

**RECRUITMENT AND RETENTION OF PUBLIC SECTOR TEACHERS IN  
GHANA: A DISCRETE CHOICE EXPERIMENT**

**BY**

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**THIS THESIS IS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES,  
UNIVERSITY OF GHANA IN PARTIAL FULFILMENT OF THE REQUIREMENT  
FOR THE AWARD OF THE MASTER OF PHILOSOPHY DEGREE IN  
STATISTICS**

**JUNE, 2015**

**DECLARATION**

I hereby declare that this report is as a result of my independent investigation and research under the supervision and direction of my supervisors Dr. Isaac Baidoo and Dr. Samuel Iddi expect materials that are duly acknowledged. This report has not been presented partly or wholly anywhere as a long essay or thesis for the award of any degree, however I am solely liable to all errors in this piece of work.

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Supervisors' Declaration

We certified that this work was done by the candidates own research and supervised by Us in line with the laid down principles as by the University of Ghana

Signature.....

DATE.....

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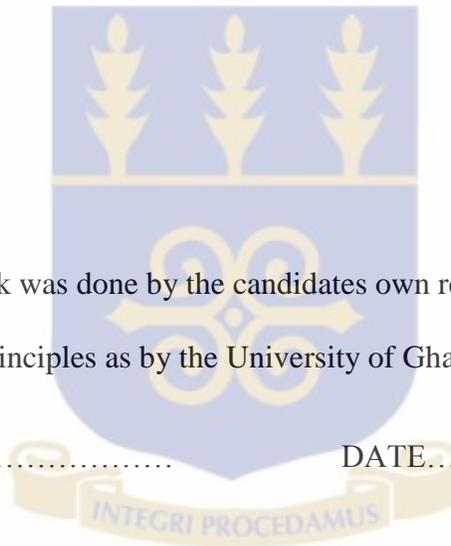
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## ABSTRACT

The shortage of public sector teachers in rural areas is one of the main challenges facing policy makers in the education sector, in both developing and developed countries. This study sought to analyze the preferences of teachers, and how they would respond to alternative incentives associated with working in a rural location.

Discrete Choice Experiment (DCE) which is rooted in Random Utility Theory (RUT) was used to capture the responses of 120 teacher trainees in Bereku College of Education. However, the full and the subgroup models were generated using the binary probit in STATA (Version 11.0). Marginal effect was also estimated.

The magnitude of estimates from both the probit model and the marginal effects indicate that, for rural area posting, teachers in the public sector generally prefer and place higher priority on incentive packages such as granting of study leave with pay, provision of housing and promotion after three years of work. This was generally supported by the subgroup analysis. Also, the levels of salary will be traded off for non-financial incentive packages.

It is recommended that in order to desist from force recruitment and the problem of mitigating geographical imbalances of public sector teachers, policy makers in the education sector should adopt a strategy by granting of study leave with pay, provision of housing and promotion after three years of teaching in rural areas.

## DEDICATION

This research work is wholly dedicated to the Almighty God for his immense protection, love and mercies for my continual existence and also to my parents Elder Dei Kusi Boadum and Deaconess Esther Kumi for their great support throughout my growth and development.



## ACKNOWLEDGEMENTS

My profound gratitude goes to my Supervisors Dr. Isaac K. Baidoo and Dr. Samuel Iddi for their directions and support in organizing this project work. I must also thank the team which assisted me during data collection for without you this project would have not seen the light of the day I salute you guys. I sincerely thank my colleague students who continually encourage me during my stay on campus and anyone who contributed in getting this piece of work done not forgetting the Principal of Bereku Teacher Training College who allowed me to interact freely with his students. Lastly, I thank Mr. Eric Nyarko for the helping hand extended to me in getting this project done. Thank you all and God bless you.



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**LIST OF ABBREVIATION**

WAEC.....West African Examination Council

SRIMPR.....Statistics Research, Information, Management and  
Publication Relation

WASSCE.....West African Senior Secondary Certificate Examination

GES.....Ghana Education Service

FWSC.....Fair Wages and Salaries Commission

DCE.....Discrete Choice Experiment

WHO.....World Health Organization

SPSS.....Statistical Package for Social Sciences

MNL.....Multinomial Logit

MNP.....Multinomial Probit

GEV.....Generalized Extreme Value

RP.....Revealed Preferences

BETCO.....Berekum Training College

## CHAPTER ONE

### INTRODUCTION

#### 1.0 Background of the Study

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 knit to the quality of the human resource as well as the conditions of service. Teachers are indeed the hub and the pivot on which the world of education revolve and are entrusted with the physical, mental and moral upbringing of students in all educational institutions (Yeboah, 2011).

According to Yeboah (2011), teaching is not an irrelevant and a paper shuffling kind of a job but rather, it has meanings, worth and value. It gives one the opportunity to touch a young and impressionable life and make it better. Teachers seem to have rare privileges but vigorous responsibility effecting changes in the lives of children for nation building. It is the basic nature of the job to guide academic learning, help a puzzled and frustrated child to finally crack the phonic code or discover pattern and meaning. Teachers help children struggling for self-esteem and for the discovery of who they are and what they can become. Teachers become important part of this sometimes painfully and sometimes joyfully for growth and self-discovery job.

In fact, 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. As a result of this problem, the Deputy Volta Regional Minister, Mr. Francis Ganyaglo, advised teachers to accept postings to wherever

their services are needed. According to him, 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 the country (Ghana) (Ganyaglo, 2014).

The Northern Regional Director of Education, Paul Apanga, revealed at an educational forum in Tamale that about 404 schools in the region do not have a single trained teacher, leaving the running of the educational establishments in the care of volunteers and untrained teaching personnel. To him, the situation has accounted for the abysmal performance of schools, in the various examinations conducted by the West Africa Examination Council (WAEC), requiring thousands of teachers to be posted to the area. He reiterated that the region needs more than 7,652 teachers to occupy the various schools to help improve upon the academic performance of students in the region.

He further stated that the Northern Region, which is about 10 hours drive from the country's capital, Accra, contains 26 districts, but surprisingly none of which had a senior high school that made it into the top 130 schools in the latest WASSCE rankings released by the Statistics, Research, Information, Management and Public relations (SRIMPR) Division of the Ministry of Education. Over the past five years, the region with a population of about 2.5 million inhabitants has scored below average results in their schools. Meanwhile, the Tamale metropolis-the regional capital-boasts a surplus of trained teaching personnel, most of which are alleged to have refused postings to rural and deprived areas. The regional directorate have identified and earmarked about 2,000 teachers in the Tamale metropolis and the Sagnerigu District to be re-posted to schools lacking trained teachers. He further asserted that the metropolis is overstaffing with teachers in the primary, which has accounted for the teacher absenteeism in schools.

Therefore, there is a need to repost such teachers to the other communities which need their service (Apanga, 2014).

According to the Public Affairs Director of the Ghana Education Service (GES), Charles Parker-Allotey, teachers who accept posting to rural areas will get 20% pay rise as financial compensation to motivate them to improve on their performance. He said that the Government is at an advanced stage of instituting a rural area allowance for such teachers, which is currently being considered by the Fair Wages and Salaries Commission (FWSC), before implementation. To him, the policy forms part of measures by government to take care of the shortfall of teachers in rural areas especially, the three northern regions-Northern, Upper West and Upper East. Further to that, the service will continue to implement the existing policy of posting newly trained teachers to begin their teaching practice in rural areas. Hundreds of schools in the Northern Region, one of the most deprived areas in the country, are in dire need of more than 7,600 trained teachers. About 404 schools in the region do not have a single trained teacher, leaving the running of the educational establishments in the care of volunteers and untrained teaching personnel. He opined that 18,000 formerly untrained teachers have been assisted to go through formal training, through programmes sponsored by development partners to help in posting more teachers to the North (Parker-Allotey, 2014).

The various proposed interventions or policies hardly mentioned any statistical analysis that was carried out in order to attract teachers to willingly accept remote and rural area postings. Although these decisions were made in good faith based on the difficulty in recruiting and retention of public sector teachers to work in difficult locations in Ghana, it may have been better served if empirical data was analyzed to actually affirm these policies.

Discrete Choice Experiment which is rooted in Random Utility Theory (RUT) can be employed to devise appropriate incentive packages to attract and retain public sector teachers to willingly accept rural and remote area postings (i.e. difficult locations).

According to Lancaster (1966), in stating a preference, the respondent is assumed to choose the alternative that constitutes his/her highest priority (utility). The author assumed that the utility yielded by an alternative depend on the utilities associated with its composing attributes and that respondents valuations depend on those attributes or characteristics. For this reason, there is a believe that the list of incentive packages (attributes and their corresponding levels) that potentially influence teachers' choice of a place of work (rural and remote location) is rather long, and that knowledge about the characteristics of the incentive packages that influence their choice need to be investigated using discrete choice experiment.

In fact, recruiting and retaining of public sector teachers can be analyzed with discrete choice experiment using stated preference or revealed preference data. In stated preference choice experiments respondents are asked to make hypothetical choices between alternatives which are described by a combination of different attributes and varying levels.

## 1.1 Problem Statement

Improvements in education and health are of primary importance in enabling people to overcome poverty. However, there are great difficulties in providing good quality public services in remote areas in developing countries. One key problem relates to attracting and retaining educated personnel in these difficult locations. Policy-makers have experimented with various approaches to motivate qualified key public service personnel to work in remote locations (WHO, 2006).

The application of discrete choice experiment (DCE) to analyze human resource policy questions is recent, but expanding. Their use in this field has so far been limited to health workers (Guttman, Castle, & Fiebig, 2009).

Discrete choice experiment has gained interest in this context given 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. To them, 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 of job attributes that would actually influence public sector teachers decision to willingly accept remote and rural area postings. 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.

An observation by Lancaster (1966) 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) and discrete choice modelling which is rooted in Random Utility Theory (RUT) to examine the problem and come up with recommendations for policy reforms.

The forgoing discussion gives rise to the following questions:

- i. What job attributes affect teachers' preference/choice?
- ii. Which attribute contribute most in determining public sector teachers' choice of remote/rural area job?
- iii. What job attributes will teachers trade-off?
- iv. Does public sector teachers value financial or non-financial job attributes?
- v. Is there any difference in choosing difficult location job with regards to age, gender, marital status and respondents' location (rural/urban)?

## **1.2 Objectives of the Study**

The main objective of the study is to assess the effects of various policy incentives (job attributes) on public sector teachers' choice of remote and rural area job.

The specific objectives are to:

- i. Design a discrete choice experiment on public sector teachers and assess the effect of the attributes on job choice.
- ii. Assess the attribute which contributes most in determining rural location job choice.
- iii. Assess the trade-offs between job attributes.
- iv. Investigate as whether public sector teachers value financial or non-financial job attributes.
- v. Perform subgroup analysis on demographic characteristics of respondents to see how preferences differ by job attributes.

