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Improving Chinese primary care providers' recruitment and retention: a discrete choice experiment

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Introduction Local primary care facilities in China struggle to recruit and retain doctors and nurses. Implementing policies to address this issue requires detailed knowledge of the preferences of primary care workers. The aim of this study is 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.

Methods A discrete choice experiment was used to analyse the job preferences of 517 primary care providers, including 282 doctors and 235 nurses.

Results Chinese primary care providers in Community Health Organizations (CHOs) considered monetary factors and non-monetary factors when choosing a job. Doctors' and nurses' preferences over job attributes were similar. Though income was important, Chinese primary care providers had strongest preferences for sufficient welfare benefits, sufficient essential equipment and respect from the community. Younger primary care providers were more likely to value training and career development opportunities.

Conclusion In order to retain skilled primary care providers to work in CHOs, policymakers in China need to improve primary care providers' income, benefits and working conditions to fulfil their basic needs. Policymakers also need to invest in CHOs' infrastructure and strengthen training programmes for primary care providers in order to raise the community's confidence in the services provided by CHOs.

Keywords Job preferences, primary care providers, discrete choice experiments

KEY MESSAGES

- Chinese primary care providers in Community Health Organizations considered monetary factors and non-monetary factors when choosing a job. Though income was important, Chinese primary care providers also had strong preferences for sufficient welfare benefits, sufficient essential equipment and respect from the community.
- Doctors' and nurses' preferences over job attributes were similar. Younger primary care providers were more likely to value training and career development opportunities compared with elder primary care providers.

- Policymakers in China could strengthen the human resources of primary care provision by improving primary care providers' income, benefits and working conditions. Policymakers could also invest in Community Health Organizations' infrastructure and strengthen training programmes for primary care providers in order to raise the community's confidence in the services provided by Community Health Organizations.

Introduction

Skilled and motivated health workers in sufficient numbers at the right place and at the right time are critical to deliver effective health services and improve health outcomes (World Health Organization 2010). However, both developing and developed countries face the intractable problem of maldistribution of health workers, with insufficient skilled health workers in rural and remote areas (Simoens 2004; Wilson *et al.* 2009). This has important consequences for residents in these areas including reduced access to care, decreased quality of services and worse health outcomes (Simoens 2004; Dussault and Franceschini 2006).

China confronts serious maldistribution of health workers, and the problem exists not only in rural areas but also in primary health facilities (Community Health Organizations, CHOs) in urban areas (Xu *et al.* 2003; Liu *et al.* 2011; Wang *et al.* 2011). Most medical school graduates in China compete to join large hospitals, where their salaries, working conditions and career opportunities are superior to those offered by CHOs in urban areas, let alone CHOs in rural areas (most CHOs in rural areas are called Township Health Centers, THCs) (Wang *et al.* 2011). CHOs in both rural and urban areas have difficulty recruiting enough qualified health workers and can only recruit those who have lower levels of education. A recent study found that most doctors working in CHOs had received only a 3-year post–high school training programme and most nurses had received only a 4-year post–middle school training programme (Yang *et al.* 2008). In contrast, doctors and nurses in upper-level hospitals have usually graduated from a 5-year post–high school training programme or 8-year post–high school training programme.

It is also hard for CHOs to retain health workers already working there. As one study found, the mobility rate of health workers in CHOs in China is high and those who leave tend to be more experienced and qualified and move to high-level health facilities (Meng *et al.* 2009). The shortage and poor competency of health workers in CHOs has become a bottleneck for the development of China's primary care system (Ye *et al*. 2012). Attracting qualified health workers to work in CHOs and how to retain, support and upskill those who are already working in CHOs should be important concerns for policymakers in China.

Most studies on human resources of China's CHOs concentrated on the description of the current situation and existing problems (Yang *et al.* 2008; Fu *et al.* 2009; Shi 2010). Some studies have analysed the job satisfaction, organizational commitment and mobility of health workers in CHOs (Meng *et al.* 2009; Wang *et al.* 2010; Song *et al.* 2012a). These studies provided useful evidence for the recruitment and retention of health workers in CHOs. However, there is a need for policymakers to have an in-depth understanding of health workers' preferences in order to formulate more effective policies tailored to local contexts.

