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Insights from a Discrete Choice Experiment

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Health, Nutrition and Population (HNP) Discussion Paper

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Health, Nutrition and Population (HNP) Discussion Paper

Attracting Doctors and Medical Students to Rural Vietnam: *Insights from a Discrete Choice Experiment*

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Abstract: Persuading medical doctors to work in rural areas is one of the main challenges facing health policy makers, in both developing and developed countries. Discrete choice experiments (DCEs) have increasingly been used to analyze the preferences of health workers, and how they would respond to alternative incentives associated with working in a rural location. Previous DCE studies focusing on the rural recruitment and retention problem have sampled either in-service health workers or students in the final year of their training program. This study is the first to sample both of these groups in the same setting. We carry out a DCE to compare how doctors and final-year medical students in Vietnam value six job attributes, and use the results to simulate the impact of alternative incentive packages on recruitment in rural areas. Results show significant differences between the two groups. The location of workplace (rural or urban) was by far the most important attribute for doctors; for medical students it was long-term education. More surprising, however, was the magnitude of the differences: there were fivefold differences in willingness-to-pay estimates for some job attributes. These differences strongly suggest that policy makers in Vietnam should consider moving away from the current uniform approach to rectifying rural shortages and tailor separate incentive packages to students and doctors. Our results also suggest that future DCE studies should carefully consider the choice of sample if results are to be used for policy making.

Keywords: discrete choice experiment, physicians, labor market, rural areas, Vietnam

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Table of Contents

ACKNOWLEDGEMENTS	VII
INTRODUCTION.....	1
METHODOLOGY	2
THEORETICAL BACKGROUND.....	2
CHOICE OF JOB ATTRIBUTES AND LEVELS	3
EXPERIMENTAL DESIGN	5
SAMPLING	5
ECONOMETRIC SPECIFICATION.....	6
RESULTS	8
DISCUSSION	11
REFERENCES.....	13

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INTRODUCTION

One of the biggest challenges facing health policy makers in developed and developing countries is motivating physicians to work in rural areas. Approximately one-half of the world's population lives in rural areas, but it is served by less than 25% of the total physician workforce. As many studies have pointed out, this lack of qualified health workers in rural areas is a significant barrier to service delivery in developing countries (for example, Dolea et al. 2010; Vujcic et. al. 2009; WHO 2010; Zurn et al. 2004).

In recent years discrete choice experiments (DCEs) have been used to study health worker preferences and to provide insight into potential policy responses to the rural recruitment and retention problem. The main value of a DCE is that it allows for a quantitative estimate of how health workers and students value various aspects of their job (including location) and allows the impact of alternative incentive packages on rural recruitment and retention to be simulated. However, one of the major challenges in carrying out DCEs in general is the choice of sample (Ryan et al. 2008; Hensher et al. 2005). Of eight previous DCEs in developing countries that focused on understanding health worker preferences for rural service, four used final-year students¹ and two in-service health workers.²

One clear advantage of focusing on medical and nursing students is that this group is relatively easy to reach, as they are located in schools rather than facilities dispersed across a country. Developing countries often have only a few medical and nursing schools—frequently centrally located—simplifying things even further. In these settings, it is often time consuming and expensive to travel between health facilities, especially if they are in remote areas, to interview a representative sample of health workers. In some cases, information systems are so weak that basic information, such as number of health workers in the country and their location, is not readily available.

However, a real disadvantage of targeting students in a DCE is that, a priori, the extent to which the results can be generalized to the entire workforce, or even to those who are at the very early stages of their career, is unclear. If policy makers are interested only in recruiting and retaining new graduates in rural areas, this is obviously a minor concern. But if the aim of the DCE is to inform the design of policy aimed to attract and retain a broader group of health workers in rural areas, then focusing on students in the sampling has inherent weaknesses. Previous qualitative research in developing countries has clearly shown that job preferences of new graduates are very different from those of mid- or late-career health professionals (Rao et al. 2010; Serneels et al. 2008).