## **1.3 Relevance of the Study**

The study will help policy makers in adopting strategies to recruit and retain public sector teachers in rural and remote areas in developing countries like Ghana.

The study is essential, and the findings shall benefit academia and research by contributing to the body of literature on posting of public sector teachers in developing countries.

The results from this study will serve as a basis for further research for both academic researchers and policy makers.

#### **1.4 Limitations of the Study**

The study covers only teacher trainees studying in one College of Education in Ghana. This might not seem very useful for assessing remote and rural area job choice by public sector teachers, because it relates to a specific category of people (students) who are not in-service teachers.

Only stated preference data were collected and thus might have an effect on the analysis result.

#### **1.5 Organization of the Study**

This study contains five main chapters but prelude to these chapters are the abstract which summarizes the whole research, the table of contents, list of figures, list of tables, list of abbreviations, dedications and acknowledgement. The references and appendix could also be found after the last chapter. Chapter one of this thesis comprises the background of the study, problem statement, study objectives, limitations of the study. Chapter two is made up of the literature review and chapter three discusses the various methods of the stated/discrete choice experiment used for the research. Chapter four analyzes and discusses the findings of the study, and finally, chapter five presents the summary, conclusions and recommendations of the study.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.0 Introduction

This section begins with remote and rural areas, workers' choices of location, factors influencing choices of location, attracting and keeping workers in remote and rural areas. It further looks at job satisfaction, theories of job satisfaction and empirical review. Finally, the procedure for implementing a discrete choice experiment, random utility theory and choice model specification are also discussed.

#### 2.1 Remote and Rural Areas

The task of defining rural areas has always been particularly challenging. The term 'rural' invokes images of farms, villages, small towns, and open spaces. But there is no consensus on specific definition for these areas. This also reflects the reality that "rural" and "urban" are multidimensional concepts, making clear-cut distinctions between the two is difficult.

The United Nations itself recognizes the difficulty of defining urban and rural areas globally, stating that, "because of national differences in the characteristics that distinguish urban from rural areas, the distinction between urban and rural population is not amenable to a single definition that would be applicable to all countries" (United Nations, 1998).

According to the United Nations (2004), rural areas are usually defined as "what is not urban", and so inconsistencies in the definition of what is urban lead to inconsistencies in characterizing what is rural. An urban agglomeration is generally easier to define. The United Nations describes

it as a place that “comprises a city or town proper and also the suburb fringe or thickly settled territory lying outside, but adjacent to its boundaries. A single large urban agglomeration may comprise several cities or towns and their suburban fringes. Each country has its own definition for these terms, taking into account in most cases two main elements; the settlement profile (population density, availability of economic structures) and the accessibility from an urban area (distance in kilometers or hours drive)(United Nations,2008).

## **2.2 Workers’ Choices of Location**

Three main trends can be observed in workforce today:

- (i) People are moving very strongly towards work-life balance models.
- (ii) People are motivated by a complex structure of rewards, in which non-financial benefits play an increasingly important role.
- (iii) People will move quickly to another job or place if their expectations are not met.

In this context, it is increasingly difficult for managers and policy makers to recruit and retain an adequately skilled workforce. Motivation and job satisfaction have been proven to be critical to increasing the performance of workers and thus the performance of the company/industry. The problems in recruitment and retention will lead to workforce shortages, while inability to motivate workers will lead to decreased productivity. It is therefore essential for policy makers to have a good understanding of recruitment, retention and motivation issues (WHO, 2009).

### **2.2.1 Factors Influencing Choices of Location**

The factors affecting movements of workers (public sector teachers) need to be analyzed and understood in the larger context of the global labour market. There is a vast literature on factors affecting choices of location in rural and remote areas (Dieleman, 2006, Lehmann et al., 2008). Recently, these factors have become to be known as 'push' and 'pull' factors, mainly in relation to research on internal and international migration of workers (Zurn et al., 2004). "Pull" factors are identified as those which attract an individual to a new destination. These might include improved employment opportunities and/or career prospects, higher income, better living conditions or a more stimulating environment. "Push" factors are those which act to repel the individual from a location. They often mirror "pull" factors and might include loss of employment opportunity, low wages, poor living conditions, lack of schooling for children among others (Lehmann et al., 2008).

There are many theories and models trying to explain the factors involved in workers' mobility. Some originate in economic theory, such as the Neoclassic Wage Theory, which suggests that the choice is driven largely by financial motives and by the probability of finding employment. In this sense, it has been argued that a worker will accept a job if the benefits of doing so outweigh the opportunity cost (Lehmann et al., 2008; Hongoro & Normand, 2006).

There are also behavioural theories, starting with those of Maslow and Herzberg, which put at the centre of a more complex decision-making process the satisfaction that workers get out of their job. Given their importance in the design and implementation of retention strategies, it is critical to have a very good understanding of these factors. Often, however, understanding them requires careful research methods, as these factors are related to human behaviour and individual preferences, which are difficult to quantify. Various methods have been proposed to identify the

factors related to choices of location, from more traditional semi-structured interviews or focus groups, to more recent methods such as the discrete choice experiment. The latter method is an approach by which detailed choices are presented to workers, and they are asked to choose between two possible scenarios (choice pairs) until a set of factors is identified that fully explain the decisions to remain in rural or remote areas (Chomitz et al., 1998; Hanson & Jack, 2007; Mangham, Hanson, & McPake, 2009).

The complexity of these factors makes their categorization difficult, but they are generally discussed as individual, organizational or broader environment factors. They do not influence workers' choices and decisions for location or practice in an isolated manner, but rather interact and influence each other. Generally discussed as individual, organizational and larger environmental factors, they need to be well identified so that appropriate responses can be designed. Therefore, the research methodologies used to elicit these factors need to be harmonized and their pertinence improved (WHO, 2009).

### **2.3 Attracting and keeping Workers in Remote and Rural Areas**

The final result of having workers in remote and rural areas depends on two inter-linked aspects:

- (i) The factors that influence the decision or choice of workers to come to, stay in or leave those areas.
- (ii) The extent to which policies and interventions respond to these factors.

What often happens is that the policies are not aligned with the factors influencing workers' choices, and this response is most often a stop-gap measure (increasing wages or rural allowances, for example), rather than a longer term cohesive strategy. Many countries have put

in place various interventions to respond to this challenge, but these interventions are at various stages of implementation, and very few have been actually evaluated for impact (WHO, 2009).

## **2.4 Job Satisfaction**

Job satisfaction can be defined in so many ways or explained by different authors. Job satisfaction is an attitude people have about their jobs (Ivancevich, Konopaske, & Matteson, 2005). Mankoe (2002) defined job satisfaction as a collection of attitudes which workers have about their jobs. It is the feelings or 'affective response' someone experiences in a job role. Some researchers have argued that it is possible to capture the level of job satisfaction with one question. Others suggested that we can have strong negative feelings about one aspect of our job (e.g. pay) but feel positive about other facets of it (e.g. colleagues). Contentment (or lack of it) arising out of interplay of employee's positive and negative feelings toward his or her work.

However, these positive and negative feelings (attitude/decision of teachers) can be measured in the context of utility.

According to Banister and Berechman (2000), measures based on utility are founded in economic theory. Utility-based accessibility measures interpret accessibility as the outcome of a range of choices (job preference). It addresses the decision to choose one discrete item from a range of potential preferences, all of which satisfy essentially the same purpose (Greene & Liu, 1988). It can be employed to model public-sector teachers' behaviour or attitude towards the location (rural, remote and urban) of a job. The utility-based method states that accessibility should be measured at the respondent level and that the computation of respondent accessibility should address user's characteristics.

Utility-based accessibility methods assign particular importance to conceptualizing the decision process to explain and model respondent choice behaviour. This type of method is mostly

operationalized using discrete choice models. The models are generally rooted in random utility theory in which the probability of a respondent making a particular choice depends on the utility of that choice relative to the utility of all choices (Thurstone, 1927). However, the expected choice behaviour is captured using a utility function (Borgers & Timmermans, 1993). The outcomes of a measure based on utility function are not easily interpreted by non-experts and that the formulation cannot be explained without reference to relatively complex theories (Handy & Niemeier, 1997).

According to Rastogi (2000), in practice, consumers make errors in perception and decision that violate classical economic rationality. It is often still possible to use observed behaviour to judge the social desirability of improvements, however, additional problems arise for measurement and analysis. Thus, policy makers are increasingly using stated preference surveys or discrete choice experiments for understanding the unpredictable behaviour of respondents under conditions that are new or hypothetical. DCE exercises provide an opportunity of trade-offs between the options (job choice) available and increase the number of responses, as at each trade-off, the respondent makes his/her choice.

## **2.5 Empirical Review**

Ultimately, the difficulties to attract and retain staff in rural facilities stem from the preferences that workers have and the choices they make. A growing body of evidence shows that, apart from wages, other job attributes like training opportunities, career development prospects, living and working conditions also play a role (Hays, Veitch, Cheers, & Crossland, 1997; Shields, 2004). However, little attention has been given to the supply side, namely to differences in preferences among workers, which is of interest to policy makers exploring how to address these

imbalances. Policies have shifted from compulsory rural service, which is challenging to manage and enforce, to providing extra economic incentives for rural service, such as rural allowances and bonuses (Wibulpolprasert & Pengpaibon, 2003; Sempowski, 2004). But there is, in the absence of rigorous evaluation, limited understanding of how effective these incentives are in attracting and retaining workers in rural areas. The available evidence suggests that while they can improve short term recruitment, their success for long term retention is less clear (Anderson & Rosenberg, 1990; Nigenda, 1997).

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.

Policy makers in Rwanda observed that human resources are the main constraint to improving health care, with both overall shortages and geographic imbalances being main factors. With almost 88 percent of doctors and 58 percent of nurses working in urban areas, while 82 percent of the population resides in rural areas, the distribution of workers was highly skewed in favor of urban areas (World Bank, 2009).

Fagnäs and Pelkonen (2010) observed that whether to hire teachers locally on a contract basis, or via competitive examinations and training as government officials, is a major policy question in developing countries. Recruitment practices could have implications for the competence, motivation and the cost of teachers. Discrete Choice Experiment was employed to assess the job preferences of a sample of 700 future elementary school teachers using either district-wide

competitive examination or from a pool of locally hired, experienced contract teachers (para-teachers) in the state of Uttarakhand in India. Skills in English, Arithmetic and Vocabulary were also tested. They found a trade-off between skills and preferences, as teachers hired using competitive examination have higher skills, but prefer posts in less remote regions. Most of the differences in preferences between the two groups were explained by geographic origin of the teachers, skills, experience and education.

Serneels, Montalvo, Pettersson, Lievans, Butera, and Kidanu (2010) in their study on the determinants of future health workers' willingness to work in rural areas, as measured by rural reservation wages, using regression analysis and unique contingent valuation data from a cohort survey of 412 nursing and medical students in Rwanda, found that workers with higher intrinsic motivation (measured as the importance attached to helping the poor) 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 main Rwanda result for intrinsic motivation was strikingly similar to that obtained for Ethiopia and Rwanda together. 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.