In recent years, discrete choice experiments (DCEs) have been more commonly used to elicit health workers' job preferences internationally (Lagarde and Blaauw 2009; De Bekker-Grob *et al.* 2012; Song *et al.* 2012b). Based on rigorous experimental designs, DCEs provide health workers with several sets of hypothetical job scenarios, which are described by several attributes with different levels, to estimate how health workers value various aspects of their jobs.

This study estimates the job preferences of Chinese primary care providers (doctors and nurses) working in CHOs using a discrete choice experiment. The aim of this study is to find out what job attributes most affect Chinese primary care providers' job choices. We are also interested in the differences in job preferences between doctors and nurses, which have not been compared in previous studies. If their preferences are quite different, it may be more difficult for policymakers to design policies that satisfy both groups of workers. In light of China's health care reforms, the findings of this study will inform policymakers about priority areas to strengthen the human resources of primary care provision in China.

Methods

Sampling

This study used a multistage sampling design. First, five provinces, namely Jilin, Shandong, Anhui, Chongqing and Shaanxi were selected representing eastern, middle and western China. Then, within each province, one urban district and two rural countries were chosen based on the representativeness of their socioeconomic status and health care development. CHOs were selected randomly within each of these districts and counties, giving 18 CHOs in urban areas and 30 CHOs in rural areas. Field work was carried out in 2011. The research team visited the selected CHOs, and all doctors and nurses who presented on the day of visit were invited to participate in the survey. To ensure confidentiality, no respondent identifiers were recorded. All respondents finished their questionnaires on their own, but research staff were available and ready to address questions raised by respondents. All eligible doctors and nurses agreed to participate. The final sample consists of 517 primary care providers, including 282 doctors and 235 nurses.

Experimental design

In this study, the attributes and levels were chosen based on literature reviews and in-depth interviews with 46 CHOs health workers. In the interviews, health workers were asked about their views on their jobs and the job attributes that they would like to be improved most in their current jobs. Six attributes were finally chosen for this study: monthly income, welfare benefits, availability of essential equipment, career development, opportunity for training and respect from the

community. Realistic levels were then assigned to each attribute (Table 1 and Figure 1).

The first job attribute is monthly income, defined in terms of changes in income. In DCE studies on job preferences of health workers, an income attribute was always included (Chomitz *et al.* 1998; Gosden *et al.* 2000; Scott 2001; Ubach *et al.* 2003; Wordsworth *et al.* 2004; Penn-Kekana *et al.* 2005; Hanson and Jack 2008; Mangham and Hanson 2008; Blaauw *et al.* 2010; Kruk *et al.* 2010; Vujicic *et al.* 2010a; Vujicic *et al.* 2010b; Kolstad 2011; Pedersen *et al.* 2012; Rockers *et al.* 2012; Sivey *et al.* 2012). Inclusion of the income attribute allows for the estimation of health workers' willingness to pay (WTP) for improvements in other attributes. In terms of income levels, we use percentage changes rather than levels because CHOs health workers' income varies substantially in the sample. The base level is 'no change in income' representing their current income, followed by 'income + 10%' and 'income + 20%' representing plausible improvements from the base level. Considering that the current income of primary care providers in China is quite low and the aim of China's recent health reforms to reinforce investment in primary care, we include only increases in the income of primary care providers.

The second job attribute is 'welfare benefits', which refers to basic insurance arrangements such as a pension scheme, basic medical insurance, unemployment insurance, employment injury insurance and maternity insurance. Employers and employees are supposed to contribute to these insurance arrangements. However, from the interviews, we found that many health workers in CHOs did not receive this insurance coverage. Without this basic insurance, they felt no sense of security and belonging. Two levels were set for this attribute. 'Insufficient welfare benefits' represents the prevailing condition for CHOs' health workers, and 'sufficient welfare benefits' represents the optimal condition.

The third attribute is 'availability of essential equipment'. Equipment availability is of importance to health workers themselves and for the effectiveness of patient care (Willis-Shattuck *et al.* 2008). From our interviews, many CHOs' health workers complained about the lack of essential equipment and the poor status of their current equipment. We also set two levels for this attribute: 'insufficient' which was described as 'Essential medical equipment and facilities are not always available' and 'sufficient' which was described as 'Essential medical equipment and facilities are always available'.