¹ Kruk et al. (2010), Chomitz et al. (1998), and Kolstad (2010) sampled medical students in Ghana, Indonesia, and Tanzania, respectively; Blaauw et al. (2010) sampled nursing students in Kenya, South Africa, and Thailand.

² Hanson and Jack (2008) interviewed in-service doctors and nurses in Ethiopia; Mangham (2007) focused on in-service nurses in Malawi.

But how relevant are these differences? In other words, how differently would a new graduate and mid-career health worker respond to the same rural incentive package? If there are significant, measurable differences, two important implications follow. First, such differences might motivate policy makers to design incentive packages that are tailored to particular career stages rather than a uniform, national incentive package (which is often the case in developing countries; WHO 2010). Second, as DCE applications expand in this area of health policy, such differences might stimulate researchers to reexamine the choice of sample and to ensure that their decision is heavily informed by their perception of how policy makers intend to use the results.

This is the first DCE focusing on recruitment and retention of health workers in rural areas of which we are aware that samples both final-year students and in-service health workers in the same setting. We focus on doctors and medical students in Vietnam, which is part of a multi-country DCE analysis of health worker preferences supported by the World Bank. One of the highest priority areas for the Ministry of Health in Vietnam is to improve access to doctors in rural areas and at lower levels of care (such as communes and districts). About 53 percent of physicians are concentrated in urban areas where only 28 percent of the population lives. According to the most recent estimates, nationally only 67 percent of commune health centers have a doctor but this figure is below 30 percent in most rural provinces (Ministry of Health 2009). Our experimental design enables us to investigate quantitatively the extent to which medical students value job attributes differently than doctors who are currently working in the health system in Vietnam. We find some important differences that are striking in magnitude. For example, compared to doctors, medical students place a relatively low value on remuneration vis-à-vis other job attributes and put a much higher value on continuing education. These differences translate into important differences between medical students and doctors in the predicted take-up rate of alternative rural incentive packages.

The remainder of the paper is structured as follows. Section 2 describes the DCE methodology and how it was applied in Vietnam. Section 3 presents the results and discusses how policy makers can use them to inform the design of incentive packages to recruit staff to rural areas. Section 4 concludes.

METHODOLOGY

THEORETICAL BACKGROUND

The random utility model provides the theoretical underpinning for the DCE. In this framework, individual n is assumed to choose between J alternative jobs, opting for the one that is associated with the highest utility level. Thus, individual n will choose job i if and only if:

$$U_{ni} > U_{nj} \quad \forall i \neq j \in J$$

The random utility model assumes that the utility associated with a particular job is made up of two components. The deterministic component V_{ni} is a function of m job attributes

(x_1, \dots, x_m) that are observed—such as pay, working conditions, and location—each valued at a certain “weight” or “preferences” $(\beta_1, \dots, \beta_m)$. The random component ε_{ni} is a function of unobserved job attributes as well as individual-level variation in tastes. The utility associated with job i , therefore, can be parametrized as:

$$U_{ni} = V_{ni} + \varepsilon_{ni} = \alpha_1 + \beta_1 x_{1ni} + \beta_2 x_{2ni} + \dots + \beta_m x_{mni} + \varepsilon_{ni} \quad (1)$$

Since the utility of a job is not directly observable, the coefficients in equation (1) cannot be estimated directly. The DCE methodology takes advantage of the fact that the jobs that individuals choose are observed along with all the other jobs that they do not choose. Thus, when individual n is presented with a pair of jobs, the probability that he or she chooses job i over job j can be written as:

$$P_{ni} = \Pr[U_{ni} > U_{nj}] \quad \forall i \neq j \in J$$

Using equation (1) this becomes

$$P_{ni} = \Pr[\varepsilon_{ni} - \varepsilon_{nj} > V_{nj} - V_{ni}] \quad \forall i \neq j \in J \quad (2)$$

Equation (2) can be estimated using standard econometric techniques and software, giving estimates of $\alpha_1, \beta_1, \dots, \beta_m$. The coefficient estimates can then be used to estimate health workers’ willingness to pay for various job attributes—in other words, how much salary they are willing to give up for better working conditions. Even more importantly, the coefficients can also be used to predict the proportion of health workers choosing one job over another. These types of simulations have the potential to assist policy makers in their decision making as they estimate the predicted take-up rate of rural jobs under alternative incentive packages.