Serneels, Linelow, and Barr (2007) investigated the willingness to work in a rural area among final year nursing and medical students in Ethiopia. Based on the data obtained from contingent valuation questions on final year students from three medical schools and eight nursing schools, they found that there is substantial heterogeneity in the willingness to serve in rural areas. Using both ordinary least squares and maximum likelihood regression analysis, they also found that household consumption and the student's motivation to help the poor are the main determinants

of willingness to work in a rural area. A simulation on how much it would cost to get a target proportion of workers to take up a rural post was also carried out.

Sharma (1999) asserted that in India, recruitment decisions of teachers have traditionally been made at the state level and teachers have been recruited as civil servants on permanent contracts. However, the practice has been criticized for producing unmotivated teachers with little incentives, often absent as they choose to commute to their rural work place work from far. Rural areas have suffered from a shortage of teachers, and often, also from a lack of commitment and excessive workloads of the existing teaching staff. According to Ramachandran et al. (2005), the state of Rajasthan alone lacks 50, 000 primary school teachers. Rural areas can lack amenities that urban-educated teachers are used to. Multi-grade teaching, with one classroom and one teacher shared by all pupils, is also common.

As mentioned earlier on around the world, various approaches have been experimented to motivate qualified key personnel to work in remote locations. In the area of health care, solutions have included various forms of compulsory service in rural areas after graduation, rotation of location for personnel on permanent contracts, targeting those with personal commitment to work in rural areas and different types of financial and non-financial incentives (WHO, 2006). For example, the Indonesian government operated a system for workers, where the likelihood of a permanent position in an urban or desired area was higher if the individual had first worked in a remote area (Chomitz et al., 1998). Many countries have adopted bonding and compulsory service policy to increase the number of workers in rural areas. South Africa is a good example of where compulsory service has been successful to increase the number of health professional especially medical doctors in remote areas (Reid & Conco, 1999).

Hanson and Jack (2008) in their study on the preferences of Ethiopian workers reported that workers have a clear preference for the capital area over other locations and pay was a more significant factor than other benefits for choosing a rural/non-capital location. Doubling of wages in rural areas would have induced a substantial change in workers' willingness to work in rural areas. They also studied the significance of personal characteristics for preferences, mainly gender, marital status and the number of children.

Pecuniary incentives, like higher salaries or hardship allowances for workers stationed in rural districts, can help make rural jobs more attractive. 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 also 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). Another suggestion is that the lack of equipment supplies and appropriate facilities can act as a deterrent for professionals accepting positions in rural and under-served areas. This is a primary factor given by students for not practicing in rural Pakistan (Zaidi, 1996). The study by Serneels et al. (2005), among others, investigated the assumption of social preferences as important decision factors. They found that

the students' motivation to help the poor, as a proxy for their intrinsic motivation, was one of two main determinants of willingness to work in a rural area in Ethiopia.

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 (and hence motivation) 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). This finding is supported by a study where it was observed that women are less likely to accept rural posts and that they are accordingly underrepresented in rural areas (Doescher et al., 2000).

One suggested reason for women being less likely to move to rural districts is that there are fewer job opportunities for spouses and insufficient education opportunities for children. Thus, the presence of family members in rural and remote areas increases the probability that an individual will consider these areas for the establishment of their practice (Dussault and Franceschini, 2006). Mangham (2006) observed in their study that family matters in various ways; nurses in Malawi are more likely to work in rural districts if decent housing is offered, and household consumption is one of the two most important determinants for the willingness to work in rural districts in Ethiopia (Serneels et al., 2005). Finally, age also sometimes matters; younger individuals typically have fewer family responsibilities and are more prepared to move or migrate to remote locations (Chomitz et al., 1998; Serneels et al., 2005).

Amoako (2011) employed binary logit regression to assess the impact of financial, staff accommodation, working conditions, professional advancement and socio-economic infrastructures on willingness to remain in rural health post in Ghana and the characteristics of health care workers who would opt for these retention factors. To him, financial incentives and Socio-economic infrastructures were significant in influencing the willingness of health workers to remain at rural health post in Ghana, while other explanatory variables (staff accommodation, working conditions and professional advancement) were not significant. The study found that financial hardship and poor socio-economic infrastructures are push factors and reasons for dissatisfaction at the current post for various health professionals in rural Ghana.

Although there is much work on recruitment issues especially in health economics, in developed countries, there is however, paucity of information on factors that influence qualified public sector teachers willingness to accept remote and rural area postings in developing countries (i.e. Ghana) using DCEs.

The main focus is the potential trade-off between attributes preferences to work in rural and remote locations, which may accompany the recruitment and retention of qualified workers. This study relies on a Discrete Choice Experiment (DCE) which is rooted in Random Utility Theory (RUT) to measure job preferences of qualified teachers. In DCEs, the indirect utility function of respondents is estimated from a choice set, that are presented to them. This is to our knowledge the first study to analyze job preferences of teachers with a DCE in Ghana, although the methodology has been used to study preferences of health workers. The DCE in this study focuses on job preferences over geographical location.

## 2.6 Procedure for Implementing a Discrete Choice Experiment

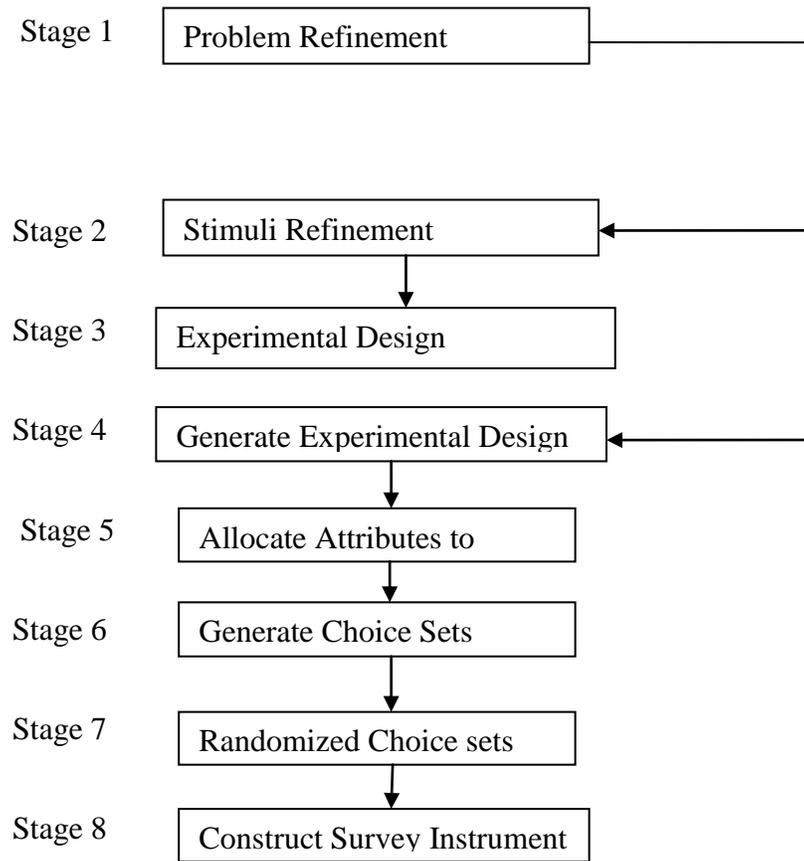
The basis of any stated/discrete choice experiment is an experimental design. An experiment defined in scientific terms involves the observation of the effect upon one variable; a response variable, given the manipulation of the levels of one or more other variables. However, the manipulation of the levels of variables does not occur in random manner, but turns to a specialized form of statistics to determine what manipulations to make and when to make them. Thus the manipulations occur by design, hence the name experimental design (Hensher et al., 2005).

Louviere et al. (2000) asserted that in various experimental design studies, the manipulated variable is called a factor, and the values manipulated are called factor levels. Such variables are also referred to in various disciplines as independent or explanatory variables, or attributes and the values manipulated are attribute levels when they are characteristics of products and services. Thus, for the case of this particular study, the term attribute/factor and attribute/factor levels will be used interchangeably. Each unique attribute level is also termed a 'treatment', or if more than one attribute is manipulated, each combination of attribute levels is called a 'treatment combination'. A designed experiment is therefore a way of manipulating attributes and their levels to enable rigorous testing of certain hypothesis of interest.

In the general case of discrete choice models, the hypothesis of interest typically concern terms in utility and choice models. More generally, the term design, refers to the science of planning in advance exactly which observations to take and how to take them to permit the best possible inferences to be made from the data regarding the hypotheses of study interest. Furthermore, designed experiments can be very simple, involving as little as one attribute level and an

associated control condition. The design aspect deals with planning the experiment in such a way that as many other influences as possible can be ruled out.

Figure 2.3 summarizes the process used to generate stated/discrete choice experiments.



**Figure 2.3: The experimental design process**

Source: (Hensher et al., 2005)

According to Hensher et al. (2005), every experimental design must commence with a problem refinement, to ensure that the researcher has an acute understanding of what the study hopes to achieve by the time of completion. Once the problem is well understood, the analyst is required to identify the stimuli to be used within the experiment. It is in this stage of the study that the analyst decides upon the list of alternatives, attributes and attributes levels to be used. This

refinement may result in further scrutiny of the problem definition, and as a result return to the problem refinement stage of the process. Moving from stimuli refinement, the analyst must now make several decisions as to the statistical properties that will be in line with the final design.

More importantly, the first two stages of the process consist of refining the researcher's understanding of behavioural aspects of the problem as they relate to respondents. It is hoped that this understanding of behavioural impacts will regulate the decision process of the analyst at the time of considering the statistical properties of the design. However, statistical considerations must take precedence. Statistically inefficient designs, designs which are unwieldy in size, or possibly even the non-availability of a decision that fits the behavioural requirements established in the earlier stages, may trigger a return to the first two stages of the design process.

They opined that experimental design may be generated, provided the researcher is through with the above steps. While it is important to generate such designs from first principles, such derivation requires expert knowledge. Statistical packages such as SPSS are capable of generating simple experimental designs (thus fractional factorial design). Following the generation of the experimental design, the researcher must assign the attributes selected in stage two (2) to specific columns of the design. Again, a return to previous stages of the design process may be necessary if the design properties do not meet the criteria established at earlier stages of the process.

They observed that once the attributes/factors have been assigned to columns within the design, the analyst manipulates the design to produce the choice. Thus, in stage six (6) of the design process, the analyst constructs choice sets that will be used in the survey instrument (the questionnaire). To overcome possible biases from order effects, the order of appearance of these

choice sets are randomized across questionnaires. As such several questionnaire versions are created for each single choice experiment undertaken. The final stage of the experimental design process is to construct the survey, by inserting the choice sets as appropriate into the different versions and inserting any other questions that the researcher may see necessary to answer the original study problem.

