^{17 28}. Another
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38 370 finding of the synthesis was the significant differences of satisfaction scores among eastern,
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41 371 western and middle regions of China. There is no doubt that imbalance exist among these
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43 372 regions at all levels. As for the satisfactions of PCWs, provinces in the eastern region, with
44
45 373 more developed economy and better health facilities, scored higher than provinces in the
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48 374 middle region and lower than provinces in the western region. Considering western China are
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51 375 remote areas with less economic development, the higher job satisfaction of PCWs may be
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53 376 explained by the lower expectations of PCWs, more government subsidies and other central
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56 377 government supports that target remote western areas. In light of this, the government should
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58 378 take into account the imbalanced development of China's different areas, especially China's
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4 379 middle area where the economic development and resources are limited and the central
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6 380 government's subsidies are also absent.
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11 381 **The health system reform and some specific policies have inevitable and indirect**
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13 382 **impacts on PCWs.** In 2009, China launched a landmark healthcare reform which aims at
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15 383 providing affordable and equitable basic health care for all by 2020⁵. As strengthening the
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17 384 primary health system is central to the health system reform, several policies have directly
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19 385 targeted PHC institutions or PCWs. As a result, the satisfaction of pay and contingent rewards
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21 386 have improved slightly, which may be attributed to the fact that PCWs' basic wages are
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23 387 guaranteed by government finance ²⁰. However, despite of the progress China has made in
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25 388 enhancing the primary health system, new problems and unintended consequences of related
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27 389 reforms have surfaced. For example, the brain drain of experienced health workers and the
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29 390 loss of patients from THCs to county hospitals have incurred a great cost^{6,31}. As for the health
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31 391 system reforms, three policies and their respective impacts on health workers' motivation
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33 392 were most studied in the literature.
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42 393 Since its introduction in 2009³⁶, the NEMS has exerted a lasting impact on PCWs'
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44 394 income structure. The essential drug list removed the incentives for over-prescribing,
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46 395 resulting in a drop in income and a loss of autonomy ³¹ because government subsidies for
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48 396 public health workers were not enough to compensate the decline in PHC institutions'
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50 397 revenue from drug prescriptions. Along with the problems in drug supply procurement,
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52 398 unintended consequences on health workers' motivation and related behaviors also emerged:
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54 399 THCs has suffered a brain drain of experienced health workers who have flowed to county
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4 400 hospitals because their prescriptions have been restricted due to a limited supply of medicines
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7 401 and they have lost many patients as a result. In conclusion, policy makers should consider
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9 402 how to reduce the policy's adverse effects on the motivation of PCWs, including how to
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11 403 appropriately remunerate health workers, ensure enough clinical autonomy and supply the
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14 404 drugs in a timely, transparent and accountable manner.

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17 405 At the beginning of the NBPHSP, the PCWs responsible for basic public health
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19 406 services held negative attitudes toward the sustainable provision of these services because it
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22 407 was accompanied by a heavier workload and insufficient subsidy to compensate their efforts
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25 408 ^{38 40 46 53}. To motivate PCWs, the government has increased the subsidies from 15 RMB per
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28 409 person in 2009 to 50 RMB in 2017. However, the combination of heavy workload, rigid
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31 410 performance assessment procedure and lack of professional knowledge remained unchanged,
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33 411 resulting in a negative effect on PCWs' job satisfaction and performance. We suggest that the
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36 412 evaluation of PCWs' performance be shifted from being fault-finding oriented to being
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39 413 support-providing oriented, such as improving the ability of public health providers or
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42 414 strengthening the teamwork between clinical doctors and the public health workers in order to
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44 415 enhance the overall delivery of these public health services.

