

What makes doctors choose to work in rural area: Discrete Choice Experiment to elicit doctors' job choices.

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Abstract

Background: Health workforce is a crucial component of health system, therefore the shortage of health workforce could deteriorate health outcomes. In Thailand, though newly graduated doctors entering rural has recently increased at approximately up to 22% of existing rural doctors, turn over rate from rural has been as high as 21%, approximately. It is thus crucial to explore attractive strategies to attract and retain doctors in rural areas.

Methods: The study has employed cohort study in its design. 255 doctors served in year 2-6 from 9 provinces were included in the sample size. Job preference was assessed by using Discrete Choice Experiment (DCE) involved asking doctors to indicate their preference between 2 hypothetical jobs, one rural and one urban. Each job was characterized by 7 job attributes: hospital size, location, salary, overtime work, specialty training opportunities, consultant provision and career promotion.

Results: Of 145 doctors responded, female doctors (53%) were slightly higher than male. The majority of doctors were single (88%), have urban upbringing (64%), and regional university graduations (65%). There were 26% of doctors under the rural recruitment project. In relation to their job preference, 6 attributes found to be statistically significant in the decision to choose a job in a rural area: hospital size, location, salary, overtime work, specialty training opportunities and career promotion. However, at baseline, where they worked were far from hometown, small size hospitals (77%), 9-14 days / months in overtime work (62%), 51,188 Bahts/ month income, having consultant provision (69%), and without quota for specialty training (79%). At baseline, only 19% stated their intention to stay at rural, while 69% intended to go for specialty training in the next 2 years.

Conclusions: The results suggest that ranges of interventions including financial and non-financial interventions that would attract doctors to rural areas are available. Rely heavily on financial incentives could post questions to the financial feasibility and professional inequity. However, salary increase, specialty training opportunities, reduce overtime work, and accelerated promotion seem equally good policy candidates.

1. Background

In **Thailand**, the shortage of health personnel in rural areas is a recurring concern. Recently it has been aggravated by two factors: an increase in health demand and inadequate workforce supply. In addition, the expansion of private health facilities, resulting from the country's economic growth and new government policies, is drawing health workers from rural public facilities to urban private facilities, further widening the rural-urban inequity gap.

Doctors are seriously affected by this problem. Currently, there were 33,166 medical doctors (Noree 2007). The problem of inequitable distribution of doctors, particularly geographical inequitable distribution, has added to the magnitude of the health workforce shortage. Evidence showed that doctors per 10,000 population ratio in the capital Bangkok is 10 times higher than that of the Northeast region (Wibulpolprasert, 2008). Rural areas where doctors are seriously needed have limited access to doctor. There were only 16.5% of doctors working in rural facilities so-called district hospitals which serve 65.7% of the country population (Wibulpolprasert, 2008). At the same time, 21.6% of doctors have worked in private sector serving mainly the urban people. As far as public and private sector concern, the evidence supported the claim of inequitable distribution of doctors between rural and

urban areas. The proportion of doctors working in private sector has been increased from 1.3% in 1985 to 23.7% in 1995 and from 19% in 1999 to 22% in 2005 (Wibulpolprasert, 2008).

Over the past 4 decades, the Thai government has implemented several strategies to redress the inequitably distribution and retention problems. The strategies have been targeted at educational strategies, motivation strategies, as well as compulsory strategies (mentioned in Wibulpolprasert and Pengpaiboon, 2003) in order to attract and retain doctors in rural area. However, turn over rate in rural areas has been irresolvable. Since 1994, the proportion of doctor turned over from public sector in relation to new entrants has increased sharply from 8% in 1994 to 61% in 1996 (Wibulpolprasert, 2008). The turn over situation was such severe as in late 1996, there was no doctor in 21 district hospitals (Wibulpolprasert and Pengpaiboon, 2003). However, due to the economic crisis situation, the proportion of turnover rate was declined from 61% in 1996 to 20% of the new entrants in 2001. Not until 2001 has the new round of brain drain started that the proportion of doctors moving from public has increased from 29% in 2001 to 63% in 2005 and slightly declined to 58% in 2006 (Wibulpolprasert, 2008). Despite a 3 year compulsory service in rural areas for doctors graduating from public universities, approximately half of the migration of doctors from public rural hospitals was made earlier than their compulsory public serviced ended (Thamarangsri, 2005). The Thamarangsri study indicated that of all the doctors who moved from public rural services, 52.3% moved to the private sector. Similarly, of all the specialists who migrated from rural areas, 83% moved to the private sector. These suggested that the doctor retention strategies were implemented as reactionary strategies in respond to immediate critical problem on an issue basis. Therefore, they are fragmented, ad hoc, and sometimes even conflicting (Noree, 2007).