The next two job attributes are 'opportunities for career development' and 'opportunities for training'. Studies have found that health workers are motivated by the opportunity to progress (Willis-Shattuck *et al.* 2008) and that limited opportunities for professional development were one of the main reasons why health workers in China left their work (Meng *et al.* 2009). In this study, 'opportunities for career development' represents the chances of getting professional promotion, and 'opportunities for training' represents the opportunity to attend short-term courses to develop professional skills. Three levels were assigned to both attributes, namely 'insufficient', 'some' and 'sufficient'.

The last attribute is 'respect from the community' which refers to the relationship with patients and the community in this study. As previous studies have indicated, recognition by the employer and community has been cited as one of the most important motivating factors for health workers (Willis-Shattuck *et al.* 2008). However, in China, there is a strained relationship between patients and physicians, as reported in recent studies (Yang *et al.* 2008; Tang *et al.* 2008) and in our interviews. The community's lack of confidence in the infrastructure of CHOs and the poor competence of health workers in CHOs are among the most important factors contributing to this problem. For 'respect from the community', we also have three levels: 'low' which was described as 'Residents in your community are not willing to go to your hospital for health services when they get diseases', 'average' and 'high' which was described as 'Residents in your community are willing to go to your hospital for health services when they get diseases'.

A full factorial design produced $2^2 \times 3^4 = 324$ scenarios. We reduced this to a more manageable level of 18 scenarios using a fractional factorial experimental design by %MktRuns macro of SAS 9.1 (Kuhfeld 2010). There was not an opportunity to pilot the survey and obtain prior estimates of coefficients to include in the experimental design. One job scenario with 'middling' attributes was chosen as a constant alternative and the other 17 alternatives compared with it. Previous studies have suggested that this approach could make the choices easier to understand (Ubach *et al.* 2003). To avoid overloading the respondents, the 17 pairs of choices were split randomly across three versions of questionnaires, with two versions of questionnaires with 6 choices and the other one with 5 choices. The three versions of questionnaires were then randomly allocated to the respondents.

Table 1 Attributes and levels

Attributes	Levels
Monthly income	No change, +10%, +20%
Welfare benefits	Insufficient, sufficient
Essential equipment	Insufficient, sufficient
Career development	Insufficient, some, sufficient
Respect from the community	Low, average, high
Training opportunity	Insufficient, some, sufficient

Imagine you are looking for a new post and have been offered two jobs, A and B. In each of the questions below, you are asked to choose which job you prefer.

When answering the questions:

- ✧ Assume all other characteristics are the same between jobs
- ✧ Answer all choices, assume that these are the only options available to you
- ✧ There are no right or wrong answers

	Job A	Job B
Monthly Income	+10%	+20%
Welfare Benefits	Insufficient	Insufficient
Essential Equipment	Sufficient	Insufficient
Career Development	Insufficient	Insufficient
Respect from the Community	Average	Low
Training Opportunity	Some	Insufficient
Which job do you prefer:		

Figure 1 Example of a choice pair.

The choice model and data analyses

The theoretical underpinning for the DCE is the random utility model. In this framework, individual n is assumed to make a choice among I alternative jobs in each of T choice sets, choosing the one that is considered as the highest utility level. The utility that individual n obtains from each alternative i in choice set t is

$$U_{nit} = \beta'_n X_{nit} + \varepsilon_{nit} \quad (1)$$

where X_{nit}. is a vector containing the attributes of alternatives, coefficient vector β_n. is unobserved for each n and varies in the population with density $f(\beta_n|\theta*)$. where $\theta*$ are the true parameters of this distribution and ε_{nit} is unobserved random term that is assumed to be independent and identically distributed (iid) extreme value (Revelt and Train 1998). Conditional on β_n, the probability that individual n chooses alternative i in choice set t is standard logit:

$$L_{nit}(\beta_n) = \frac{\exp(\beta'_n X_{nit})}{\sum_{j=1}^{I} \exp(\beta'_n X_{njt})} \quad (2)$$