CHOICE OF JOB ATTRIBUTES AND LEVELS

We identified six job attributes and accompanying levels to be the most important on the basis of extensive preparatory qualitative research. We carried out in-depth interviews with practicing doctors and focus group discussions with final-year medical students. We also interviewed key decision makers in the government to ensure that job attributes selected were amenable to policy changes. A full summary of results from the qualitative research are available elsewhere (Witter et al. 2010). The six attributes for this study are location, condition of equipment in facility, official income, skills development (short-term training), long-term education (specialist training), and availability of free housing. The job attributes and their levels are defined in Table 1.

Table 1: Job Attributes and Levels

Attribute	Definition	Levels
Location	This attribute specifies whether the place of work is in a remote rural area or in an urban center. Remote area is defined as a sparsely populated area, which is more than 1 hour driving from a main urban center.	Remote rural area Urban center area
Equipment	This attribute includes medical tools and facilities to support your work (clinical diagnosis, for instance). “Adequate” is the government standard package and “Inadequate” is lower than the government standard package for that level.	Inadequate Adequate
Official Income	This is the income from specific government sources, such as salary, occupational allowance, overtime allowance, hospital autonomous funds, but not those from private practice or private consultancies	Level 1 (VND 4 million) Level 2 (VND 8 million) Level 3 (VND 12 million) Level 4 (VND 16 million) Level 5 (VND 20 million)
Skills Development (short-term training)	This attribute is the opportunity to develop professional skills. Staff may be given the possibility to attend short-term courses or workshops on specific issues, to work with a range of experienced colleagues and to receive more supportive technical supervision.	No skills development program Short-term courses, expert exchange, and supportive supervision
Long-term Education (specialist training)	This attribute states that, on the condition that the doctor stays at least 5 years on the job, she or he will be offered the opportunity to go back to a formal medical school in a central teaching hospital for a training of at least one year. This training would enable a doctor to get the full medical doctor degree, if not yet received, or to acquire a specialization degree.	None Possibility to enter advanced medical school after 5 years on the job
Housing	This attributes specifies whether or not the government will provide free housing in addition to the wage.	None Government-provided housing free of charge

EXPERIMENTAL DESIGN

The choice sets for a DCE questionnaire were generated using well-established statistical methods. We chose to limit the number of choice sets to 16, which is within the acceptable range for DCE studies. We used DCE macros in the statistical program SAS to generate a D-optimal design that maximized D-efficiency (Kuhfeld and Tobias 2005).³ This method takes account of orthogonality (attribute levels are independent of each other), level balance (attribute levels appear with the same frequency), and minimal overlap (attributes do not take the same level within a choice set). Two questions were inserted as tests of rationality where one job dominates the other in every attribute (and these were dropped for the analysis). This led to a total of 18 choice sets.

Prior to the field data collection, the questionnaire was pretested to evaluate the reactions of the respondents, the appropriateness of the questions, and the suitability of format and wording of questions.

SAMPLING

The study used multistage sampling. In the first stage facilities were randomly selected from seven predefined strata based on facility level and province. In the second stage, doctors were randomly selected from facilities. This approach could be seen as being close to a probability sampling, allowing generalization of study findings to the whole population of doctors in the chosen regions (after applying sampling weights). The final sample size was 292 doctors, with 174 in Hanoi (the capital), 61 in Dong Thap (a province in the Mekong Delta), and 57 in Lao Cai (a mountainous rural province in the Northern Highlands). This number represents about 0.6 percent of all doctors in Vietnam. We included two regions that have difficulties in attracting doctors (the Mekong Delta and Northern Highlands), and one that does not (Hanoi).