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47 416 After the implementation of TVHSIM, the village doctors who had been previously
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49 417 self-employed and not integrated into the formal health delivery system, were managed in the
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52 418 same way as THC staffs and experienced a transformation of their income structure as
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55 419 government subsidy has become an increasing source of income. They were motivated not
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58 420 only by the more stable financial subsidy from government, but also by the good reputation
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60 421 and respect from local residents as health providers with formal status. However, their income

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4 422 and fringe benefits still lagged behind the regular employees in THCs, which remained an
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6 423 demotivating factor for village doctors³⁴. A well-rounded social insurance model for village
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9 424 doctors is urgently needed ⁴³.

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12 425 The rationale for using ERG theory to guide the analysis lies in the fact that this
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15 426 needs-based theory generally encompasses work motivation, provides a useful
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17 427 conceptualization of what PCWs care about (motivating factors) and explains their
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20 428 performance in organizations. The findings of this review suggest that PCWs can be
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23 429 encouraged to perform well by positive motivations responding to satisfying ERG needs, but
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25 430 it should be interpreted with caution because of several limitations. First, this review only
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28 431 focuses on the motivating factors of PCWs' work performance, therefore, other relevant
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30 432 articles on motivating factors influencing the attraction of PCWs were excluded by the search
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33 433 strategy. Second, all the included studies analyzed PCWs' motivation from the perspective of
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36 434 problems and critics, which could lead to some bias because few positive thoughts on PCW's
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39 435 current motivation status have been reported. Third, factors related to personal
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41 436 sociodemographic characteristics and mental state were not analyzed as motivating factors.
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44 437 They were only exacted from the original article and presented as influencing factors, as
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46 438 shown in the Supplementary Appendix 3.

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50 51 52 53 440 **Conclusions**

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56 441 Low motivation is at the crux of promoting the work performance of China's
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58 442 on-service PCWs. Policy makers should take into account all level of human needs that

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4 443 influence PCWs' motivation and start from the local reality to set priorities to ensure of
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6 444 PCWs' appropriate remuneration and career development opportunities. Just as illustrated by
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9 445 the *Global Strategy on Human Resources for Health*, efforts should be made to improve
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11 446 deployment strategies, working conditions, reward systems, continuous professional
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13 447 development opportunities and career pathways by adopting and implementing
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15 448 evidence-based health workforce policies that are tailored to the local context so as to make
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17 449 the best possible use of limited resources and enhance both capacity and motivation for
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19 450 improved performance⁵². We also suggest that countries undergoing health system reform
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21 451 should consider the views of different stakeholders and analyze the potential side effects of
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23 452 some specific policies on health providers who are not directly targeted in order to benefit
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25 453 both providers and demanders¹⁵.

454

455 **Abbreviations**

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

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13 467 All authors proposed the hypothesis and idea for the systematic review and take
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15 468 responsibility for all aspects of it. QM, BY and HL discussed and contributed to the
16
17 469 conceptualization of this review and the development of review protocol. BY applied the
18
19 470 inclusion criteria. HL and DW extracted the data. HL was a major contributor to the draft of
20
21 471 the manuscript. All authors read and approved the final manuscript.
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39 476 The authors declare that they have no competing interests.
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48 479 **Data sharing statement**

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51 480 There are no additional data available.
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4 641 **Figure legends**
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7 642 **Figure 1.** PRISMA diagram
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9 643 **Figure 2.** Job satisfaction score among primary care workers across different regions in China
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12 644 **Figure 3.** Forest plot of the job satisfaction score among primary care workers
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For peer review only

645 **Tables**646 **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

647 **Table 1.** Motivating factors for primary care workers

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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 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 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