In order to take the presence of unobserved preference heterogeneity in the sampled population into consideration, the mixed logit model has been used in recent studies (Blaauw *et al.* 2010; Kruk *et al.* 2010; Vujicic *et al.* 2010a; Vujicic *et al.* 2010b; Sivey *et al.* 2012). Equation (2) is extended by integrating the choice probability over the normal density:

$$Q_{nit}(\theta*) = \int L_{nit}(\beta_n) f(\beta_n|\theta*) d\beta_n \quad (3)$$

A simulated maximum likelihood estimator is used to estimate the parameters. In a mixed logit model, the distribution of the random coefficients is estimated with two parameters: one is the mean of the coefficient distribution and the other is the standard deviation which represents the distribution of individuals' coefficients relative to the average in the population (preference heterogeneity). This standard deviation indicates the extent to which preferences vary across individuals. The estimates of both the coefficient mean and the standard deviation have a standard error.

In this study, we use 500 halton draws with the Stata 'mixlogit' command (Hole 2007) for the estimations of four separate mixed logit models. The first model pools the data for doctors and nurses and includes the six main job attributes as well as interaction terms between these attributes and an indicator variable for doctors to test whether there are any differences between the job preferences of doctors and nurses. The second and third models include only the direct effects of the six main job attributes, for doctors and nurses separately. For these two models, the monetary valuation of each attribute (willingness-to-pay) is also estimated through the ratio with the coefficient estimate for the income attribute. The final model examines the influence of institutional and personal characteristics over preferences for different job choices. Interaction terms such as rural–urban, doctor–nurse, age, sex, marital status, professional title, educational level and current monthly income were included. For the final model, we used a backward stepwise approach to exclude variables with P values higher than 0.05 from the model. In order to simplify the model, professional title and educational level were both recoded into binary variables, namely lower professional title (primary title or lower), higher professional title (intermediate title or higher), lower educational level (technical school or lower) and higher educational level (associate degree or higher).

Results

Descriptive statistics

Table 2 shows the descriptive statistics of the sample. A total of 517 primary care providers participated in the survey, including 282 doctors and 235 nurses. Doctors are 6 years older than nurses on average (39.39 vs 33.34). Most doctors are male (59.57%) while nurses are predominantly female (98.30%). Most of the respondents are married (86.48% and 73.93%, for doctors and nurses, respectively) and have either a primary professional title (51.42% and 65.38%, respectively) or an intermediate professional title (31.21% and 26.50%, respectively). In terms of educational level, doctors are better educated than nurses, with a larger proportion of doctors having bachelor degrees or higher (31.56% vs 7.66%). Doctors' monthly income is 334 Ren Min Bi (official currency of China) (20%) higher than nurses.

There are also differences between health workers in urban CHOs and rural CHOs. For example, doctors in urban CHOs are more likely to be older, female, not married and more likely to have higher professional title and bachelors' degree compared with doctors in rural CHOs. The conditions for nurses in both urban and rural CHOs are similar, except that those in urban CHOs are more highly educated than those in rural CHOs.

Job preferences

Table 3 shows the results of the first model, which includes the six main job attributes and doctor interactions with each job attribute. The coefficients of the six main job attributes are statistically significant, whereas the interaction terms do not reach statistical significance. A likelihood-ratio test (LR test) was conducted to compare the first model with a model that only includes the six main job attributes. The difference between the log likelihoods of the two models is not statistically significant (LR $\chi^2(9) = 7.27$, $P = 0.609$), suggesting that there is no significant difference between doctors' and nurses' job preferences.

Table 4 shows the regression results of the second and third model. For doctors, all coefficients are statistically significant, except opportunities for career development. For nurses, all the six job attributes significantly influence their job choices. The signs of coefficients are all of the expected direction. Doctors and nurses prefer a job that offers a higher increase in monthly income, provides sufficient welfare benefits, has better working conditions, has sufficient opportunities for career development and training and they enjoy higher respect from the community.