Medical students were sampled as a separate group. We sampled one medical university in each of the three regions: Hanoi Medical University (in the capital), Can Tho Medical University (serving the Mekong Delta), and Thai Nguyen Medical University (serving the Northern Highlands). We sampled 35 final-year students per institution (105 in all). As the total number of final-year students in each of these three institutions is 250–270, this sample was expected to represent about 13 percent of the total student population.

The final sample of doctors is quite representative of the doctor population on several key characteristics, as reported in Table 2. The gender composition of our sample is identical to the overall workforce. Similarly, the self-reported official income in the DCE sample lies within the official guidelines for physicians laid out by the Ministry of Health. The level of facilities surveyed for the DCE does, however, differ from the figures provided by the health worker census, since we slightly “undersample” district and “oversample” provincial and national facilities. We do not have national statistics on the characteristics of final-year medical students and, therefore, cannot assess the representativeness of our

³ For more information on the SAS macro, see http://support.sas.com/techsup/tnote/tnote_stat.html#market.

sample. However, 90 percent of sampled students are 24–26 years old. There is an even split between males and females, only three are married, and around 10 percent own the house they live in.

The questionnaire was administered in person at health facilities and universities. Data were double entered into Excel, checked for consistency, and then transferred to Stata for analysis.

Table 2: Descriptive Statistics of Doctor Sample

Variable Means for DCE Sample and Health Worker Census for Doctors			
Variable		DCE Sample	2008 Health Worker Census
n		292	50,110
Age		42	n/a
Gender	Male	0.54	0.54
	Female	0.46	0.46
Facility Level	Commune	0.12	0.17
	District	0.26	0.35
	Province and National	0.63	0.47
Public Wage		VND 3 million	VND 2.2–3.3 million

ECONOMETRIC SPECIFICATION

We estimated equation (2) using a mixed logit model. This framework has been increasingly used in DCE analysis, including two recent studies focusing on health workers (Kruk et al. 2010; Blaauw et al. 2010). The model has the convenient properties of allowing for preference heterogeneity, the violation of the independence of irrelevant alternative assumption, and the fact that each individual has to choose between three options. Hensher and Greene (2001) provide an overview of this model and this section follows their approach. According to the authors, one way of intuitively picturing the workings of the mode is to divide the error term into two additive parts. The first one (η_{ni}) is correlated across alternatives and heteroskedastic and the second one (ε_{ni}) is iid over choices as well as over individuals. Equation (1), therefore, becomes:

$$U_{ni} = \alpha_l + \beta_1 x_{1ni} + \beta_2 x_{2ni} + \dots + \beta_m x_{mni} + \eta_{ni} + \varepsilon_{ni} \quad (3)$$

where α_l is the intercept, x_{ni} the attributes, and β the associated coefficients; η_{ni} is the heteroskedastic and ε_{ni} the iid error term. The researcher can specify the distribution for η_{ni} —common ones are normal, log normal, and triangular. Since ε_{ni} is still iid extreme value 1, for a given η_{ni} the conditional probability (P_c) of choosing job i is:

$$P_{C1} = \frac{\exp\{\alpha_1 + \beta_1 x_{1ni} + \beta_2 x_{2ni} + \dots + \beta_m x_{mni} + \eta_{ni}\}}{\sum_j \exp\{\alpha_1 + \beta_1 x_{1nj} + \beta_2 x_{2nj} + \dots + \beta_m x_{mnj} + \eta_{nj}\}} \quad \forall i \neq j \in J \quad (4)$$

Integrating overall values of η_{ni} gives the unconditional probability:

$$P_1 = \int P_{C1}(\eta) f(\eta|Z) d\eta \quad (5)$$

where $f(\eta|Z)$ is the density of η and Z the fixed parameters of the distribution. In practice this framework treats coefficients not as fixed but as random parameters.

