HISTORICAL BACKGROUND VERSUS STATED PREFERENCES

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Abstract

The geographical imbalance of public sector teachers is one of the main challenges facing policy makers in developing countries. This study sought to analyze public sector teachers' decision in choosing a remote and/or rural area job with reference to their historical background. Discrete choice experiment modeling approach was adopted to estimate consideration sets. The survey focused on 120 teacher trainees. The effects of certain attributes based on the findings from the study revealed that teachers were will to trade off location for benefits such as granting of study leave with pay, provision of housing, and early promotion (after 3 years of work). Teachers with rural living experience tended to prefer rural assignments. The extent to which teachers were will to trade off their initial preferences for salary was limited.

Keywords: Discrete choice experiment, stated preference, job preference, recruitment, teachers

Introduction

Education has been one of the most important institutions in all societies from the dawn of human history. It has played a major role in moving countries forward for which Ghana is not an exception. The achievement of any organization is closely tied to the quality of the human resource as well as the conditions of service. Teachers help children struggling for self-esteem and for the discovery of who they are and what they can become. They become important part of this sometimes painfully and sometimes joyfully for growth and self-discovery job (Yeboah, 2011). Improvements in education are of much importance in enabling people to overcome poverty. However, there are great difficulties in providing good quality public services in remote and rural areas in developing countries like Ghana. One key problem relates to attracting and retaining educated

personnel in these difficult locations. Even though a large number of teachers graduate from teacher training colleges each year, there are still shortages of professional teachers, particularly in deprived communities and rural areas of the country (Ghana) (Ganyaglo, 2014).

To address these difficulties (Pearson, O'Connell, & Dickinson, 1995; Sempowski, 2004) opined that many studies and countries as diverse as the US, Australia, Thailand, and Indonesia have attempted recruitment programs that target workers who are more committed to rural service. Laven, Wilkinson (2003), and Lindelöw, Serneels (2006) in their study observed that workers with a rural background are more willing to work there, and more responsive to additional incentives to work in rural areas.

Serneels, Montalvo, Pettersson, Lievans, Butera, and Kidanu (2010) in their study on the determinants of future health workers' willingness to work in rural areas found that workers with higher intrinsic motivation as well as those who have grown up in a rural area, and Adventists who participated in a local bonding scheme were all significantly more willing to work in a rural area. The results suggested that in addition to economic incentives, intrinsic motivation and rural origin play an important role in workers' decisions to work in a rural area, and that faith-based institutions matter. A number of financial incentive schemes have been suggested, and it is often found that financial incentives have a positive effect on the willingness to work in rural areas (Chomitz et al., 1998; Serneels et al., 2005; Kristiansen & Forde, 1992). The size of this effect, however, varies across schemes, countries and cadres. Several empirical studies have also identified important non-pecuniary motivation factors. For instance, Vujicic et al. (2004) showed that non-pecuniary incentives, like the provision of housing and the prospect of an opportunity to upgrade qualifications, are important reasons for wishing to migrate. Moreover, financial incentives have, in some cases, limited effects compared with non-financial incentives when it comes to self-esteem and job satisfaction (Kingma, 2003). Opportunities for educational upgrading, career development and colleagues in the work place are other motivating factors that have been found to be important when workers decide where to work (Serneels et al., 2005; Chomitz et al., 1998). Drawing on existing research, there is also reason to believe that background variables and other personal characteristics can be important explanatory variables. Gender, family income, talent, education level and the regional base of the family are all variables that are likely to affect each individual's willingness to work in rural districts. For example, Chomitz et al. (1998) in their study showed that the premium needed to make Indonesian workers move to rural districts was substantially lower for students from rural districts than for students originally from Jakarta. A Japanese study also found that rural doctors were more likely to remain in practice in rural areas

if they had a rural background, and men were much more likely to remain in rural practice than women (Matsumoto et al., 2005).

Discrete choice experimentation has been used in this context due to the absence of data sets on actual choices that public sector workers have made regarding their jobs (Fragernas & Pelkonen, 2012). Damaraju, James and Pallavi (2011) observed that in real life situation, consumers reveal their preferences through choices, and that the aggregate of choices constitute the demand for goods and services, the vote for political leaders and many other phenomena of interest. Understanding how changes in the characteristics of alternatives affect preferences, for them, is important in many fields in which predicting human choices are of interest. However, the various assertions by policy makers in the education sector that even though a large number of teachers graduate from college each year, there are still shortage of teachers; particularly in deprived communities and rural areas of Ghana, trained teaching personnel have refused postings to rural and deprived areas, and teachers who accept posting to rural areas will get 20% pay rise as financial compensation to motivate them to improve on their performance (Ganyaglo, 2014; Apanga, 2014; Parker-Allotey, 2014) are a clear indication that Ghana is faced with the problem of recruiting and retaining of educated personnel in difficult locations, but they have failed to come out with packages or bundles that would actually influence public sector teachers decision to willingly accept remote and/or rural area job posting. In this light the author is of the view that policy makers in the education sector should adopt a strategy by designing incentive packages that would influence teachers' choice of remote and rural area job. Lancaster (1966) observation that individuals valuation of goods depend on its composing attributes is a basis to assert that teachers have preferences in choosing difficult location job, which is determined by a range of influencing factors. Also, for the available range of incentive packages, a public sector teacher will prefer his/her highest alternative, and therefore forgo others.