Therefore, an overview of the effort necessary to conduct stated/discrete choice study by Adamowicz et al., (1998) is discussed under the following steps below:

- (i) Characterization of the decision problem: This is a most essential stage of the study. Here the analyst seeks to characterize the decision problem in terms that the decision maker understands. Specifically, analysts need to understand how respondents; (i) become aware of the need to make the decision in question, (ii) define the dimensions of evaluation of the product or service, (iii) search for information on alternatives and attributes, (iv) construct choice sets, and (v) make decisions.

These items are crucial in formulating a decision problem that is most kin to the decisions that respondents make in real life, when the selection problem of interest is one relatively familiar to decision makers. Researchers also seek to identify sources of respondent heterogeneity that could lead to important behavioral differences. Although, identifying and controlling for heterogeneity is important, it is necessary to recognize that there will always be a chance that unidentified attributes are influencing preference parameter estimates. The basic output of this stage are four; (i) choice set size and composition, (ii) relevant attributes, (iii) respondent differences and (iv) relevant sampling frame for the study.

(ii) Attribute level selection: Based on study objectives and the above step 1 information, the number and value of the levels for each attribute must be defined. This stage of the study is often conducted in parallel with step 1, since even the language for communicating levels to respondents is often an issue. An important consideration at this stage is to be sure not to hamstring subsequent analyzes due to an excessively limited range for the attributes. Commonly, attributes are identified from prior experience, secondary research and/or primary, exploratory research. After identifying the attributes for a particular experiment, the researcher must assign values or levels to each attribute. These levels should be chosen to represent the relevant range of variation in the present or future market of interest. Attribute levels are commonly presented in words and numbers.

(iii) Experimental design development: Once attributes and their levels have been determined, researchers typically use some form of orthogonal design to generate different combinations of attribute levels called “profiles”, and a profile is a single attribute level combination in a complete factorial combination of attribute levels.

A “design” is a sample of profiles which have a particular set of statistical properties that determines the utility specification(s) that can be estimated. The overwhelming majority of experiments in which respondents express preferences for attribute level combinations presented one-at-a-time make use of orthogonal arrays called “main effects plans”. A main effect plan is an orthogonal subset of the complete factorial design which allows an analyst to estimate a strictly additive, “main effects only” (no interaction terms) utility specification. That is, one must assume that all interaction effects between attributes are not significant; if this assumption is not satisfied, the use of main effects models can lead to unknown and potentially large bias in the utility parameters that are estimated. Main effects plans are unlikely to be appropriate in many

choice contexts. Their popularity seems to arise from; (i) a perceived need to model respondents to avoid aggregation biases, and (ii) insufficient training in statistical design theory, which results in over reliance on design catalogues and computerized design generators.

(iv) Questionnaire development: The questionnaire is usually a paper and pencil task that is either self-administered or presented through an interviewer. While its main context will be one or more choice scenarios through which the respondent will be guided, it may also include sections requesting socio-demographic, psychographic, attitudinal and past behaviour data. This last item (past behaviour data) may be of particular interest if one aims to combine revealed preference data with stated choice results. However, there is no need to collect information on only what the respondent actually did, but also what other alternatives were considered, and if necessary, the characteristics of both chosen and non-chosen alternatives. As in any survey based research, pre-testing of the questionnaire through piloting is a necessary component of the research program. Also, stated choice experiments require that the researcher define how many choice scenarios each respondent will be asked to do. While there are no hard and fast rules, the analyst must balance respondent learning and fatigue against efficient use of the respondent. There is contradictory evidence about the impact of the task length on the quality of data provided by respondents.

As a practical matter, researchers usually submit a respondent to about eight choice scenarios. However, as little as one and as many as sixteen (or very occasionally, even thirty-two) scenarios may be given to a respondent. There has been little systematic analysis on the impact of varying the number of choice alternatives on respondents. Furthermore, there is little analysis that researchers are aware of on non-response bias in stated choice methods, either item-non-response

or survey-non-response. However, more complex, taxing survey designs will result in increased item non-response.

- (v) **Sampling strategy:** The usual considerations of desired accuracy levels versus data collection costs must guide definition of sample sizes. In addition, in estimating models that account for respondent differences, there is the need to impose minimum sample size requirements within segment to enable accurate predictions within segment. While the above general principles are applicable, in stated choice experiments total sample size will be further affected by the total number of choice scenarios and the number of choice alternatives in a given scenario.

Also stated preference surveys are statistically efficient, in the sense that each respondent produces not just one observation but several on the same choice context. It is suggested that 75-100 interviews per market segment might be sufficient. However, part of the difficulty lies in the nature of the information collected in stated preference surveys. The fact that each interview may result in 10 or more stated responses to the same number of hypothetical choice situations provides information about the variations in responses within each respondent. However, for a good representative model, one needs to incorporate the variations that occur between as well as within respondents and only an adequately sized and representative sample can do this (Ortúzar & Willumsen, 1994).

- (vi) **Model estimation:** Literature abounds in examples of stated preference or choice model estimations. The models that are normally estimated are the Multinomial Logit (MNL), Probit, Multinomial Probit, Nested Logit, and the most common estimation criterion is maximum likelihood.

### 2.6.1 Stated Choice Survey Design

Adamowicz et al., (1998) stated that stated choice surveys are the means by which stated choice experiments are implemented. Survey is any means by which scenarios and other questions are presented, and responses or answers obtained. Thus, a survey can be a “paper and pencil” presentation of questions and choice sets, or it might be a full-blown multimedia event. In addition, a survey can be administered by mail, face-to-face, personal interview or even through the internet.

Discrete choice surveys usually consist of a glossary which provides basic information about the context, the attributes, the levels of the attributes and many more. The choice task itself is preceded by a set of standardized instructions to respondents regarding the task, its objective, its context and how to respond to the scenarios. The task itself follows the instructions, and depends mainly on the decision to be simulated and the study objectives. Thus, a task can be as simple as yes/no response to scenarios containing single alternatives presented one-at-a-time, pairs of alternatives plus the option of not choosing, multiple alternatives with a no-choice option, and many variations thereof. In general, the task should be designed to simulate the actual choice and choice context as closely as possible. The scenarios typically appear in a random order, but there are no research results to provide guidance as to whether the ordering can be a single random ordering for all respondents, multiple random orders to which respondents are assigned or separate random orders for each respondent. However, Adamowicz et al. (1998) found no differences due to order, even in very lengthy tasks, except for difference in reliability. Generally, shorter tasks are more reliable, but unreliability increased slowly with task length for numbers of scenarios that would be considered in applications.

## 2.7 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;

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

where  $U_i$  is the unobservable, true utility of offering  $i$ ;  $V_i$  is the systematic component of utility; and  $\varepsilon_i$  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 consumer will choose the  $i^{\text{th}}$  offering from some set of competing offerings, say  $C$ , which can be expressed as:

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

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. Thus, analysts must devote sufficient time and resources in advance of data collection and modelling to identify and include as many of the key influences on job choice as possible. This can be based on primary, qualitative research (e.g. focus groups) that is tailored to a particular project, from

secondary research (e.g. literature sources, previous experience with the same or similar products), or (as is most common) from a hybrid approach that uses both secondary and primary research. The goals of this phase of any SC model should be; (i) to identify how consumers think about the evaluative process (i.e. the evaluation dimensions and their levels, the links between evaluation dimensions and engineering or physical attributes) and (ii) to identify which of those dimensions should be included in which of the two components of the utility function (i.e. the systematic and random components).

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:

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

where  $\beta$  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:

$$P(i/C) = P[(\beta' X_i + \varepsilon_i) > (\beta' X_j + \varepsilon_j)], \quad \forall j \in C \quad (4)$$

Equation (4) indicates that the probability that a respondent will choose offering  $i \in C$  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  $\beta$  vector associated with the variables hypothesized to explain choice.

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  $\gamma$ . These individual difference measures may be hypothesized to influence utility levels via intercept and/or slope coefficients in the  $\beta$  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; a Gumbel distribution gives rise to the conditional or Multinomial Logit (MNL) model (McFadden, 1974; Ben-Akiva & Lerman, 1985); and a Generalized Extreme Value (GEV) distribution gives rise to models such as the nested MNL (McFadden, 1981) and the ordered GEV (Small, 1981).

The systematic (or mean) component of utility can be identified and the parameters estimated from an appropriately designed empirical study of the way in which choices vary in response to differences in the positions of the offerings on key attributes and differences in individual decision makers. That is, individuals' preferences are revealed by the choices made in choice experiments. "Stated choices" are decisions made in hypothetical situations (job choice) in which there may be no corresponding real choices, or any "real" consequences of making a choice. Despite the potential lack of realism in such job choice, random utility theory nonetheless suggests that consumers should try to maximize utility, although the utility function might include variables not used in making choices in real situations or markets. Economic theory has nothing to say about this matter; hence, whether choice processes are the same in real and hypothetical markets is an empirical issue (Louviere & Swait, 1996).

The ultimate purpose of estimating the choice model is generally to obtain unbiased estimates of the taste parameter vector  $\beta$ , which contains marginal utilities of attributes. While specification analyzes and model fitting are the same whether the data are revealed preferences or stated choices from an experiment, it should be noted that choice experiments will often permit the identification of parameters (e.g. higher-order effects, interactions between variables, individual difference variables) that cannot be identified in Revealed Preference (RP) data due to lack of variability, limited range or similar conditions. What is or not identifiable in SC models will depend greatly (but not completely) on the experimental design, but it is generally the case that they will permit richer specifications than can be supported by RP models (Adamowicz et al.,1998).

A component of the utility function that is commonly ignored in specification analysis is the error term. The most commonly applied choice model, the MNL, assumes that the error term is *iid* across alternatives and individuals. It is becoming more common to see more complex specifications of the covariance matrix of the error distribution, through models such as the Multinomial Probit (MNP) and Nested MNL. However, there is growing indication that the behaviour of the error term in choice models may itself be explained in terms of covariates that impact the magnitudes of elements of the covariance matrix. For example, Swait and Adamowicz (1997) demonstrated that the complexity of the decision situation influences the magnitude of the variance of the error term and Cameron and Englin (1997) showed that the variance of welfare measures depends systematically on the prior experience the respondent has with the good.

## CHAPTER THREE

### METHODOLOGY

#### 3.0 Introduction

This chapter deals with a description of the methods employed for this study. It begins with the study area and continues to look at the sampling strategy. The design of the discrete choice experiment; determination of attributes and their levels, the questionnaire, pilot questionnaire, data collection, data entry and analysis are also discussed. Finally, the probit model is also presented.

#### 3.1 The Study Area

The Brong Ahafo region is the second largest region in Ghana with a land area of 39,558 km<sup>2</sup> with 27 administrative districts/municipalities. It covers 16.6% of the country's total land area. However, it is located within longitude 0° 15' E-3° W and Latitude 8° 45' N-7° 30' S in the west central part of Ghana. It shares common boundaries with five others namely, Northern Region to the north, Ashanti and Western Regions to the south, the Volta Region to the east and the Eastern Region to the south-east. It also shares an international boundary to the west with the Republic of Cote d'Ivoire.