The integrals considered here do not have a closed form. As a consequence the choice probabilities cannot be calculated directly; they have to be approximated by simulation. For a given value of parameters a value of h is drawn from its distribution and employed to calculate the choice probability. This process is repeated a number of times and the average probability calculated:

$$\bar{P}(i_n) = \frac{1}{R} \sum_{r=1}^R \bar{P}_r(i_{nr}) \quad (6)$$

where R is the total number of repetitions and P the choice probability.

RESULTS

Coefficient estimates are reported in Table 3. For both students and doctors, all attributes were significant (at the 1 percent confidence level) and coefficients were of the expected sign. Respondents positively value being located in an urban area, having adequate equipment, higher official income, being offered skills development (short-term training), long-term education (specialist training), and free housing.

Table 3. Mixed Logit Model Regression Results Estimating Preferences for Job Attributes

Variable	Doctors		Medical Students	
	Coefficient	Standard Deviation	Coefficient	Standard Deviation
Location	1.113*** (0.131)	1.505*** (0.129)	1.002*** (0.135)	0.652*** (0.149)
Equipment	0.784*** (0.088)	0.839*** (0.090)	0.552*** (0.101)	0.0170 (0.163)
Official Income	15.8*** (2.08)	-	3.54*** (1.07)	-
Skills Development	0.748*** (0.066)	0.325** (0.131)	0.226** (0.0889)	-0.0102 (0.210)
Long-term Education	0.817*** (0.086)	0.862*** (0.087)	1.099*** (0.118)	0.362** (0.174)
Housing	0.500*** (0.075)	0.422*** (0.136)	0.219** (0.102)	-0.0221 (0.278)
Job A Constant	-0.654*** (0.092)	0.990*** (0.090)	-0.280* (0.143)	0.957*** (0.116)
Number of Individuals	292		105	
Observations	9344		3360	
Log Likelihood	-2485**		-942**	

Notes: (i) Estimations are based on a mixed logit model. (ii) Dependent variable takes value one if individual chooses that particular alternative. (iii) "Official Income" coefficient is fixed, remaining coefficients assumed to be normally distributed. (iv) Every individual contributes a total of 32 observations (16 questions of two choices). (v) Standard Errors reported in parentheses. (vi) Official income coefficient inflated by 100. (vii) ** p<0.05, *** p<0.001.

The willingness-to-pay estimates for doctors and medical students are reported in Table 4. Willingness to pay is the amount of total pay that individuals are willing to forgo each month in order to attain a higher level of a particular job attribute. It is, in other words, the monetary value that doctors place on different job attributes and is derived from the coefficient estimates in Table 3. For job attribute x_j , for example, it is simply the value β_j / β_I where β_I is the coefficient on official income.

Overall, doctors value the location of their workplace the most and free housing the least. For the whole sample, doctors are willing to pay VND 7.04 million to work in an urban location. Long-term education is valued the second highest at VND 5.17 million followed by adequate equipment (VND 4.96 million). Finally, doctors put a value of VND 4.73 million on skills development and VND 3.16 million on free housing.

Table 4: Estimated Willingness to Pay for Various Job Attributes

How much are you willing to pay for ...	Doctors			Medical Students		
	WTP (VND million)	95% Confidence Interval		WTP (VND million)	95% Confidence Interval	
A Job in Urban Area	7.04	5.34	8.77	28.3	8.30	48.41
Adequate Equipment	4.96	4.00	5.92	15.6	7.32	23.90
Long-term Education	5.17	4.24	6.11	31.1	15.02	47.22
Skills Development	4.73	3.85	5.63	6.4	-2.44	13.06
Housing	3.16	2.22	4.11	6.2	-5.99	13.07

Notes: (i) Calculations based on coefficient estimates in Table 3. (ii) We used the nlcom command in Stata to calculate 95% confidence intervals.