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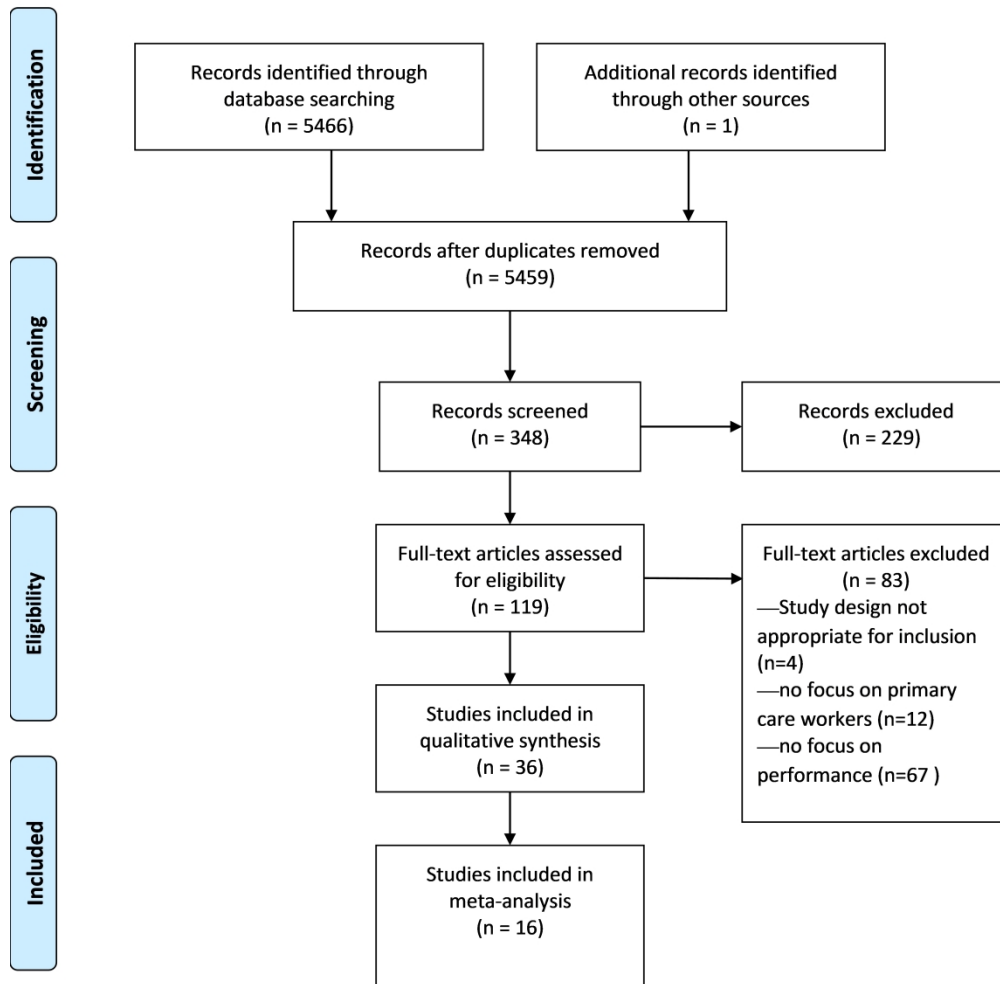
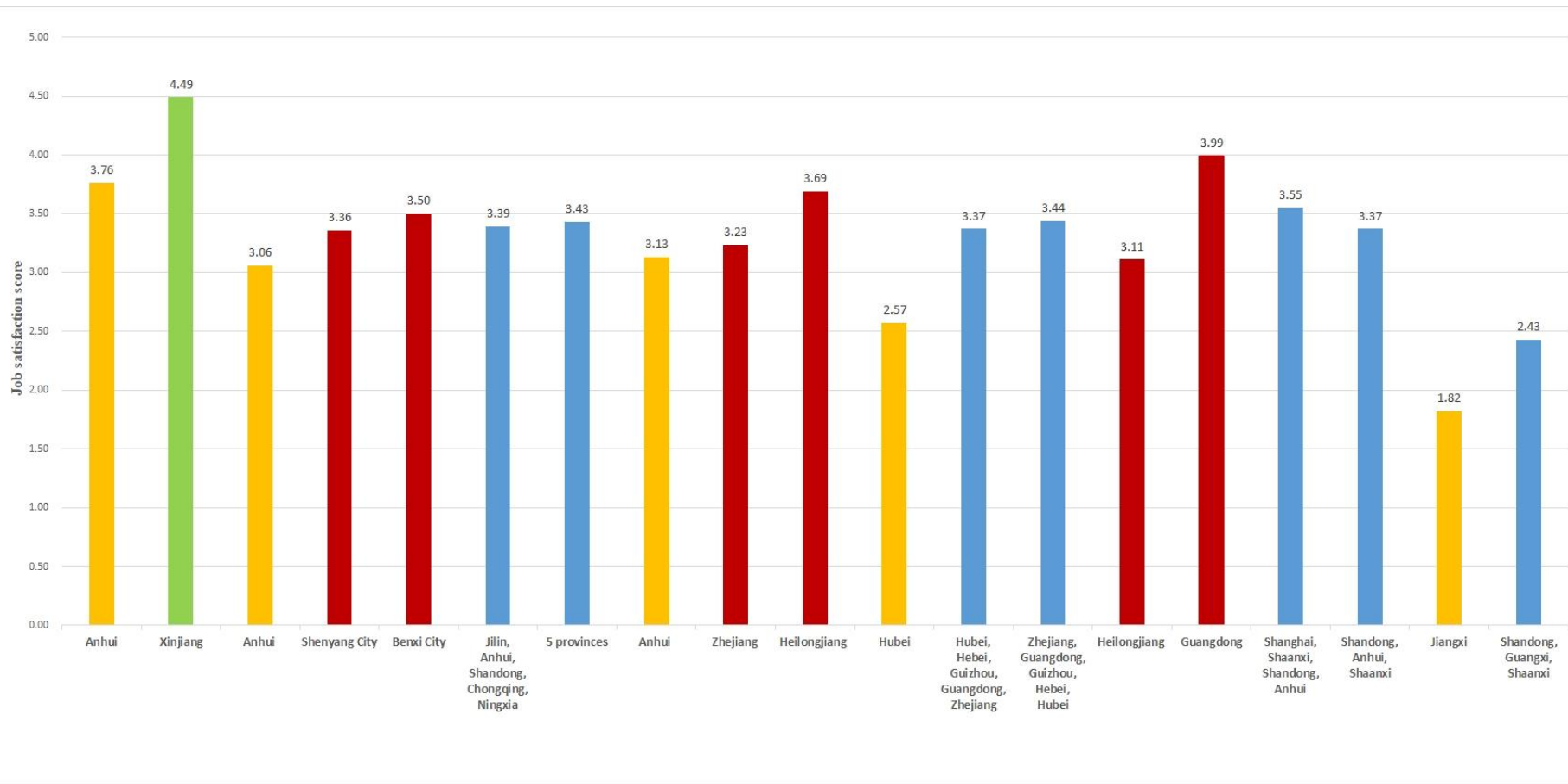