From the standard deviation of the regression coefficients, we find that although sufficient welfare benefits, sufficient essential equipment or low level of respect from the community influence the job choices of both doctors and nurses significantly, the preferences over these job attributes vary among the respondents. In contrast, respondents' preference for a high level of respect from the community does not vary significantly

Table 2 Descriptive statistics

Variables	Overall ($n=517$)	Doctors			Nurses		
		Total ($n=282$)	Urban CHOs ($n=102$)	Rural CHOs ($n=180$)	Total ($n=235$)	Urban CHOs ($n=112$)	Rural CHOs ($n=123$)
Age, mean (SD)	36.63 (10.38)	39.39*** (10.87)	42.03$^{\#}$ (12.83)	37.88$^{\#}$ (9.29)	33.34*** (8.69)	33.60 (9.59)	33.10 (7.81)
Sex (%)							
Male	33.27	59.57***	50.98$^{\#}$	64.44$^{\#}$	1.70***	3.57	0.00
Female	66.73	40.43***	49.02$^{\#}$	35.56$^{\#}$	98.30***	96.43	100.00
Marital status (%)							
Married	80.78	86.48***	80.39$^{\#}$	89.94$^{\#}$	73.93***	71.17	76.42
Not married	19.22	13.52***	19.61$^{\#}$	10.06$^{\#}$	26.07***	28.83	23.58
Professional title (%)							
No title	6.40	6.03***	5.88$^{\#\#\#}$	6.11$^{\#\#\#}$	6.84***	4.46	9.02
Primary	57.75	51.42***	38.24$^{\#\#\#}$	58.89$^{\#\#\#}$	65.38***	66.96	63.93
Intermediate	29.07	31.21***	34.31$^{\#\#\#}$	29.44$^{\#\#\#}$	26.50***	26.79	26.23
≥Deputy senior	6.78	11.35***	21.57$^{\#\#\#}$	5.56$^{\#\#\#}$	1.28***	1.79	0.82
Education (%)							
≤Technical school	34.04	27.30***	13.73$^{\#\#\#}$	35.00$^{\#\#\#}$	42.13***	32.14$^{\#}$	51.22$^{\#}$
Associate degree	45.26	41.13***	36.27$^{\#\#\#}$	43.89$^{\#\#\#}$	50.21***	58.93$^{\#}$	42.38$^{\#}$
≥Bachelor degree	20.70	31.56***	50.00$^{\#\#\#}$	21.11$^{\#\#\#}$	7.66***	8.93$^{\#}$	6.50$^{\#}$
Monthly income RMB, mean (SD)	1912.88 (692.94)	2063.45*** (712.68)	2092.50 (723.24)	2046.99 (708.12)	1729.07*** (621.78)	1692.16 (639.50)	1763.22 (605.61)

SD, standard deviation; Between groups: *$0.05 \geq P \geq 0.01$; **$0.01 > P \geq 0.001$; ***$P < 0.001$. Within groups: $^{\#}0.05 \geq P \geq 0.01$; $^{\#\#}0.01 > P \geq 0.001$; $^{\#\#\#}P < 0.001$.

Table 3 Model with the six main job attributes and doctor interactions

Variables[a]	Coefficient means	SE
Constant	−0.563**	0.205
Increase in monthly income	0.124***	0.014
×doctors[b]	−0.007	0.017
Welfare benefits-sufficient	1.352***	0.202
×doctors[b]	−0.096	0.248
Equipment-sufficient	0.988***	0.211
×doctors[b]	0.254	0.263
Career development-insufficient	−0.433*	0.183
×doctors[b]	0.076	0.248
Career development-sufficient	0.526*	0.268
×doctors[b]	−0.011	0.345
Respect from the community-low	−1.225***	0.228
×doctors[b]	−0.279	0.284
Respect from the community-high	0.497*	0.213
×doctors[b]	0.344	0.261
Training opportunity-insufficient	−0.585**	0.204
×doctors[b]	−0.021	0.244
Training opportunity-sufficient	0.373	0.206
×doctors[b]	0.335	0.242
Obs	5848	
Log likelihood	−1576.503	
Wald χ^2(df)	197.17(19)***	

SE, standard error; df, degree of freedom; Estimations are based on a mixed logit model.

[a]Reference category is Welfare benefits-insufficient, Equipment-insufficient, Career development-some, Respect from the community-average, Training opportunity-some.

[b]Relative to nurses.

*$0.05 \geq P \geq 0.01$; **$0.01 > P \geq 0.001$; ***$P < 0.001$.

across respondents. 'Opportunities for training' appears to be an important attribute for both doctors and nurses when choosing a job. Doctors' preferences for this attribute did not vary, whereas nurses' preferences for the importance of this attribute varied.