Three major differences between doctors and medical students may be highlighted in Table 4. First, willingness-to-pay values for medical students are much higher in absolute terms for all attributes. This is driven almost entirely by the fact that the coefficient on total pay for medical students is about one-fifth that for doctors. Such a result clearly indicates that medical students, overall, value nonfinancial incentives much more and financial incentives much less than doctors. This is consistent with the findings from our preliminary qualitative work. Medical students were much more concerned with their long-term career prospects (and future income) when choosing a job and much less concerned with current earnings, compared to doctors.

Second, the willingness-to-pay values for medical students vary to a much greater extent than for doctors. For example, the 95 percent confidence interval for the willingness to pay to be in an urban area for students is VND 8.3 million and VND 48.4 million, which is an incredible range compared to doctors. One interpretation of this finding is that medical student preferences are much more heterogeneous than those of doctors.

Third, despite lower levels of reliability, there are still statistically significant differences in willingness to pay between doctors and medical students for equipment and long-term education. The most important job attribute for medical students is long-term education, with a mean willingness to pay of VND 31.1 million, which is much higher than the VND 5.17 million for doctors. Medical students are willing to pay, on average, VND 15.6 million for adequate equipment compared to VND 4.96 million for doctors. For the other attributes, willingness to pay is not statistically different among doctors and medical students.

We then use regression results from equation (6) to simulate the impact of alternative incentive packages on the take-up rate of rural jobs for both medical students and doctors. Similar to previous work that uses a mixed logit model, we use 500 Halton draws and average the results to arrive at the predicted probability of take-up for our entire sample (Kruk et al. 2010). We set our baseline urban and rural jobs according to the current situation in Vietnam based on the available data, our qualitative analysis, and key informants in the ministry of health. Urban jobs are taken to have adequate equipment, a total pay of VND 4.0 million, and to offer skills development opportunities (short-term training). Rural jobs have the same pay but inadequate equipment and no skills

development opportunities. In both rural and urban areas on the baseline, jobs did not have any provisions for entering long-term training after five years nor did they offer free housing. Under this baseline scenario, the predicted take-up rate of rural jobs is 23 percent for both medical students and doctors.⁴

Table 5 summarizes the predicted take-up rate of rural jobs when, all else equal, one aspect of those rural jobs improves over the baseline scenario. For example, relative to the baseline scenario, if the condition of equipment improves in rural areas, this increases the predicted take-up rate of rural jobs to 32 percent for both medical students and doctors. For the other policy options, however, the differences in predicted take-up between doctors and medical students are statistically significant, although in many cases the magnitude of difference is small from a policy-making perspective.

Offering skills development opportunities in rural areas increases the predicted take-up rate to 32 percent for doctors and 27 percent for medical students, relative to the baseline scenario. Providing free housing in rural areas has the smallest impact for both doctors and medical students. The predicted take-up rate increases to only 29 percent for doctors and 27 percent for medical students. The impact of long-term education is very different for doctors and medical students. For doctors, it is predicted to increase the take-up rate of a rural job to 34 percent but for medical students the effect is much larger, at 42 percent. The impact of a rural financial allowance of VND 4.9 million is also different, with doctors responding more favorably than medical students. Interestingly though, a wage premium for rural service of VND 2 million has a fairly small effect on the predicted take-up rate of rural jobs for both doctors and medical students.

⁴ Unfortunately, the human resources for health management data system, along with our definition of rural and urban areas, do not allow us to validate this baseline take-up rate.