Figure 1. PRISMA diagram

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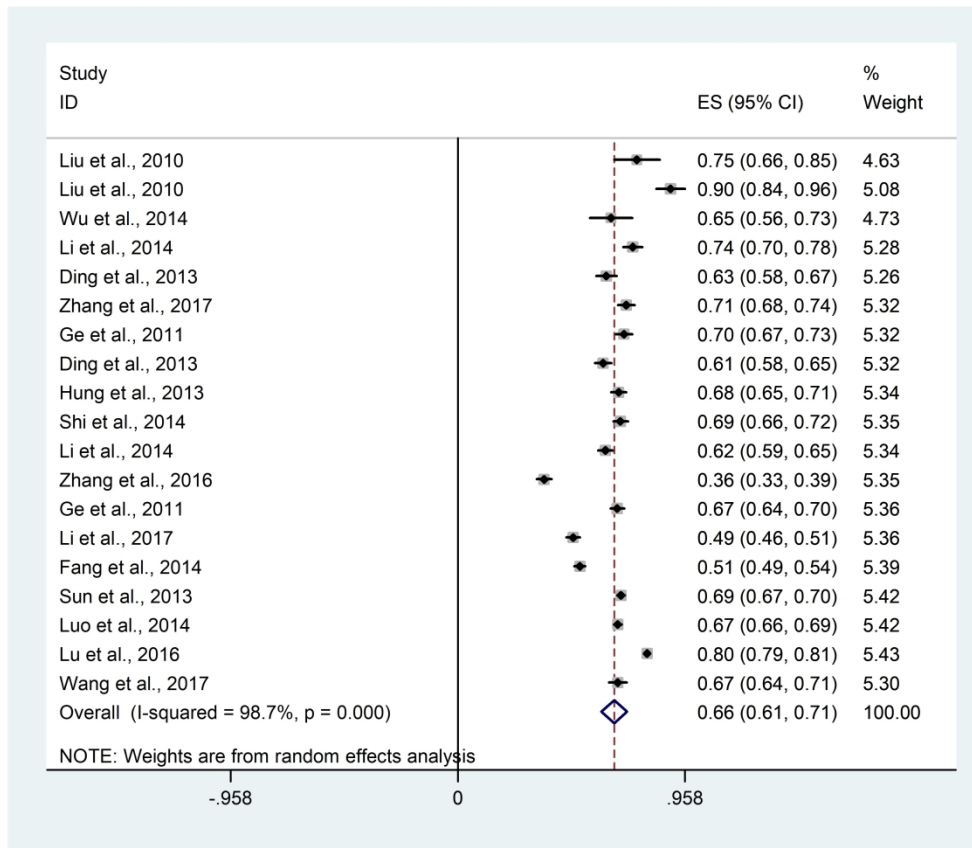


Figure 3. Forest plot of the Job satisfaction score among primary care workers

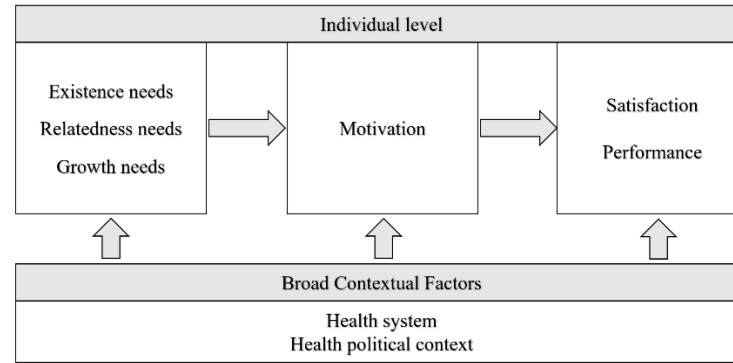
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Supplementary Appendix

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



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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 <i>et al.</i> , 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 <i>et al.</i> , 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 <i>et al.</i> , 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 <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Li <i>et al.</i> , 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 <i>et al.</i> , 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 <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Liu <i>et al.</i> , 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 <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Ding <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Hung <i>et al.</i> , 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 <i>et al.</i> , 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.	

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Ding <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Li <i>et al.</i> , 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 <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Ge <i>et al.</i> , 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 <i>et al.</i> , 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 <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhou <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Chen <i>et al.</i> , 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 <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Li <i>et al.</i> , 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

For peer review only

Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhang <i>et al.</i> , 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 <i>et al.</i> , 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

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Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Meng <i>et al.</i> , 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 <i>et al.</i> , 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

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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

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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