The region currently has a total population of 2,282,128 (2010) with an estimated growth rate of 2.2% (against 2.4% national average). The year 2000 Population Census also puts the total population of the Region at 1,824,822, with estimated population growth rate of 2.6% (against 2.5% national average). Proportion of rural/urban is 62.6: 37.4 (CSIR, 2015). There are 38

Teacher Training Colleges in Ghana with three in Brong Ahafo (Atebubu, ST. Joseph at Bechem and Berekum College of Education).

### 3.2 Sampling Strategy

The study used simple random sampling and systematic sampling technique. Simple random sampling was used to select one school out of the 38 training colleges in the country. Teacher trainees were targeted since the study sought to analyze the hypothetical choice of a job by these people.

A sampling frame of 600 teacher trainees was obtained from the Berekum Training College with their contact numbers. Their names and contact numbers were then entered on an excel worksheet and randomized. A random sample of 120 students was finally selected. Hensher et al., (2005) asserted that a total sample of 50 respondents each with 16 choice sets and fully generic parameter specification for design attributes and covariate effects might just be acceptable for choice experiment.

In order to select a sample of 120 respondents based on the systematic sampling technique, the author took every fifth student on the excel sheet after selecting a random starting point between 1 and 5. The skip interval (k) is found by dividing the sampling frame (N) by the sample size (n):

$$\text{Now, } k = \frac{600}{120} = 5 \text{ (skip interval)}$$

The 120 teacher trainees were traced to the corresponding names and contact numbers in their various houses to answer the stated choice questionnaire. There was a total response.

### **3.3 Design of the Discrete Choice Experiment**

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 attributes/levels in the study.

#### **3.3.1 Choice of Attributes and Levels**

In every DCE studies, the second step after the problem refinement stage is the choice of the attributes and their corresponding levels (Hensher et al., 2005).

The researcher identified five job attributes and accompanying levels to be the most important on the basis of extensive preparatory qualitative research. I carried out in-depth interviews with in-service and focus group discussions with final-year teacher trainees. Key decision makers in the education sector were interviewed to ensure that job attributes selected are amenable to policy changes. According to Adamowicz et al. (1998), attributes are commonly identified from prior experience, primary or secondary research. The five attributes for this study are provision of government housing, net salary, opportunities for further studies, workload and number of years before promotion. The job attributes and their levels are shown in Table 3.1.

**Table 3.1: Job Attributes and Corresponding Levels**

<b>Attributes</b>	<b>Corresponding Levels</b>
Provision of Government Housing	Provided
	No Decent Housing Provided
Net Salary	Gh¢ 680 (approximately \$200)
	Gh¢ 816 (approximately \$240)
	Gh¢ 884 (approximately \$260)
Workload	A Teacher to $\leq 20$ students
	A Teacher to $\geq 30$ students
Number of Years before Promotion	3 Years
	5 Years
Opportunities for Further Studies	Granting Study Leave with Pay
	No Study Leave

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Source: Study design, 2015

### **3.3.2 Experimental Design**

Experimental design helps in structuring and running our experiment. According to Louviere et al., (2000), it is a way of manipulating attributes and their levels to enable rigorous testing of certain hypothesis of interest. After the attributes and their levels have been determined, the experiment was designed to elicit the stated choices to be presented to the respondents. A formal statistical design (main effect fractional factorial design) was used before translating into a survey form, taking into account the condition of optimality.

A design that is optimal is both balanced and orthogonal. In general terms, a design is balanced when each effect is orthogonal to the intercept and, orthogonal when the frequencies for level pairs are equal. Orthogonal array is a special type of fractional factorial design, and fractional factorial design that is both balanced and orthogonal is called orthogonal array. The choice sets for the DCE questionnaire were generated using well-established statistical methods. Using the orthogonal design facility in SPSS, the full factorial design that consists of  $(2^4 * 3^1)$ , where the subscripts are the corresponding levels and the superscript are the attributes. A combination of the attributes and attribute levels was stripped down to eight (8) profiles for the experiment (Kuhfeld 2010; Hensher et al., 2005). The profiles generated from the orthogonal design facility in SPSS are presented in Table 3.2.

**Table 3.2: Orthogonal Arrays Generated from SPSS**

Choice Set	Provision of Housing	Net Salary	Workload	Number of Years	Opportunities for Further Studies
1	Provided	GH¢ 680	A teacher to $\leq 20$ students	3 years	Granting study leave with pay
2	Not provided	GH¢ 680	A teacher $\geq 30$ students	5 years	No study leave
3	Not provided	GH¢ 680	A teacher $\geq 30$ students	3 years	Granting study leave with pay
4	Provided	GH¢ 884	A teacher $\geq 30$ students	5 years	Granting study leave with pay
5	Provided	GH¢ 816	A teacher $\geq 30$ students	3 years	No study leave
6	Not provided	GH¢ 816	A teacher to $\leq 20$ students	5 years	Granting study leave with pay
7	Provided	GH¢ 680	A teacher to $\leq 20$ students	5 years	No study leave
8	Not provided	GH¢ 884	A teacher to $\leq 20$ students	3 years	No study leave

Source: Study design output, 2015

The profiles were combined to generate 28 choice sets which were randomly blocked into two sets in order to reduce respondents fatigue or wear-out. The students were asked to compare each of the 14 choice sets and indicate which job alternatives will influence their choice of a rural/remote area posting taking into consideration the attributes and their corresponding levels. An example of a choice set is shown in Table 3.3.

**Table 3.3: Choice set**

Which of these two jobs would you prefer to choose?

<b>Attributes</b>	<b>Job 1</b>	<b>Job 2</b>
Provision of Government Housing	House provided	House not provided
Net Salary	GH¢ 680	GH¢ 680
Work load	A teacher to $\leq 20$ students	A teacher $\geq 30$ students
Number 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 [ ]

Source: Study questionnaire, 2015

### 3.4 The Questionnaire and Questionnaire Pilot

The questionnaire is preceded by an introduction, indicating the subject of the study, who is carrying out the survey, and how the results will be used. It also contains demographic information on the respondents and a range of job choice questions for the discrete choice experiment. According to Adamowicz et al., (1998), a choice task (questionnaire) is preceded by

a set of standardized instructions to respondents regarding the task, its objective, its context and how to respond to the scenarios.

The research questionnaire was tested in a pilot with in-service teachers and teacher trainees. Adamowicz et al. (1998) observed that pre-testing of the questionnaire through piloting is a necessary component of the research program. The aim of the pilot was to assess as whether the respondents understand the definition of attributes and attribute levels, cope with the choice task and respondents' reasons for making specific choices. It was also to examine the data entry template and assist the researcher to appreciate possible challenges and problems during the survey.

### **3.4.1 Data Collection**

The data used for this study come from a cohort survey conducted in 2015 by the author, which surveyed a total of 120 teacher trainees at Berekum College of Education in the Brong Ahafo region of the Republic of Ghana. The data were collected using paper and pencil/self-administered questionnaire in the various houses of residence. A questionnaire is either self-administered or presented through an interviewer (Adamowicz et al., 1998).

The enumerator explained how to answer the choice sets in the questionnaire to the respondents before completing it. The questionnaire as well as the verbal instructions was given in both English and Ghanaian language (the main language in the state). A vast majority of the students have had at least some teaching experience, and thus they are a relevant part of the in-service public sector teachers in the country. The respondents were not compensated for the time spent in completing the questionnaire.

### 3.4.2 Data Entry

In all stated or discrete choice experiment datasets, respondents answer more than one discrete choice question, which results in multiple observations for each respondent. The questionnaires administered were checked prior to the data entry process. The data were entered using Microsoft excel before importing to the STATA (version 11.0) statistical software for analysis.

### 3.5 Data Analysis

The data generated from the survey were analyzed using the main effect probit estimator in STATA 11.0. The probit model estimates the probability of choosing a job given the differences in job attribute levels from the choice set.

#### 3.5.1 Econometric Specification

A discrete choice model is used to analyze the relative importance of different job attributes for preferences and especially, whether location options significantly affect choices.

Discrete choice experiment modeling is rooted in Random Utility Theory (RUT). However, the utility can be modeled as;

$$U_{ci} = V_{ci} + \varepsilon_{ci} \quad (1)$$

where  $V_{ci}$  is the deterministic term of the utility and  $\varepsilon_{ci}$  is the random term, taking care of the uncertainty. The deterministic term  $V_{ci}$  of each alternative is a function of the attributes of the alternative itself and the characteristics of the respondent.

McFadden (1974) opined that a utility can be characterized by a function;

$$U_{ci} = \alpha + \sum_{k=1}^K \beta_k X_{cki} + \sum_{m=1}^M \gamma_m Z_{mi} + \sum_{k=1}^K \sum_{m=1}^M \delta_{km} X_{cki} Z_{mi} + u_{ci} \quad (2)$$

where job choice  $c = \{Job1, Job2\}$  and  $i = 1 \dots N$  refers to respondents.  $X$  is a vector of  $K$  attribute levels, and  $Z$  is a vector of  $M$  personal characteristics. The parameter  $\beta_k$  refers to the utility associated with job attribute  $k$  and the parameter  $\delta_{km}$  measures how this utility varies by a specific characteristic of the respondent. The term  $u_{ci}$  is random and represents unobservable influences on respondent choice. The framework assumes that the respondent chooses the job option which generates more utility. The utility gain from choosing job1 over commercial job2 for individual  $i$  is:

$$U_{Bi} - U_{Ai} = \sum_{k=1}^K \beta_k (X_{Bki} - X_{Aki}) + \sum_{k=1}^K \sum_{m=1}^M \delta_{km} (X_{Bki} - X_{Aki}) Z_{mi} + (u_{Bi} - u_{Ai}) \quad (3)$$

The random component  $u_{ci}$  may be hypothesized to consist of three additive components; respondent specific component  $v_i$ , job choice specific component  $e_c$  and a true iid random term. Of these, the respondent specific term cancels out. The job choice specific component can be assumed to be zero, unless the respondents have a consistent tendency to be more or less likely to respond to job1 instead of job2. Suppose the respondent chooses job2 if  $U_{Bi} - U_{Ai} > 0$ . This takes place with the probability

$$\begin{aligned} P[U_{Bi} - U_{Ai} > 0] &= P \left[ \sum_{k=1}^K \beta_k (X_{Bki} - X_{Aki}) + \sum_{k=1}^K \sum_{m=1}^M \delta_{km} (X_{Bki} - X_{Aki}) Z_{mi} + (u_{Bi} - u_{Ai}) > 0 \right] \\ &= P \left[ (u_{Ai} - u_{Bi}) < \sum_{k=1}^K \beta_k (X_{Bki} - X_{Aki}) + \sum_{k=1}^K \sum_{m=1}^M \delta_{km} (X_{Bki} - X_{Aki}) Z_{mi} \right] \quad (4) \end{aligned}$$

Assuming a distribution for  $(U_{Ai} - U_{Bi})$ , for instance a standard normal distribution, the probability in (4) can be expressed in terms of a cumulative standard normal distribution and modeled accordingly with probit:

$$P[U_{Bi} - U_{Ai} > 0] = F \left[ \sum_{k=1}^K \beta_k (X_{Bki} - X_{Aki}) + \sum_{k=1}^K \sum_{m=1}^M \delta_{km} (X_{Bki} - X_{Aki}) Z_{mi} \right] \quad (5)$$

where

$$F(x) = \Phi(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^x \exp\left(-\frac{1}{2}t^2\right) dt \quad (6)$$

This work estimates equation (5) with a binary probit model where the levels of job attributes are treated as metric and dummy variables in the regression analysis. The response variable (job choice) is assigned 1 if Job 1 is chosen and 0 if Job 2 is chosen.