This study applies Discrete Choice Experiment (DCE) which has its basis in Random Utility Theory (RUT) to examine the problem and come up with recommendations for policy reforms.

Methods and Materials

Survey Design and Data Collection Procedure

By adopting the systematic sampling technique, a sample size of 120 teacher trainees was traced to their corresponding names and contact numbers in their various halls to answer the stated choice questionnaire. Final year teacher trainees were targeted since the study sought to analyze the hypothetical choice of a rural job by these people. A total sample of 50

respondents each with 16 choice sets might just be acceptable for choice experiment (Hensher et al., 2005).

In this study, respondents were asked to choose between pairs of hypothetical jobs resulting from the combination of both attributes and attribute levels. The job bundles contained in each description were considered to be the main factors influencing public sector teachers' choice of job location. However, this method requires respondents to trade-off the different aspects of the job bundles thereby identifying important attribute levels in the study.

The attributes and levels used in this study were established following in-depth interviews and focus group discussions with in-service teachers and final-year teacher trainees. However, key decision makers in the education sector were interviewed to ensure that job attributes selected are amenable to policy changes. The attributes and corresponding levels as used in the study are:

- Provision of government housing: provided, no decent housing provided
- Net salary: Gh¢ 680, Gh¢ 816, Gh¢ 884
- Workload: a teacher to ≤ 20 students, a teacher to ≥ 30 students
- Number of years before promotion: 3 years, 5 years
- Opportunities for further studies: granting study leave with pay, no study leave

The full factorial technique with above-mentioned job attributes and corresponding levels will produce $2^4 * 3^1$ (48) profiles. However, to address the problem of respondents fatigue and worn out from a complex choice task, fractional orthogonal main effects design (by SPSS version 11.0) produced 8 profiles by eliminating the dominating and dominated profiles. 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) (Kuhfeld, 2010). Thereinafter, combinatory approach was used to generate 28 choice sets which were randomly grouped into two blocks, each containing two stated choice alternatives. Two sets of questionnaires were prepared each having fourteen stated preference (SP) choice sets. During the data collection, enumerators were trained in multiple sessions to improve the quality of the work as these are self administered interviews. A sample of the SP choice set is presented in Table 1.

Table 1: Sample choice set

Attributes	Job 1	Job 2
Provision of Government Housing	House provided	House not provided
Net Salary	GH¢ 680	GH¢ 680
Work load	A teacher to ≤ 20 students	A teacher ≥ 30 students
# of Years before Promotion	3 years	5 years
Opportunities for Further Studies	Granting study leave with pay	No study leave
Which job would you choose?	**Job 1 [ ]**	**Job 2 [ ]**

Random Utility Theory and Choice Model Specification

Thurstone (1927) proposed random utility theory as the basis for explaining dominance judgments among pairs of offerings. To him, consumers should try to choose the offerings they like best, subject to constraints (e.g. salary, time), just as in standard economic theory. However, a consumer may not choose what seems to the analyst to be the preferred alternative. Such variations in choice can be explained by proposing a random element as a component of the consumer's utility function. That is;

$$U_i = V_i + \varepsilon_i \qquad (1)$$

Where U_i is the unobservable, true utility of offering i; V_i is the systematic component of utility; and ε_i is the random component. The econometric justification for this random component is that the analyst may omit variables or commit measurement errors; the consumer may be inattentive to the particular decision.