Table 5 shows the monetary valuation of each job attribute. A positive sign indicates how much health workers would be willing to pay per month to have more of the job attribute, and a negative sign indicates how much monthly income health workers would be willing to accept to have more of the attribute.

The willingness-to-pay estimates are free from possible scale differences in the utility functions of doctors and nurses, allowing a more robust test of the difference between the two. We find for each attribute that the differences between the means of the estimated WTP distributions are not statistically significant, further suggesting the lack of significant difference between doctors' and nurses' preferences. The most important job attributes, ranked in terms of willingness to sacrifice monthly income, are sufficient welfare benefits, respect from the community and sufficient essential equipment. 'Opportunities for career development' is not as important as the other attributes in determining job choice. The two coefficients of the training attribute are quite small and are only marginally statistically significant when considered individually, but when considering both coefficients together (i.e. all three levels), the size of the effect on utility is of roughly the same magnitude as for the essential equipment attribute.

Doctors feel strongly about a job with low level of respect from the community. If the job's respect from the community deteriorates from medium to low, doctors would need to be compensated 12.5% of their current monthly income. Nurses prefer a job with sufficient welfare benefits above other attributes and are willing to forgo 10.7% of their current monthly income in order to work in a job with sufficient

Table 4 Models for doctors and nurses separately

Variables[a]	Doctors		Nurses	
	Coefficient means (SE)	SD (SE)	Coefficient means (SE)	SD (SE)
Constant	−0.554 (0.283)	0.061 (0.104)	−0.598 (0.308)	0.027 (0.045)
Increase in monthly income	0.118 (0.014)***	–	0.126 (0.017)***	–
Welfare benefits-sufficient	1.287 (0.219)***	1.367 (0.326)***	1.342 (0.236)***	1.119 (0.278)***
Equipment-sufficient	1.277 (0.217)***	1.101 (0.253)***	1.017 (0.240)***	1.118 (0.292)***
Career development-insufficient	−0.396 (0.207)	0.565 (0.335)	−0.454 (0.193)*	0.058 (0.075)
Career development-sufficient	0.474 (0.265)	0.682 (0.538)	0.538 (0.299)	1.183 (0.442)**
Respect from the community-low	−1.465 (0.264)***	1.655 (0.298)***	−1.294 (0.282)***	0.953 (0.322)**
Respect from the community-high	0.880 (0.212)***	0.326 (0.433)	0.520 (0.246)*	0.567 (0.372)
Training opportunity-insufficient	−0.636 (0.226)**	0.446 (0.670)	−0.596 (0.236)*	1.040 (0.425)*
Training opportunity-sufficient	0.667 (0.217)**	0.220 (0.360)	0.491 (0.246)*	1.153 (0.401)**
Obs	3192		2656	
Log likelihood	−837.523		−733.798	
Wald χ^2(df)	136.35 (10)***		81.86 (10)***	

SE, standard error; SD, standard deviation; df, degree of freedom; Estimations are based on a mixed logit model.

[a]Reference category is Welfare benefits-insufficient, Equipment-insufficient, Career development-some, Respect from the community-average, Training opportunity-some.

*$0.05 \geq P \geq 0.01$; **$0.01 > P \geq 0.001$; ***$P < 0.001$.

Table 5 Estimated monetary value of job attributes (% of monthly income)

Variables	Doctors		Nurses	
	Monetary value means	95% confidence interval	Monetary value means	95% confidence interval
Welfare benefits-sufficient	10.95***	7.84, 14.05	10.68***	7.51, 13.86
Equipment-sufficient	10.86***	7.13, 14.58	8.10***	4.41, 11.79
Career development-insufficient	−3.37	−7.04, 0.30	−3.61*	−6.86, −0.36
Career development-sufficient	4.03	−0.08, 8.15	4.28	−0.16, 8.73
Respect from the community-low	−12.46***	−16.96, −7.95	−10.31***	−14.22, −6.40
Respect from the community-high	7.48***	4.06, 10.90	4.14*	0.30, 7.98
Training opportunity-insufficient	−5.41**	−9.28, −1.54	−4.74*	−8.53, −0.96
Training opportunity-sufficient	5.67**	1.93, 9.42	3.91*	0.19, 7.63

Calculations based on coefficient estimates in Table 4. The nlcom command in Stata was used to calculate monetary value and 95% confidence intervals using the delta method.