The probit model employed for the study based on RUT was therefore stated as;

$$\text{Pr ob}(Y = \text{Job}_1) = \text{Pr ob}(U_{\text{Job}_1} > U_{\text{Job}_2}) \quad (7)$$

$$Y = \beta_o + \beta_1 H_p + \beta_2 H_n + \beta_3 S_{680} + \beta_4 S_{816} + \beta_5 S_{884} + \beta_6 T_{\leq 20} + \beta_7 T_{\geq 30} + \beta_8 P_{3b} + \beta_9 P_{5b} + \beta_{10} L_p + \beta_{11} L_n + \varepsilon \quad (8)$$

where;

$Y$  = Response (choice),

$\beta_i$  = The alternative specific constant,

$H_p$  = Housing provided,

$H_n$  = No decent housing provided,

$S_{680}$  = Net Salary (Gh¢ 680),

$S_{816}$  = Net Salary (Gh¢ 816),

$S_{884}$  = Net Salary (Gh¢ 884),

$T_{\leq 20}$  = A Teacher to  $\leq 20$  students,

$T_{\geq 30}$  = A Teacher to  $\geq 30$  students,

$P_{3b}$  = Three years before promotion,

$P_{5b}$  = Five years before promotion,

$L_p$  = Study leave with pay,

$L_n$  = No study leave,

$\varepsilon$  = Error term,

## CHAPTER FOUR

### RESULTS OF DATA ANALYSIS

#### 4.0 Introduction

This chapter thoroughly explores, analyzes and reports the data solicited from subject in assessing public sector teachers' preferences/attitude towards remote/rural area job posting, and in building a discrete choice model that exhibits the significant attributes that influence teachers' choice. This chapter presents the results of the full model with their marginal effects which is further restricted by gender, rural and non rural background. All analysis was done using STATA (version 11.0).

#### 4.1 The parameter estimates of full model

The Table 4.1 presents the parameter estimates of the probit model for the respondents with their Standard Errors (SE) in parentheses. The results as discussed below portray public sector teachers' contribution of the attributes presented to them and their influence on choice decisions as uncovered from the experiment.

**Table 4.1: The parameter estimates of full model**

Attributes	Coefficient (SE)	Z Value	P> Z	[95% Conf. Int.]	
Housing provided	0.8230 (0.1848)	4.45	0.000	0.4607	1.1853
No decent housing provided	0.3962 (0.1895)	2.09	0.037	0.0248	0.7677
Net salary (Gh¢ 680)	-0.8372 (0.0627)	-13.34	0.000	-0.9602	-0.7142
Net salary (Gh¢ 816)	-0.3610 (0.0665)	-5.43	0.000	-0.4914	-0.2306
Workload (a teacher to $\leq$ 20 students)	0.0825 (0.0504)	1.64	0.102	-0.0162	0.1814
Years before promotion (3 years)	0.2983 (0.0512)	5.82	0.000	0.1977	0.3988
Granting study leave with pay	1.2556 (0.0512)	24.49	0.000	1.1550	1.3561
Constant	-0.9340 (0.1818)	-5.14	0.000	-1.2904	-0.5777
Number of observations	3360				
Likelihood ratio $\chi^2$	1006.60				
Prob > $\chi^2$	0.000				
Pseudo $R^2$	0.2161				

Source: Field data, 2015

The results reveal that there is goodness-of-fit of the model from the data. The likelihood ratio chi-square of 1006.60 with a p-value of 0.000 tells us that the model as a whole is statistically significant, that is, it fits significantly better than a model with no predictors.

All estimated coefficients have the expected sign and are significant at the 95% confidence level and therefore in the direction of the study route. However, workload (a teacher to  $\leq 20$  students per a classroom) is insignificant.

Job attributes like granting study leave with pay, housing provided and 3 years of work before promotion to those without increase the utility of the individual and thereby increase the probability of remote/rural area job preference by 1.2556, 0.8230 and 0.2983 respectively. In other words, in accepting a remote/rural area job posting, public sector teachers prefer job bundles with the opportunity for further studies with pay, housing, and 3 years of work before promotion. These factors would attract public sector teachers to willingly accept remote/rural area job. However, in the absence of decent housing ( $\beta = 0.3962$ ), utilities such as opportunity for further studies with pay and 3 years of work before promotion would increase a rural area job choice.

The levels of salary Gh¢ 680 ( $\beta = -0.8372$ ) and Gh¢ 816 ( $\beta = -0.3610$ ) decrease the utility associated with remote/rural area job choice, though significant. This factor would be trade-off for other attributes like granting study leave with pay, housing provided and 3 years of work before promotion.

#### **4.1.1 Marginal effects of full model**

The result of marginal effects after probit model with their Standard Errors (SE) in parentheses is depicted in Table 4.1.1.

**Table 4.1.1: Marginal effects of the model**

Attributes	dy/dx(SE)	Z Value	P> Z	[95% Conf. Int.]
Housing provided	0.3191 (0.0676)	4.72	0.000	0.1864 0.4517
No decent housing provided	0.1570 (0.0741)	2.12	0.034	0.0117 0.3023
Net salary (Gh¢ 680)	-0.3243 (0.0229)	-14.14	0.000	-0.3692 -0.2793
Net salary (Gh¢ 816)	-0.1421 (0.0256)	-5.54	0.000	-0.1923 -0.0918
Workload (a teacher to $\leq 20$ students)	0.0329 (0.0200)	1.64	0.101	-0.0064 0.0722
Years before promotion (3 years)	0.1184 (0.0202)	5.86	0.000	0.0788 0.1580
Granting study leave with pay	0.4695 (0.0167)	27.97	0.000	0.4366 0.5024

Source: Field data, 2015

The result of the marginal effect indicates that attributes such as granting study leave with pay, housing provided and 3 years of work before promotion to those without increase the utility of the change in the probability of remote/rural area job choice by 0.4695, 0.3191 and 0.1184 respectively; and are all significant. The levels of salary are also significant even though they decrease the change in the probability of remote/rural area job choice. Also, workload (a teacher to  $\leq 20$  students) is insignificant.

#### 4.2 The parameter estimates of restricted model by male teachers

The Table 4.2 portrays the parameter estimates of the probit model for male teachers with their Standard Errors (SE) in parentheses. The results as discussed below show respondents contribution of the attribute.

**Table 4.2: The restricted model by male teachers**

Attributes	Coefficient(SE)	Z Value	P> Z	[95% Conf. Int.]	
Housing provided	0.8928 (0.2008)	4.44	0.000	0.4991	1.2865
No decent housing provided	0.4989 (0.2164)	2.30	0.021	0.0746	0.9231
Net salary (Gh¢ 680)	-0.7876 (0.0863)	-9.12	0.000	-0.9568	-0.6184
Net salary (Gh¢ 816)	-0.3603 (0.0885)	-4.07	0.000	-0.5339	-0.1868
Workload (a teacher to $\leq$ 20 students)	0.0638 (0.0723)	0.88	0.378	-0.0779	0.2056
Years before Promotion (3 years)	0.2891 (0.0729)	3.96	0.000	0.1462	0.4321
Granting study leave with pay	1.1937 (0.0729)	16.37	0.000	1.0508	1.3367
Constant	-0.9836 (0.1912)	-5.14	0.000	-1.3584	-0.6088
Number of observations	1848				

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Likelihood ratio $\chi^2$	552.51
Prob > $\chi^2$	0.000
Pseudo $R^2$	0.2157

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Source: Field data, 2015

All estimated coefficients have the expected sign and are significant at the 95% confidence level, with the exception of workload (a teacher to  $\leq 20$  students) which has no significant effect on job choice by male teachers.

Granting of study leave with pay, housing provided and 3 years of work before promotion to those without improve the utility and uptake probability associated with remote/rural area job choice by 1.1937, 0.8928 and 0.2891 respectively. This means that for job location choice, male teachers prefer or value bundles such as granting of study leave with pay, housing provided and promotion after 3 years of work.

The levels of salary would be traded off for other attributes.

Besides, all the significant attributes are in line with those estimated in the full model.

#### **4.3 The parameter estimates of restricted model by female teachers**

The Table 4.3 shows the parameter estimates of the probit model for the sample population who are females with their Standard Errors (SE) in parentheses.

**Table 4.3: The restricted model by female teachers**

Attributes	Coef.(SE)	Z Value	P> Z	[95% Conf. Interval]	
Housing provided	0.4462 (0.0729)	6.12	0.000	0.3032	0.5892
Net salary (Gh¢ 680)	-0.8798 (0.0939)	-9.36	0.000	-1.0640	-0.6956
Net salary (Gh¢ 816)	-0.3583 (0.1015)	-3.53	0.000	-0.5573	-0.1594
Workload (a teacher to $\leq 20$ pupils)	0.0808 (0.0729)	1.11	0.268	-0.0621	0.2238
Years before promotion (3 years)	0.2874 (0.0742)	3.87	0.000	0.1418	0.4330
Granting study leave with pay	1.3160 (0.0742)	17.72	0.000	1.1704	1.4615
Constant	-0.5606 (0.1116)	-5.02	0.000	-0.7794	-0.3419
Number of observations	1512				
Likelihood ratio $\chi^2$	456.12				
Prob > $\chi^2$	0.000				
Pseudo $R^2$	0.2176				

Source: Field data, 2015

All estimated coefficients have the expected sign and are significant at the 95% confidence level, with the exception of workload (a teacher to  $\leq 20$  students) which has no significant effect on job location choice by female teachers.

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 1.3160, 0.4462 and 0.2874 respectively. This means that for job location choice, female teachers prefer or value bundles such as granting of study leave with pay, provision of housing and promotion after 3 years of work.

Also, the levels of salary decrease the utility associated with job location preference. This means that females will trade this attribute off.

Generally, all the significant attributes are in line with those estimated in the full model. However, as male teachers prefer remote/rural area job with or without the provision of housing, housing is a priority for female teachers.