Doctor retention and motivation

With regards to the doctors turn over, a few studies have carried out to investigate factors affecting their decision to move out of community hospitals and public hospitals. Sumaman (1992) and NaRanong (1992) had studied factors affecting intention to leave community hospitals and found similar results. The Sumaman's study recruited 481 doctors across the country, whilst that of NaRanong has stratified randomly recruited 48 doctors working in community hospitals. Factors found negatively associated with intention to leave community hospitals to private sector were: career advancement, recognition, policy and administration, supervision, work environment and pay.

Later in 2003, 2 studies had accessed factors drove doctors to move away from rural community hospital and public hospitals conducted by Preuksananond et al (2003) and Thamarangsri (2003). The Preuksananond et al studied 958 doctors moved out of public sectors during 2001-2003, and the results showed that factors negatively associated with decision to leave public sector were: workload, organization policy and administration, overall work satisfaction and organizational commitment. Thamarangsri's study targeted on doctors moved from community hospitals and found that factors affecting their decision making were: need for further education, workload, work close to family, income and organizational administration. Administration aspect was primarily concerns of doctors across all studies and factors such as need for further education, working close to family and high workload were increasingly important.

Looking from the other angle of doctor turn over, retention factors were as much important as turn over factors. Three studies had investigated retention factors of doctors, particularly at community hospitals. Sumaman (1992) found that factors associated with intention to stay at community hospitals were: work itself, recognition from society and work achievement. The Putasen (1996) studied 375 doctors working at community hospitals assessing work

satisfaction had showed that factors associated with work satisfaction were: work itself, recognition, work achievement, career advancement and relationship with peers.

Factors likely to affect retention or turn over from public health facilities of doctors were: work itself and appropriate workload, career advancement, further education, pay, policy and administrative, work condition, relationship with peers and work close to family. However, the existing strategies to attract and retain doctors in rural area have not yet been proved their effectiveness. Evidence also suggested that high turnover rate or work satisfaction can be attributed to a range of factors, some of which need systematic approaches to resolve. Therefore, there is a need for rigor study to assess the attractive and retention strategies in order to find out evidence to inform policy makers. These therefore have driven this study to access job preferences and the effectiveness of current and future hypothetical government interventions to improve recruitment and retention of doctors in rural areas, as well as to describe their actual job choice.

2. Methods

Sample size

A prospective cohort of doctors were recruited from 9 provinces. A cluster sampling technique was applied where 75 provinces in Thailand were classified into 3 strata, poor, medium and rich provinces, using average household consumption expenditure as proxy of economic well-being, from the 2007 national household socio-economic survey (SES) conducted by the National Statistical Office (2007). From the three strata, a systematic random sampling of 3 provinces was identified as sampling provinces. There are nine sample provinces in total. Note that the provincial economic status reflects the growth and availability of private sector providers which furnishes more choices in private hospitals and clinics to doctors in the province that might have impact on their actual choices and retention in rural services. All physicians in the nine selected provinces who had served for two, three, four, five and six years after medical graduation in district and provincial hospitals in that province were recruited as cohort members. That made up of 255 sample size.

Data Collection

Multiple methods were used to evaluate individuals' attitudes, preferences and choices in relation to rural practice. In depth-interview with 10 policy makers was used to assess the prospective measures and policy to improve the recruitment and retention of health professionals in rural areas. A self-administration questionnaire was developed and administered to each cohort member to collect basic individual characteristics (age, sex, etc.). Questions related to educational background, attitude towards living and working in rural areas was developed. A discrete choice experiment (DCE) was used to investigate the relative importance to doctors of different policy interventions that may be used to attract them to work in rural areas. Telephone interview was conducted after 1 year of baseline data collection.

Discrete Choice Experiment (DCE) development

Following the steps suggested by Ryan & Farrar (2000), Scot (2001) and Ryan (2004), the Discrete Choice Experiment (DCE) was developed. The first step in a DCE was to decide characteristics to include in the experiment, and to define the appropriate levels for each characteristic. The focus of job characteristics was on doctors' preferences for different financial and non-financial incentives that could be used to attract and retain them in rural areas. The selection of policy options to include in the DCE was based on:

- a literature review of the interventions that have been tried, and that have been successful, in attracting and retaining health workers in rural areas in developing and developed countries (reported in Lagarde and Blaauw, 2009);

- a review of Ministry of Public Health human resource policy documents and key informant interviews with 10 relevant policy makers to identify feasible strategies; and
- focus group discussions with 5 newly graduated doctors and with 3 doctors currently working in rural areas who worked in other provinces, to obtain their suggestions and preferences.