The presence of this random component permits the analyst to make probabilistic statements about consumers' behaviour. Thus, we focus on modeling the probability that a respondent will choose the i^{th} offering from some set of competing offerings, say C, which can be expressed as:

$$P(i/C) = \Pr\left[U_i > U_j\right] = \Pr\left[(V_i + \varepsilon_i) > (V_j + \varepsilon_j)\right], \ \forall j \in C \qquad (2)$$

The systematic component of utility is that portion of product attractiveness that can be related to product attributes (i.e. incentive packages); our ability to capture it depends on how well we identify, measure and include as many of the key factors that influence choice as possible. Once identified, the analyst has to specify how these variables combine to drive systematic preferences. That is, the analyst must propose a utility function to specify the formal relationship between the explanatory variables and choice behaviour. With no loss of generality, the systematic component can be expressed as a linear-in-the-parameters function of the explanatory variables as follows:

$$V_i = \beta' X_i \qquad (3)$$

Where β is a k-vector of utility coefficients associated with a vector X of explanatory variables (including income, prices, other attributes of the alternative and interactions between these elements). Equation (2) can then be rewritten as follows:

$$P\left(i/C\right) = \mathrm{P}\left[\left(\beta' X_i + \varepsilon_i\right) > \left(\beta' X_j + \varepsilon_j\right)\right], \ \forall \mathrm{j} \in \mathrm{C} \qquad (4)$$

Equation (4) indicates that the probability that a respondent will choose offering $i \in \mathrm{C}$ equals the probability that the combined systematic and error components of offering i are higher than the systematic and associated error components for all other competing offerings. Equation (4) also suggests that our objective is to identify and estimate the β vector associated with the variables hypothesized to explain job choice. However, choices may differ systematically from individual to individual, and to account for as many of these individual differences as possible, the set of explanatory variables can be expanded to include individual difference (i.e. demographic and psychographic) measures Z, with associated vector of coefficients γ. These individual difference measures may be hypothesized to influence utility levels via intercept and/or slope coefficients in the β vector.

Many different probabilistic choice models can be derived by making different assumptions about the distribution of the errors (random component). For example, a bivariate normal distribution yields the binary probit model (Thurstone, 1927), which has its multivariate generalization in the multinomial probit discrete choice model. However, this study specifically relied on the binary probit model to estimate utility coefficients.

Model Results and Discussion

The signs of the parameter estimates in Table 2 and Table 3 are as expected and in agreement with the actual condition of the study route. It is evident from the P-values that the parameter estimates are statistically significantly different from 0. However, generally, workload (a teacher to ≤ 20 students) has no significant effect on rural area job choice by public sector teachers with rural and urban background. The overall goodness of fit is considered using Pseudo R^2. Value of the Pseudo R^2 between 0.2 and 0.4 indicates acceptable model fit (Louviere, Hensher, & Swait, 2000). The Pseudo R^2 values indicate that these models are good in fit.

Granting of study leave with pay, housing provided and 3 years of work before promotion to those without increase the utility and uptake probability associated with remote/rural area job preference. This means that generally, for job location choice, teachers prefer or value job bundles such as granting of study leave with pay, provision of housing and promotion after 3 years of work.

Also, the salary attribute would be traded off for attributes like granting of study leave with pay, provision of housing and promotion after 3 years of work.

Generally, as teachers with rural background prefer remote/rural area job with or without the provision of housing, urban background teachers prefer housing. This is an indication that rural-background teachers prefer to work in those areas.

Table 2: Probit model by teachers with remote/rural background

Attributes	**Coefficient**	**Z Value**	**P>|Z|**	**[95% Conf. Inter.]**	
Housing provided	1.1249	3.64	0.000	0.5190	1.7308
No decent housing provided	0.6511	2.06	0.039	0.0330	1.2692
Net salary (Gh¢ 680)	-0.8078	-8.76	0.000	-0.9886	-0.6271
Net salary (Gh¢ 816)	-0.4334	-4.45	0.000	-0.6243	-0.2425
Workload (a teacher to ≤ 20 students)	0.1129	1.53	0.127	-0.0319	0.2578
# of years before promotion (3 years)	0.2823	3.75	0.000	0.1349	0.4297
Granting study leave with pay	1.2970	17.25	0.000	1.1496	1.4444
Constant	-1.2246	-4.01	0.000	-1.8234	-0.6258
Number of observations	1596				
Likelihood ratio χ^2	505.20				
Prob > χ^2	0.000				
Pseudo R^2	0.2283				

Table 3: Probit model by teachers with no remote/rural background

Attributes	**Coefficient**	**Z Value**	**P>|Z|**	**[95% Conf. Inter]**	
Housing provided	0.5733	2.40	0.016	0.1048	1.0418
No decent housing provided	0.1807	0.74	0.462	-0.3005	0.6621
Net salary (Gh¢ 680)	-0.8811	-10.16	0.000	-1.0511	-0.7111
Net salary (Gh¢ 816)	-0.3131	-3.40	0.001	-0.4935	-0.1326
Workload (a teacher to ≤ 20 students)	0.0476	0.68	0.494	-0.0888	0.1841
# of years before promotion (3 years)	0.3306	4.66	0.000	0.1915	0.4696
Granting study leave with pay	1.2195	17.19	0.000	1.0805	1.3585
Constant	-0.6835	-2.92	0.004	-1.1426	-0.2244
Number of observations	1736				
Likelihood ratio χ^2	500.80				
Prob > χ^2	0.000				
Pseudo R^2	0.208				