#### **4.4 The restricted model by teachers with remote/rural background**

The Table 4.4 shows the parameter estimates of the probit model for the sample population who have ever dwelt in a remote/rural area with their Standard Errors (SE) in parentheses.

**Table 4.4: The restricted model by teachers with remote/rural background**

Attributes	Coefficient(SE)	Z Value	P> Z	[95% Conf. Inter.]	
Housing provided	1.1249 (0.3091)	3.64	0.000	0.5190	1.7308
No decent housing provided	0.6511 (0.3153)	2.06	0.039	0.0330	1.2692
Net salary (Gh¢ 680)	-0.8078 (0.0922)	-8.76	0.000	-0.9886	-0.6271
Net salary (Gh¢ 816)	-0.4334 (0.0973)	-4.45	0.000	-0.6243	-0.2425
Workload (a teacher to $\leq 20$ students)	0.1129 (0.0739)	1.53	0.127	-0.0319	0.2578
Years before promotion (3 years)	0.2823 (0.0752)	3.75	0.000	0.1349	0.4297
Granting study leave with pay	1.2970 (0.0752)	17.25	0.000	1.1496	1.4444
Constant	-1.2246 (0.3055)	-4.01	0.000	-1.8234	-0.6258
Number of observations	1596				
Likelihood ratio $\chi^2$	505.20				
Prob > $\chi^2$	0.000				
Pseudo $R^2$	0.2283				

Source: Field data, 2015

All estimated coefficients have the expected sign and are significant at the 95% confidence level, with the exception of workload (a teacher to  $\leq 20$  students) which has no significant effect on rural area job choice by public teachers with rural background.

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 1.2970, 1.1249 and 0.2823 respectively. This means that for job location choice, teachers with rural background 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 for other attributes.

#### **4.5 The restricted model by teachers with no remote/rural background**

The Table 4.5 shows the parameter estimates of the probit model for the sample population who have never dwell in a remote/rural area with their Standard Errors (SE) in parentheses.

**Table 4.5: The restricted model by teachers with no remote/rural background**

Attributes	Coef.(SE)	Z Value	P> Z	[95% Conf. Interv.]	
Housing provided	0.5733 (0.2390)	2.40	0.016	0.1048	1.0418
No decent housing provided	0.1807 (0.2456)	0.74	0.462	-0.3005	0.6621
Net salary (Gh¢ 680)	-0.8811 (0.0867)	-10.16	0.000	-1.0511	-0.7111
Net salary (Gh¢ 816)	-0.3131 (0.0920)	-3.40	0.001	-0.4935	-0.1326
Workload (a teacher to $\leq$ 20 students)	0.0476 (0.0696)	0.68	0.494	-0.0888	0.1841
Years before promotion (3 years)	0.3306 (0.0709)	4.66	0.000	0.1915	0.4696
Granting study leave with pay	1.2195 (0.0709)	17.19	0.000	1.0805	1.3585
Constant	-0.6835 (0.2342)	-2.92	0.004	-1.1426	-0.2244
Number of observations	1736				
Likelihood ratio $\chi^2$	500.80				
Prob > $\chi^2$	0.000				
Pseudo $R^2$	0.208				

Source: Field data, 2015

All estimated coefficients have the expected sign and are significant at the 95% confidence level, with the exception of workload (a teacher to  $\leq 20$  students) and no decent housing provided which have no significant effect on job location choice by teachers with no rural background.

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 1.2195, 0.5733 and 0.3306 respectively. This means that for job location choice, teachers from urban areas prefer or value 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, all the significant attributes are in line with those estimated in the full model. However, as teachers with rural background prefer remote/rural area job with or without the provision of housing, urban background teachers prefer housing.

#### **4.6 The restricted model by teachers who had their primary and/or secondary education in a remote/rural area**

The Table 4.6 shows the parameter estimates of the probit model for the sample population who attended primary or secondary school in a remote/rural area with their Standard Errors (SE) in parentheses.

**Table 4.6: The restricted model by teachers who had their primary and/or secondary education in a remote/rural area**

Attributes	Coef.(SE)	Z Value	P> Z	[95% Conf. Inter.]	
Housing provided	0.8709 (0.2838)	3.07	0.002	0.3145	1.4272
No decent housing provided	0.4283 (0.2913)	1.47	0.142	-0.1427	0.9995
Net salary (Gh¢ 680)	-0.8099 (0.0992)	-8.16	0.000	-1.0044	-0.6154
Net salary (Gh¢ 816)	-0.4197 (0.1058)	-3.97	0.000	-0.6271	-0.2123
Workload (a teacher to ≤ 20 students)	0.1258 (0.0799)	1.57	0.116	-0.0308	0.2825
Years before promotion (3 years)	0.2293 (0.0809)	2.83	0.005	0.0707	0.3879
Granting study leave with pay	1.2653 (0.0809)	15.64	0.000	1.1067	1.4239
Constant	-0.9529 (0.2796)	-3.41	0.001	-1.5009	-0.4048
Number of observations	1344				
Likelihood ratio $\chi^2$	403.34				
Prob > $\chi^2$	0.000				
Pseudo $R^2$	0.2165				

Source: Field data, 2015

All estimated coefficients have the expected sign and are significant at the 95% confidence level, with the exception of workload (a teacher to  $\leq 20$  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.

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 for other attributes.

#### **4.7 The restricted model by teachers who never had their primary and/or secondary education in a remote/rural area**

The Table 4.7 shows the parameter estimates of the probit model for the sample population who did not attend primary or secondary school in a remote/rural area with their Standard Errors (SE) in parentheses.

**Table 4.7: The restricted model by teachers who did not have their primary and/or secondary education in a remote/rural area**

Attributes	Coef.(SE)	Z Value	P> Z	[95% Conf. Interv.]	
Housing provided	0.7683 (0.2450)	3.14	0.002	0.2881	1.2485
No decent housing provided	0.3488 (0.2509)	1.39	0.164	-0.1429	0.8406
Net salary (Gh¢ 680)	-0.8725 (0.0819)	-10.65	0.000	-1.0332	-0.7119
Net salary (Gh¢ 816)	-0.3398 (0.0862)	-3.94	0.000	-0.5090	-0.1707
Workload (a teacher to $\leq$ 20 students)	0.0470 (0.0654)	0.72	0.472	-0.0812	0.1754
Years before promotion (3 years)	0.3595 (0.0669)	5.37	0.000	0.2283	0.4908
Granting study leave with pay	1.2519 (0.0669)	18.69	0.000	1.1206	1.3832
Constant	-0.8917 (0.2406)	-3.71	0.000	-1.3635	-0.4200
Number of observations	1988				
Likelihood ratio $\chi^2$	599.77				
Prob > $\chi^2$	0.000				
Pseudo $R^2$	0.2176				

Source: Field data, 2015

All estimated coefficients have the expected sign and are significant at the 95% confidence level, with the exception of workload (a teacher to  $\leq 20$  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 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.

Also, the salary attribute would be traded off.

Generally, all the significant attributes are in line with those estimated in the full model.

The next chapter presents summary, conclusion and recommendations of the research and also further studies areas.

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.0 Introduction

This chapter presents summary of the findings and concluding statements from the study. It further recommends rational measures for policy makers in recruiting and retention of public sector teachers. Finally, it recommends further study possibility areas for future researchers.

#### 5.1 Summary

The main objective of this study was to assess the effects of various job attributes on public sector teachers' attitude in choosing a remote or rural area job. The study considered teacher trainees in Berekum Training College in the Brong Ahafo region of Ghana. The survey data were further restricted on the basis of gender, rural and non rural background. Marginal effect of the full model was also estimated. These were achieved with the help of the probit model in STATA (version 11.0). Data were entered using Microsoft excel.

The study revealed that the levels of opportunities for further studies (granting of study leave with pay), provision of government housing (housing provided) and number of years before promotion (3 years of work before promotion) play essential role in the choice decisions of public sector teachers with regards to job location, which were further supported by the marginal effects.

Besides, the magnitude of the estimated parameters showed that granting of study leave with pay contributed most in teachers' choice of a remote or rural area job.

It was also observed that the levels of salary would be traded-off by public sector teachers for other attributes such as granting of study leave with pay, provision of housing and promotion after 3 years of work. Public sector teachers value non final incentive packages.

Finally, the subgroup analysis indicated that, generally, as there is difference in job location choice by gender and location background (rural or urban residents) with respect to the significance of the housing attribute, there is no difference in either respondents got their primary and/or secondary education in a rural or urban area. (Kara & William, 2008)

It is therefore recommended that in order to desist from force recruitment and effectively recruit public sector teachers to willingly accept rural area postings, policy makers in the education sector should adopt a strategy by granting of study leave with pay, provision of housing and promotion after 3 years of work in a rural area.

## **5.2 Conclusions**

The assumption that the data collected from the respondents follow the normal distribution was in line, with chi-square value from the analysis showing significant at 95% level. The model indicates goodness-of-fit of the survey data, and also the set objectives for the study were justified by the results.

The effects of certain attributes based on the findings from the study revealed that in choosing a rural area job, respondents consideration sets in order of importance were granting of study leave with pay, provision of housing and promotion after 3 years of work. Confirming the studies by Vujicic et al. (2004) that non-financial incentives, like the provision of housing and the prospect of an opportunity to upgrade qualifications, are important reasons for wishing to migrate to rural areas. Opportunities for educational upgrading and career development 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).

Public sector teachers' preference for housing is in line with the observation by Mangham (2006) that family matters in various ways; nurses in Malawi are more likely to work in rural districts if decent housing is offered.

The most important attribute that influence rural job preference is granting of study leave with pay which has the highest coefficient among all the attributes estimated in both the full and the restricted models.

Generally, salary would be traded-off for non-financial attributes (granting of study leave with pay, provision of housing and promotion after 3 years of work). Confirming the observation by Kingma (2003) that financial incentives have, in some cases, limited effects compared with non-financial incentives.

On the other hand, generally, subgroup analyses differ only in gender and location background (rural or urban residents) with respect to the housing attribute.

### **5.3 Recommendations**

The following are recommendations to policy makers and planners:

1. It is recommended that much attention should be given to job bundles like granting of study leave with pay, provision of decent housing, and promotion after few years of work since they have the potential to attract public sector teachers to rural areas.
2. It is recommended that much attention should be given to granting of study leave with pay as a result of the large magnitude of its estimate.

3. In rural area job choice, much attention should not be given to normal/fixed salary since it will be traded-off. However, rural allowance would be the best alternative.
4. Much attention should be given to non-financial incentive packages since they increase/improve rural area job choice.
5. Subgroup analysis is important as it enriches the findings of the study.
6. In areas where revealed data are absent, Discrete Choice Experiment could be used because of its robustness.

#### **5.4 Further Studies**

The behaviour of certain attributes/attribute levels in the model call for further work.