Seven attributes were selected: hospital size, hospital location, income, over time call, case consultant provision, opportunity for specialist training, and career advancement. It was also decided to design a labeled discrete choice experiment where respondents would have to choose between hypothetical job in a rural area and another hypothetical job in an urban area. Attribute levels were then defined. For most of them the base level was anchored on what corresponded to the current situation. Better levels were defined base on evidence collected during the qualitative work and the literature review. The DCE tool was piloted with a sample of 10 doctors working in community hospitals. The pilot was used to improve the wording and definition of the attributes and levels.

Table 1 Attributes and levels of discrete choice experiment (DCE)

Attributes	Levels	
	Rural facility	Urban facility
Hospital size	<ul style="list-style-type: none"> ▪ Small (10-60 beds) ▪ Large (>60 beds) 	<ul style="list-style-type: none"> ▪ Small (10-60 beds) ▪ Large (>60 beds)
Hospital location	<ul style="list-style-type: none"> ▪ Home province ▪ Different province 	<ul style="list-style-type: none"> ▪ Home province ▪ Different province
Total monthly income	<ul style="list-style-type: none"> ▪ Same ▪ Add 15% ▪ Add 30% ▪ Add 45% 	<ul style="list-style-type: none"> ▪ Same
Overtime work per month	<ul style="list-style-type: none"> ▪ 7 times per month ▪ 14 times per month 	<ul style="list-style-type: none"> ▪ 7 times per month ▪ 14 times per month
Case consultant provision	<ul style="list-style-type: none"> ▪ No ▪ Yes 	<ul style="list-style-type: none"> ▪ No ▪ Yes
Opportunity for specialist training	<ul style="list-style-type: none"> ▪ No ▪ Yes 	<ul style="list-style-type: none"> ▪ No ▪ Yes
Year in services for promotion	<ul style="list-style-type: none"> ▪ 1 years ▪ 2 years 	<ul style="list-style-type: none"> ▪ 2 years

The full factorial design produced $2^{11} \times 4 \times 1 = 8,192$ scenarios. As so many choice sets cannot possibly be answered by respondents, a fractional factorial design was produced, with 16 scenarios. To ensure that an efficient and orthogonal fractional factorial design was chosen, SAS Program Macros were used (Kuhfeld, 2005). The selected combinations were organized into a series of choice pairs (Fig 1) to be evaluated by the respondents. Each study participant evaluated 16 choice questions.

The final DCE questionnaire was administered to the sample of doctors in the form of a self-administered questionnaire, and responses were return by postal. Data from the DCE was entered, cleaned and analysed using STATA. DCE analysis used regression techniques to model respondent's choices as a function of the different package components. This paper presents the preliminary results obtained from a conditional logit model.

Fig 1 Example of a choice pair

Question **1**: Which of these two public sector facilities would you choose to work in?

Facility Characteristics	RURAL Facility	URBAN Facility
Hospital size	Small (10-60 beds)	Large (>60 beds)
Hospital location	Home province	Home province
Total monthly income	Increase 15%	Same
Overtime work per month (night and weekend)	14 times per month	7 times per month
Provision of case consultation	No	Yes
Opportunity for specialist training	Yes	Yes
Year in service for promotion	1	2

Which facility would you choose?

Rural Facility

Urban Facility

DCE Analysis

To analyse the labeled choice experiment, job characteristics were dummy-coded, and then interacted with the label. Using a conditional logit model, the odd ratios of the independent variables can therefore be interpreted as the effect of the job characteristic on the likelihood of choosing a rural position or on the likelihood of choosing an urban position. In addition, the prediction for rural choice was computed to demonstrate the relative 'market share' of each label under different configurations under the simulated scenarios.

3. Results

Baseline information

Of all 255 doctors, 145 (57%) participated in baseline activities. Female doctors was slightly higher in proportion than the male. The majority of study participants were single (88%) and 63% of them have graduated from regional universities. Of all respondents, 64% were born and spent their childhood in urban areas. The majority of doctors were recruited by entrance examination to enter their medical student (74%) and only 26% were recruited through the local recruitment system where students were recruited from rural by the local mechanisms (Table 2).