*$0.05 \geq P \geq 0.01$; **$0.01 > P \geq 0.001$; ***$P < 0.001$.

welfare benefits. Both doctors and nurses value sufficient essential equipment highly. Compared with a job with insufficient essential equipment, they would pay 10.9% and 8.10% of their current monthly income, respectively, to work in a well-equipped workplace.

Model with interaction terms

Table 6 shows the results of the influence of institutional and personal characteristics over preferences for different job choices. In interpreting the coefficients of the institutional and personal characteristics variables, we must be aware that such coefficient estimates may suffer from endogeneity problems and as such the estimates must be interpreted as associations rather than causal effects.

Compared with nurses, doctors have a stronger preference for a job with high respect from the community. Considering the strained relationship between patients and physicians in China, this result is plausible. Doctors place a lower value on a job with insufficient training opportunities compared with nurses. In terms of age, older primary care providers value sufficient opportunities for career development less and are more tolerant of a job with insufficient training opportunities compared with younger primary care providers. These results are also plausible because in general, young workers who have just entered a career will value training opportunities and career development more highly. Current income also has an influence on primary care providers' opinion on career development. Primary care providers with higher monthly income place a higher value on a job with sufficient opportunities for career development. This result is consistent with Maslow's Hierarchy of Needs, which indicates that when individual's basic needs are met, they will desire the fulfilment of higher level needs.

Table 6 Model with interaction terms

Variables[a]	Coefficient means	SE
Constant	−0.566**	0.203
Increase in monthly income	0.083***	0.022
×monthly income	0.019	0.011
Welfare-sufficient	1.252***	0.151
Equipment-sufficient	1.099***	0.151
Career development-insufficient	−0.285	0.152
×urban CHOs[b]	−0.270	0.166
Career development-sufficient	1.267*	0.642
×higher professional title[c]	0.574	0.335
×monthly income	0.465*	0.209
×age	−0.051**	0.019
Respect from the community-low	−1.159***	0.202
×higher professional title[c]	−0.551*	0.259
Respect from the community-high	0.374	0.198
×doctors[d]	0.521*	0.235
Training opportunity-insufficient	−1.727***	0.426
×age	0.038***	0.011
×doctors[d]	−0.512*	0.235
Training opportunity-sufficient	0.550***	0.158
Obs	5790	
Log likelihood	−1549.808	
Wald χ^2(df)	211.73 (19)***	

SE, standard error; df, degree of freedom; Estimations are based on a mixed logit model.

[a]Reference category is Welfare-insufficient, Equipment-insufficient, Career development-some, Respect from the community-average, Training opportunity-some.

[b]Relative to those working in rural CHOs.

[c]Relative to lower professional title.

[d]Relative to nurses.

*$0.05 \geq P \geq 0.01$; **$0.01 > P \geq 0.001$; ***$P < 0.001$.

Discussion

This study provides an insight into the job preferences of Chinese primary care providers working in CHOs using a discrete choice experiment. Instead of evaluating health workers' actual decisions on job choices, DCEs analyse their stated

preferences over trade-offs among job attributes, thereby revealing their underlying preferences. For developing countries including China, where reliable retrospective data sets of health personnel are quite scarce and prospective studies are needed to support policy planning decisions, DCEs could be a particularly valuable method in the field of human resources research (Lagarde and Blaauw 2009).

This study shows that Chinese primary care providers in CHOs consider not only monetary factors but also non-monetary factors such as working conditions and respect from the community when choosing a job. They prefer a job that offers a higher monthly income, sufficient welfare benefits, better working conditions, sufficient opportunities for career development and training and higher respect from the community. Other studies that have used DCEs to elicit job preferences of health workers in other countries have also found similar results (Chomitz *et al*. 1998; Scott 2001; Ubach *et al*. 2003; Wordsworth *et al*. 2004; Penn-Kekana *et al*. 2005; Blaauw *et al*. 2010). Financial incentives, although important, are not the only consideration when Chinese primary care providers make a job choice decision.