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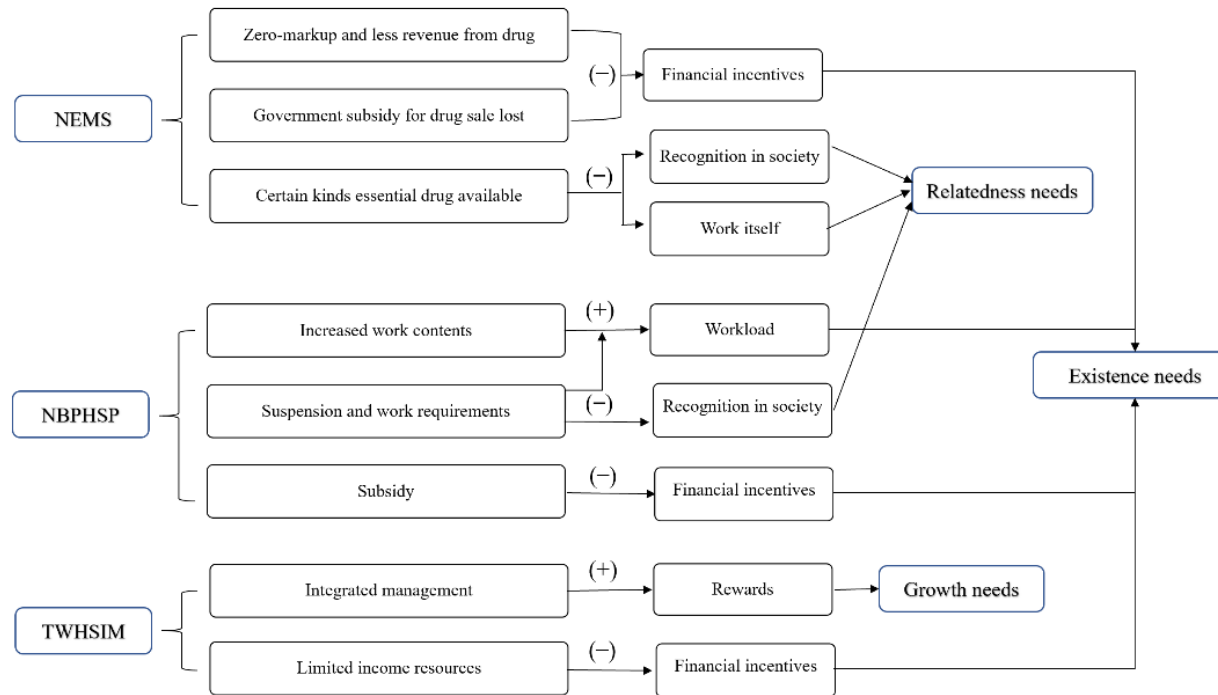
Study [Citation]	Study period	Study design	Province	Area	Institution	Objective	Key motivation conclusions	Influencing factors	Risk of bias
Zhang et al., 2017	2013	Qualitative Study	Shandong	Urban	Community Health Centre/ Station	To analyze how health reform of CHS led to changing job features for primary 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 provision in rural areas.	Low

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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 <i>et al.</i> , 2010	2007	Anhui	rural	77	Likert 5 point	Sum of dimension	3.76*	-
Liu <i>et al.</i> , 2010	2007	Xinjiang	rural	95	Likert 5 point	Sum of dimension	4.49*	-
Ding <i>et al.</i> , 2013	2009	Anhui	urban	765	Likert 5 point	Sum of dimension	3.06	0.497
Ge <i>et al.</i> , 2011	2009-2010	Shenyang City	urban	1010	Likert 5 point	Sum of dimension	3.36*	-
Ge <i>et al.</i> , 2011	2009-2010	Benxi City	urban	684	Likert 5 point	Sum of dimension	3.50*	-
Shi <i>et al.</i> , 2014	2011	5 provinces	both	863	Likert 5 point	Sum of dimension	3.43	0.77
Hung <i>et al.</i> , 2013	2011	Jilin, Anhui, Shandong, Chongqing, Ningxia	both	823	Likert 5 point	Sum of dimension	3.39	-
Wu <i>et al.</i> , 2014	2012	Zhejiang	both	111	Likert 5 point	Sum of dimension	3.23	0.06
Li <i>et al.</i> , 2014	2012	Heilongjiang	urban	448	Likert 5 point	Sum of dimension	3.69	-
Ding <i>et al.</i> , 2013	2012	Anhui	urban	495	Likert 5 point	Sum of dimension	3.13	0.643
Luo <i>et al.</i> , 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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