Table 2 Characteristics of doctors by years in services

Characteristics	Number (%)
Sex	
- male	67 (46.2)
- female	78 (53.8)
Marital status	
- Single	128 (88.3)
- Married	17 (11.7)
University	
- Bangkok	51 (35.7)
- Regional	92 (64.3)
Hometown background	
- urban	93 (64.1)
- rural	52 (35.9)
Type of recruitment	
- entrance exam	107 (73.8)
- rural enter	38 (26.2)

DCE analysis

Independent variables were coded as the difference between the characteristics in a rural area and that in an urban area. The DCE Results are shown in Table 3. All attributes except case consultant provision, were found to have a significant influence on the choice of rural jobs. The odd ratios, were all in the expected direction. In particular, the odds-ratio on the hospital size, hospital location, overtime work, and promotion variables show that doctors would be less likely to choose a job in a rural area that are in large hospitals, located close to home town, provide more over time work and offer a promotion that would be twice as slow as in another rural job.

The results in table 3 therefore show that financial benefit was the most important job characteristics, where 45% increase, 30% increase and 15% increase of salary ranked the first, second and third attributes to attract doctors to rural. Non-financial incentives were also found important attributes. Provide opportunities for specialty training ranks fourth. Hospital location that far from home town, small hospital size, a fast-track promotion, and less overtime work were non-financial measures that doctors have taken into account when they were making rural choices. However, case consultant provision was not significantly associated with rural choice. As far as individual characteristics concern, none of variables: sex, rural upbringing, rural recruitment system nor regional university training found to be significantly associated with rural choice (Table 3).

For choosing urban facilities: hospital located far from home town, specialty training opportunity, career advancement, small size hospital, case consultant provision and less overtime work were found to be associated with the urban choice. As the model has tested 2 interventions, salary increase and fast-track promotion, therefore these interventions were not included in the urban facility attributes.

Table 3 Conditional logistic regression results

Attributes	Odd- Ratios (SE)	95% CI	P- value
RURAL POST			
Small hospital	0.686 (0.074)	0.556 , 0.847	<0.001
Hospital located close to hometown	0.242 (0.034)	0.183 , 0.319	<0.001
15% salary increase	2.232 (0.312)	1.697, 2.934	<0.001
30% salary increase	3.183 (0.534)	2.291 , 4.423	<0.001
45% salary increase	5.400 (0.920)	3.868 , 7.541	<0.001
Less on call/ month	0.880 (0.234)	0.850 , 0.911	<0.001
Case consultant provision	1.189 (0.146)	0.934 , 1.512	0.159
Having opportunity for specialty training	2.202 (0.357)	1.600 , 3.025	<0.001
Faster career promotion	0.704 (0.085)	1.602 , 3.025	0.003
URBAN POST			
Small hospital	0.645 (0.074)	0.511 , 0.809	<0.001
Hospital located close to hometown	0.316 (0.045)	0.239 , 0.421	<0.001
Less on call/ month	0.876 (0.017)	0.844 , 0.911	<0.001
Case consultant provision	1.480 (0.162)	1.194 , 1.835	<0.001
Having opportunity for specialty training	2.567 (0.355)	1.958 , 3.366	<0.001
Faster career promotion	0.493 (0.148)	0.273 , 0.889	0.019
INDIVIDUAL CHARACTERISTICS INTERACTIONS			
Male doctors	0.848 (0.151)	0.598 , 1.203	0.357
Rural upbringing	0.972 (0.264)	0.576 , 1.645	0.918
Rural recruitment system	0.919 (0.191)	0.611 , 1.383	0.688
Bangkok university graduation	0.897 (0.184)	0.600 , 1.341	0.597

Prediction of rural job uptake

The results of the DCE have been used to compute the relative 'market share' of each label under different configurations in order to simulate the policy option scenarios. Table 4 reports the effects of four policy scenarios on the probability of choosing a rural job, comparing with the current scenario of urban hospitals where the hospitals are large size, located close to hometown, offer the same salary that they have obtained, provide case consultants and opportunity for specialty training, and have to work for 2 years before promotion. The first scenario of rural hospital is close to the current situation where rural hospitals are predominantly in small size and located far from hometown, while the salary offered is 15% higher than in urban areas. On call per month is 14 days, higher than that of the urban. Though case consultant is provided, there is no quota for specialty training, and they have to wait 2 years before being promoted. In this scenario, doctors are likely to choose the rural job up to 25.8%. The second scenario is similar to the first scenario but offering to a doctor a specialty training quota and less on call per month. The second scenario has increased the likelihood that doctors will choose the rural job as much as 65.3%. Scenario 3 is similar to scenario 2, but offering 30% salary increase and fast-track promotion. The probability of doctors to choose rural facilities is up to 82.5%. Finally, when the salary is increased by 45% for doctors working in rural, whilst other attributes are similar to scenario 3, the probability of rural choice is as high as 89.1 % (Table 4).