Table 4: Probit model by teachers who had their primary and/or secondary education in a remote/rural area

Attributes	**Coefficient**	**Z Value**	**P>|Z|**	**[95% Conf. Inter.]**
Housing provided	0.8709	3.07	0.002	0.3145 1.4272
No decent housing provided	0.4283	1.47	0.142	-0.1427 0.9995
Net salary (Gh¢ 680)	-0.8099	-8.16	0.000	-1.0044 -0.6154
Net salary (Gh¢ 816)	-0.4197	-3.97	0.000	-0.6271 -0.2123
Workload (a teacher to ≤ 20 students)	0.1258	1.57	0.116	-0.0308 0.2825
Years before promotion (3 years)	0.2293	2.83	0.005	0.0707 0.3879
Granting study leave with pay	1.2653	15.64	0.000	1.1067 1.4239
Constant	-0.9529	-3.41	0.001	-1.5009 -0.4048
Number of observations	1344			
Likelihood ratio χ^2	403.34			
Prob > χ^2	0.000			
Pseudo R^2	0.2165			

Table 5: Probit model by teachers who did not have their primary and/or secondary education in a remote/rural area

Attributes	**Coefficient**	**Z Value**	**P>|Z|**	**[95% Conf. Inter]**
Housing provided	0.7683	3.14	0.002	0.2881 1.2485
No decent housing provided	0.3488	1.39	0.164	-0.1429 0.8406
Net salary (Gh¢ 680)	-0.8725	-10.65	0.000	-1.0332 -0.7119
Net salary (Gh¢ 816)	-0.3398	-3.94	0.000	-0.5090 -0.1707
Workload (a teacher to ≤ 20 students)	0.0470	0.72	0.472	-0.0812 0.1754
Years before promotion (3 years)	0.3595	5.37	0.000	0.2283 0.4908
Granting study leave with pay	1.2519	18.69	0.000	1.1206 1.3832
Constant	-0.8917	-3.71	0.000	-1.3635 -0.4200
Number of observations	1988			
Likelihood ratio χ^2	599.77			
Prob > χ^2	0.000			
Pseudo R^2	0.2176			

All estimated coefficients have the expected sign and are significant at the 95% confidence level, with the exception of workload (a teacher to ≤ 20 students) and no decent housing provided which have no significant effect on remote/rural area job choice by public sector teachers who had their education in a rural area (Table 4).

Granting of study leave with pay, housing provided and 3 years of work before promotion to those without increase the utility and uptake probability associated with remote/rural area job choice by 1.2653, 0.8709 and 0.2293 respectively. This means that for job location choice, teachers

who had their education in a rural area prefer or value bundles such as granting of study leave with pay, provision of housing and promotion after 3 years of work. The levels of salary would be traded off.

Table 5 portrays that all the calibrated coefficients are significant at the 95% confidence level. However, workload (a teacher to ≤ 20 students) and no decent housing provided have no significant impact on remote/rural area job choice by public sector teachers who had their education in an urban area. Granting of study leave with pay, housing provided and 3 years of work before promotion to those without increase the utility and uptake probability associated with remote/rural area job choice by 1.2519, 0.7683 and 0.3595 respectively. This means that for job location choice, teachers who had their education in an urban area prefer or value bundles such as granting of study leave with pay, provision of housing and promotion after 3 years of work. This finding is similar to teachers who had their education in a rural area.

Conclusion

This study sought to assess public sector teachers' decision in choosing a remote and/or rural area job with reference to their historical background. Discrete choice experiment which has its basis in Random Utility Theory and probit model were used to estimate respondents' consideration sets. The effects of certain attributes based on the findings from the study revealed that for job location choice, public teachers prefer or value job bundles such as granting of study leave with pay, provision of housing and promotion after 3 years of work. Generally, granting of study leave with pay was highly valued by teachers, followed by provision of housing and promotion after 3 years of work. A similar observation was reported by (Vujicic et al., 2004).

The salary attribute would be traded off or has limited effect on rural area job choice. This is consistent with the study by (Kingma, 2003). Generally, as there is no difference in job location choice with respect to area (rural/urban) of education, there is however, difference in job location choice by teachers with rural background. Workers with rural background are more willing to work there, and more responsive to additional incentives to work in rural areas (Laven & Wilkinson, 2003; Lindelöw & Serneels, 2006).

The findings of this study may be used by policy makers to adopt strategies to recruit and retain public sector teachers in rural and remote areas in developing countries. This will help to minimize the problem of false teachers' postings in Ghana.

Further developments of this study may be identified by considering D-efficient designs, Latent Class Models, and Conjoint Experiment.

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