In terms of monetary valuation, the most important job attributes are sufficient welfare benefits, respect from the community and sufficient essential equipment. Chinese primary care providers value opportunities for training and career development least. According to Maslow's Hierarchy of Needs, the most basic level of human's needs must be met before the individual will strongly desire the secondary or higher level needs. As Chinese primary care providers still value the most fundamental needs and place less importance on opportunities for training and career development (the highest level of needs in Maslow's theory), we can conclude that Chinese primary care providers' basic needs are still not satisfied. Studies on Chinese primary care providers' job satisfaction also found that income and benefits were the items which they were least satisfied about (Song *et al.* 2012a; Shi *et al*. 2013). Thus, fulfilling Chinese primary care providers' basic needs should be a priority when trying to retain health workers working in CHOs.

Our finding that respect from the community is of great importance for both doctors and nurses working in CHOs is especially notable. Respondents all felt strongly about a job with low respect from the community. This seems to be a major factor influencing job choice and therefore recruitment and retention in CHOs. In China, patients' trust in CHOs is low and they often seek care at large hospitals for simple health problems (Yip *et al*. 2012), and the relationship between patients and health workers is tense (Tang *et al*. 2008). The reasons are multifactorial, but the poor infrastructure of CHOs and the poor competence of health workers in CHOs aggravate the situation. Considering the relative high value that Chinese primary care providers also lay on this attribute, alleviating these issues could be an important priority for policymakers.

We also find that, generally, there is no significant difference between doctors' and nurses' preferences over job attributes when making a job choice decision. This finding may not initially seem consistent with prior expectations of large differences between doctors and nurses. One possible explanation in our data is that in Chinese CHOs, doctors are more similar to nurses than we might expect. For example, doctors earn only 20% more than nurses, a much smaller premium than in other countries or other contexts in China. Therefore, the situation in CHOs that doctors and nurses face are similar, with low levels of salary and welfare benefits and a poorly equipped working environment. As a result, both doctors and nurses may consider these same factors as the most important when making a job choice. When including institutional and personal characteristics into the regression model, we do find minor differences between doctors' and nurses' job preferences. For example, doctors place a lower value on a job with insufficient training opportunities and place a higher value on a job with high respect from the community. When it comes to age, our study finds that younger primary care providers value training opportunity and career development more, which implies that they have stronger desire for personal growth.

There are several limitations of this study. First, we did not carry out a pilot study in order to test the rationality of our questionnaire (Scott 2001; Kolstad 2011). However, the in-depth interviews and literature review reassured us that the attributes and levels that we set in this study are appropriate. This also meant we did not follow recent literature in implementing a Bayesian updated design (e.g. Sivey *et al.* 2012), which could have improved the efficiency of our DCE. However, as most of the coefficients in our models were statistically significant, we conclude that our DCE was sufficiently efficient to estimate the most important determinants of job choice in our context. Second, the sample population for this study is doctors and nurses already working in primary health care (PHC) facilities rather than new graduate medical students, therefore the major policy implications of the results apply more to retention, rather than attraction of health workers in PHC facilities. However, the results still have implications for recruitment of new workers. Third, we treat the income attribute as fixed rather than random. This specification allows us to estimate normally distributed willingness to pay statistics using the fixed income coefficient as the denominator. However, an attractive alternative specification to achieve this end would be to use a willingness-to-pay space model (Scarpa *et al.* 2008). Finally, as with all stated preference studies, the job choices we presented to the respondents were hypothetical, and further research needs to compare these results with results based on actual behaviour.

Conclusion

The findings from this study have important policy implications for the retention of Chinese primary care providers in CHOs. First, in order to retain primary care providers working in CHOs, their basic needs must be fulfilled. Policymakers must work to provide better pay and benefits and better working conditions for doctors and nurses in CHOs. For example, more funds could be invested to improve primary care providers' welfare benefits, including improving the pension scheme and basic medical insurance, which are the most frequently mentioned concerns found in our interviews. Second, to alleviate the strained relationship between patients and health workers, policymakers need to invest in the development of infrastructure and human resources of CHOs to improve patients' trust.

Third, the fact that doctors' and nurses' preferences over job attributes are similar when making job choices suggests that policymakers can devise policies that will influence both groups of workers in CHOs to a similar extent.

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