Table 4 Prediction for rural choice of nurses in the scenario simulations.

Attributes	Urban scenario	Scenario 1 Rural hosp	Scenario 2 Rural hosp	Scenario 3 Rural hosp	Scenario 4 Rural hosp
1. Hospital size	> 60 beds	< 60 beds	< 60 beds	< 60 beds	< 60 beds
2. Location	Close to home town	Far from home town	Far from home town	Far from home town	Far from home town
3. Monthly salary	Same	Add 15%	Add 15%	Add 30%	Add 45%
4. On call per month	7 days	14 days	7 days	7 days	7 days
5. Case consultant provision	Yes	Yes	Yes	Yes	Yes
6. Having specialty training opportunity	Yes	No	Yes	Yes	Yes
7. Year in service before promotion	2 years	2 years	2 years	1 years	1 years
Prediction for rural choice		25.8 %	65.3 %	82.5 %	89.1 %

Actual workplace and intention to stay

As far as current workplace concerns, all of them worked at rural hospitals. The majority of doctors worked at small hospital (77%), and approximately half of them work at their home provinces. In relation to their income, the majority (63%) have the income in the range of 40,000 – 50,000 Bahts, and the average income was 51,188 Bahts (SD = 13,901). Almost 90% of doctors have their overtime duty more than 8 days per month, and 83% stated that there was no opportunity for specialist training at their designated hospitals. For case consultant, the majority (70%) stated the availability of this at their hospitals. The current situation was similar to scenario 1 where the probability of choosing rural is 25.8%. When asking about their intention in the next 2 years, only 19% of them intended to stay at the same rural hospital, and 69% of them will go for specialty training. Of participated doctors, 8% will move to urban area, while 4% will resign from government (Table 5).

Table 5 Workplace characteristics of doctors

Workplace Characteristics		Number (%)
Hospital size	▪ Small (10-60 beds)	111 (76.6)
	▪ Large (>60 beds)	67 (23.4)
Hospital location	▪ Home province	78 (53.8)
	▪ Different province	67 (46.2)
Total monthly income	▪ 30,001- 40,000*	38 (26.4)
	▪ 40,001 – 50,000	53 (36.8)
	▪ 50,001 – 60,000	32 (22.2)
	▪ More than 60,000	21 (14.6)
Overtime work per month	▪ Less than 8 times	14 (9.7)
	▪ 8-13 times	80 (55.2)
	▪ 14 times and above	50 (34.5)
Case consultant provision	▪ No	44 (30.3)
	▪ Yes	101 (69.7)
Opportunity for specialist training	▪ No	115 (83.3)
	▪ Yes	23 (16.7)
Intention to stay in the next 2 years	▪ Stay at rural hospitals	27 (19.1)
	▪ Leave to urban hospitals	11 (7.8)
	▪ Go for specialty training	97 (68.8)
	▪ Resign from government	6 (4.3)

* 1 USD = 33.3 Bahts

4. Discussion and conclusion

This paper presented the preliminary results of a study that was designed to determine the doctors' job preference, actual job choice and to assess which policies could encourage doctors to work in rural areas.

The results from the discrete choice experiment provide interesting information to determine the relative importance of employment characteristics. In particular, doctors seem to value financial attributes more. However, non-financial incentives were also found important measures to attract doctors to rural. Working at hospitals located far from home town, small hospital size, having fast-track promotion, and have less overtime work were non-financial measures that could equally attract doctors to rural.

The predictions for rural choice models as well as their actual job choice have suggested that the current policy was not likely to attract the majority of doctors to rural areas. These results show that doctors place a high value on financial incentive as well as non-financial incentives. To attract doctors to rural hospitals, policy-makers should make rural jobs more attractive than urban jobs in many respects. The appropriate combination between financial and non-financial incentives is likely to be effective measures to attract them to rural. Increase salary, provide opportunity for specialty training, have fast-track promotion, and less overtime work could be the incentive packages that would attract doctors to rural areas.

Finally, a number of limitations have been highlighted concerning the results of DCE. The effects of fatigue and use of heuristic rule by respondents to complete the tasks might lead to lack of reliability of estimates. Besides, there is regularly some debate over the validity of DCE to elicit individual preferences. However, choice experiments have been showed to be complying with theoretical validity and in some cases confirmed by revealed preferences. Finally, the results of the DCE have provided evidence only on the likely impact of possible strategies for attracting doctors but have not taken into consideration the costs associated with implementing the alternative policy options.

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