Table 5: Estimated Take-Up Rates (%) for a Rural Job Under Different Policy Options

	Doctors	Medical Students	Difference is Significant at 5% level
Baseline	23	23	
(SD)	0.168	0.14	
Wage Premiums VND 4.9 million	44	46	
(SD)	0.215	0.177	
VND 2.0 million	26	24	*
(SD)	0.176	0.142	
Equipment	32	32	
(SD)	0.166	0.153	
Skills Development	32	27	*
(SD)	0.175	0.143	
Long-term Education	34	42	*
(SD)	0.212	0.179	
Housing	29	27	*
(SD)	0.215	0.145	
Observations	292	105	

Note: (i) Consistent with previous studies, take-up rates are estimated from equation (6) using 500 Halton draws and averaging the resulting probabilities (Kruk et al. 2010). (ii) VND 4.9 million is the estimated monthly cost per doctor to the government of providing long-term education. Thus, per doctor, this level of financial bonus entails approximately the same cost to the government as providing long-term education.

DISCUSSION

Rural shortages of doctors and other health personnel are a major issue not just in Vietnam but globally. The new WHO policy guidelines on rural retention demonstrate that there is a vast menu of policy options available to decision makers and the appropriateness of alternative policies depends heavily on tailoring these policies to the country context (WHO 2010). These guidelines recommend carrying out country-focused analytic work such as a DCE in order to be able to better calibrate, or customize incentive packages. As previous studies have shown, health worker preferences vary significantly across countries, and within countries depending on individual characteristics. Our results provide important insight into both the design of rural recruitment and retention policies for doctors in Vietnam, as well as the design of future DCEs that focus on this issue.

The government of Vietnam applies a uniform approach to the problem of rural shortages. The current policy has two main features. There is an increased salary level for health workers who locate in rural areas. However, in a separate analysis, we show that when all sources of income are taken into account, including local payments from hospitals and dual income earnings, total pay is significantly lower in rural areas (Vujicic et al. 2010). In other words, the government's salary policy is being diluted by the various income streams that doctors have in the system. Second, the government mandated newly graduated doctors to serve up to two years in a rural area. Experienced

doctors are also rotated into rural areas for periods of up to three months. While there has not been any formal evaluation of the effectiveness of these approaches, it is clear that significant challenges remain. Some new graduates find mechanisms to avoid mandatory rural service. Others serve in rural areas but either move to private practice or return to urban settings before their mandatory service is over.

Our analysis provides quantitative estimates of the likely impact of alternative policies aimed at improving rural recruitment and retention and how these differ between medical students and doctors. It is clear from our findings that medical students place a very high value on long-term education (specialist training). Therefore, an incentive scheme that offers new graduates priority access to long-term training opportunities when they work in a rural area might be an effective policy option to explore. Similarly, our results provide some insight into the total pay differential that is required to alter the predicted take-up rate of rural jobs by a certain amount. This information can be used to revise the current pay policy in Vietnam. Perhaps most importantly, our analysis has, for the first time as far as we can tell, quantified differences in preferences for job attributes between medical students and doctors in a particular setting. The results provide strong motivation to move away from the current uniform approach, and to tailor specific incentive packages to doctors at different stages of their careers.

Based on these findings, there are important issues to highlight for researchers conducting DCEs to inform rural recruitment and retention policies in developing countries. First, the choice of whether to sample students or in-service providers has extremely important implications and should be thought through carefully and should be driven by the end users of DCE analysis – the policy makers. Our results show that medical students and doctors in Vietnam have differences in job-attribute preferences. We believe this is very likely to be the case in other countries as well. As a result, there is significant risk in using findings from a DCE on final-year students to inform a general, systemwide rural recruitment and incentive policy that will apply to the entire workforce.

However, if policy makers are, a priori, interested primarily in getting young doctors to rural settings and plan on developing an incentive policy targeted to this group, then the appropriate sample may well be final-year students. There may be little value in taking on the extra time and cost associated with sampling in-service health workers. Of course, with no time and cost constraints it would always be preferable to sample both final-year students and in-service health workers, but this is often not feasible. By working together closely at the design stage of the DCE, researchers and policy makers can explore the trade-offs associated with alternative sampling strategies. As DCEs are increasingly used in developing countries to inform policy, there will be many opportunities for such collaboration.

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