1. A further study should be conducted to find the effect of additional salary increment/allowance, and the supply of electricity and portable water on the choice of rural area job.
2. A DCE approach could be applied to assess the willingness to pay for job attributes.
3. Conjoint analysis could be employed for the same study.
4. Different design methods such as A and D-efficient design and analytical tools such as the random parameter logit and the conditional/multinomial logit model could also be used for this same study.
5. Further studies should consider sampling from more than one college of education.

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**APPENDIX I****Discrete Choice Experiment Questionnaire****INTRODUCTION**

I am a Master of Philosophy student in University of Ghana, undertaking a research on the topic: **Recruitment and Retention of Public Sector Teachers in Ghana: A Discrete Choice Experiment**. Because it is impossible to interview everybody, we have chosen you to assist in answering the questionnaire. You are very much assured of the confidentiality of all information provided and it will solely be used for the purpose of the study.

Thank you for your co-operation.

**BACKGROUND INFORMATION**

1. Gender: Male  Female
2. Age: Below 20  21-23  24-26  27-29  30+
3. Did you grow up in a rural area? Yes  No
4. Did you have your Primary and/or Secondary education in a rural area? Yes  No

**CHOICE SETS**

<b>ATTRIBUTES</b>	<b>JOB 1</b>	<b>JOB 2</b>
Provision of Government Housing	House provided	House not provided
Net Salary	GH¢ 680	GH¢ 680
Work load	A teacher to $\leq 20$ students	A teacher $\geq 30$ students
Number of Years Before Promotio	3 years	5 years
Opportunities for Further Studies	Granting study leave with pay	No study leave
Which of these two jobs do you prefer?	<input type="checkbox"/>	<input type="checkbox"/>

ATTRIBUTES	JOB 4	JOB 8
Provision of Government Housing	House provided	House not provided
Net Salary	GH¢ 884	GH¢ 884
Work load	A teacher $\geq$ 30 students	A teacher $\leq$ 20 students
Number of Years B/f Promotion	5 years	3 years
Opportunities for Further Studies	Granting study leave with pay	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 1	JOB 3
Provision of Government Housing	House provided	House not provided
Net Salary	GH¢ 680	GH¢ 680
Work load	A teacher to $\leq$ 20 students	A teacher $\geq$ 30 students
Number of Years B/f Promotion	3 years	3 years
Opportunities for Further Studies	Granting study leave with pay	Grant. study leave with pay
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 1	JOB 4
Provision of Government Housing	House provided	House provided
Net Salary	GH¢ 680	GH¢ 884
Work load	A teacher to $\leq$ 20 students	A teacher $\geq$ 30 students
Number of Years B/f Promotion	3 years	5 years
Opportunities for Further Studies	Granting study leave with pay	Grant. study leave with pay
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 1	JOB 5
Provision of Government Housing	House provided	House provided
Net Salary	GH¢ 680	GH¢ 816
Work load	A teacher to $\leq$ 20 students	A teacher $\geq$ 30 students
Number of Years B/f Promotion	3 years	3 years
Opportunities for Further Studies	Granting study leave with pay	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 2	JOB 3
Provision of Government Housing	House not provided	House not provided
Net Salary	GH¢ 680	GH¢ 680
Work load	A teacher $\geq$ 30 students	A teacher $\geq$ 30 students
Number of Years B/f Promotion	5 years	3 years
Opportunities for Further Studies	No study leave	Grant. study leave with pay

Which of these two jobs do you prefer?	[ ]	[ ]
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ATTRIBUTES	JOB 2	JOB 5
Provision of Government Housing	House not provided	House provided
Net Salary	GH¢ 680	GH¢ 816
Work load	A teacher $\geq$ 30 students	A teacher $\geq$ 30 students
Number of Years B/f Promotion	5 years	3 years
Opportunities for Further Studies	No study leave	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 5	JOB 8
Provision of Government Housing	House provided	House not provided
Net Salary	GH¢ 816	GH¢ 884
Work load	A teacher $\geq$ 30 students	A teacher $\leq$ 20 students
Number of Years B/f Promotion	3 years	3 years
Opportunities for Further Studies	No study leave	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 2	JOB 4
Provision of Government Housing	House not provided	House provided
Net Salary	GH¢ 680	GH¢ 884
Work load	A teacher $\geq$ 30 students	A teacher $\geq$ 30 students
Number of Years B/f Promotion	5 years	5 years
Opportunities for Further Studies	No study leave	Grant. study leave with pay
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 2	JOB 7
Provision of Government Housing	House not provided	House provided
Net Salary	GH¢ 680	GH¢ 680
Work load	A teacher $\geq$ 30 students	A teacher $\leq$ 20 students
Number of Years B/f Promotion	5 years	5 years
Opportunities for Further Studies	No study leave	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 2	JOB 8
Provision of Government Housing	House not provided	House not provided
Net Salary	GH¢ 680	GH¢ 884
Work load	A teacher $\geq$ 30 students	A teacher $\leq$ 20 students
Number of Years B/f Promotion	5 years	3 years
Opportunities for Further Studies	No study leave	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 3	JOB 8
Provision of Government Housing	House not provided	House not provided
Net Salary	GH¢ 680	GH¢ 884
Work load	A teacher $\geq$ 30 students	A teacher $\leq$ 20 students
Number of Years B/f Promotion	3 years	3 years
Opportunities for Further Studies	Granting study leave with pay	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 4	JOB 5
Provision of Government Housing	House provided	House provided
Net Salary	GH¢ 884	GH¢ 816
Work load	A teacher $\geq$ 30 students	A teacher $\geq$ 30 students
Number of Years B/f Promotion	5 years	3 years
Opportunities for Further Studies	Granting study leave with pay	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 1	JOB 8
Provision of Government Housing	House provided	House not provided
Net Salary	GH¢ 680	GH¢ 884
Work load	A teacher to $\leq$ 20 students	A teacher $\leq$ 20 students
Number of Years B/f Promotion	3 years	3 years
Opportunities for Further Studies	Granting study leave with pay	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

<b>ATTRIBUTES</b>	<b>JOB 2</b>	<b>JOB 6</b>
Provision of Government Housing	House not provided	House not provided
Net Salary	GH¢ 680	GH¢ 816
Work load	A teacher $\geq$ 30 students	A teacher $\leq$ 20 students
Number of Years B/f Promotion	5 years	5 years
Opportunities for Further Studies	No study leave	Grant. study leave with pay
Which of these two jobs do you prefer?	[ ]	[ ]

<b>ATTRIBUTES</b>	<b>JOB 4</b>	<b>JOB 6</b>
Provision of Government Housing	House provided	House not provided
Net Salary	GH¢ 884	GH¢ 816
Work load	A teacher $\geq$ 30 students	A teacher $\leq$ 20 students
Number of Years Before Promotion	5 years	5 years
Opportunities for Further Studies	Granting study leave with pay	Grant. study leave with pay
Which of these two jobs do you prefer?	[ ]	[ ]

<b>ATTRIBUTES</b>	<b>JOB 4</b>	<b>JOB 7</b>
Provision of Government Housing	House provided	House provided
Net Salary	GH¢ 884	GH¢ 680
Work load	A teacher $\geq$ 30 students	A teacher $\leq$ 20 students
Number of Years Before Promotion	5 years	5 years
Opportunities for Further Studies	Granting study leave with pay	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

<b>ATTRIBUTES</b>	<b>JOB 1</b>	<b>JOB 6</b>
Provision of Government Housing	House provided	House not provided
Net Salary	GH¢ 680	GH¢ 816
Work load	A teacher to $\leq$ 20 students	A teacher $\leq$ 20 students
Number of Years Before Promotion	3 years	5 years
Opportunities for Further Studies	Granting study leave with pay	Grant study leave with pay
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 1	JOB 7
Provision of Government Housing	House provided	House provided
Net Salary	GH¢ 680	GH¢ 680
Work load	A teacher to $\leq 20$ students	A teacher $\leq 20$ students
Number of Years Before Promotion	3 years	5 years
Opportunities for Further Studies	Granting study leave with pay	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 3	JOB 4
Provision of Government Housing	House not provided	House provided
Net Salary	GH¢ 680	GH¢ 884
Work load	A teacher $\geq 30$ students	A teacher $\geq 30$ students
Number of Years Before Promotion	3 years	5 years
Opportunities for Further Studies	Granting study leave with pay	Study leave with pay
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 6	JOB 7
Provision of Government Housing	House not provided	House provided
Net Salary	GH¢ 816	GH¢ 680
Work load	A teacher $\leq 20$ students	A teacher $\leq 20$ students
Number of Years Before Promotion	5 years	5 years
Opportunities for Further Studies	Granting study leave with pay	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 6	JOB 8
Provision of Government Housing	House not provided	House not provided
Net Salary	GH¢ 816	GH¢ 884
Work load	A teacher $\leq 20$ students	A teacher $\leq 20$ students
Number of Years B/f Promotion	5 years	3 years
Opportunities for Further Studies	Granting study leave with pay	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

<b>ATTRIBUTES</b>	<b>JOB 7</b>	<b>JOB 8</b>
Provision of Government Housing	House provided	House not provided
Net Salary	GH¢ 680	GH¢ 884
Work load	A teacher $\leq$ 20 students	A teacher $\leq$ 20 students
Number of Years B/f Promotion	5 years	3 years
Opportunities for Further Studies	No study leave	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

<b>ATTRIBUTES</b>	<b>JOB 3</b>	<b>JOB 5</b>
Provision of Government Housing	House not provided	House provided
Net Salary	GH¢ 680	GH¢ 816
Work load	A teacher $\geq$ 30 students	A teacher $\geq$ 30 students
Number of Years B/f Promotion	3 years	3 years
Opportunities for Further Studies	Granting study leave with pay	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

<b>ATTRIBUTES</b>	<b>JOB 3</b>	<b>JOB 6</b>
Provision of Government Housing	House not provided	House not provided
Net Salary	GH¢ 680	GH¢ 816
Work load	A teacher $\geq$ 30 students	A teacher $\leq$ 20 students
Number of Years B/f Promotion	3 years	5 years
Opportunities for Further Studies	Granting study leave with pay	Granting study leave with pay
Which of these two jobs do you prefer?	[ ]	[ ]

<b>ATTRIBUTES</b>	<b>JOB 3</b>	<b>JOB 7</b>
Provision of Government Housing	House not provided	House provided
Net Salary	GH¢ 680	GH¢ 680
Work load	A teacher $\geq$ 30 students	A teacher $\leq$ 20 students
Number of Years B/f Promotion	3 years	5 years
Opportunities for Further Studies	Granting study leave with pay	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 5	JOB 6
Provision of Government Housing	House provided	House not provided
Net Salary	GH¢ 816	GH¢ 816
Work load	A teacher $\geq$ 30 students	A teacher $\leq$ 20 students
Number of Years B/f Promotion	3 years	5 years
Opportunities for Further Studies	No study leave	Granting study leave with pay
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 5	JOB 7
Provision of Government Housing	House provided	House provided
Net Salary	GH¢ 816	GH¢ 680
Work load	A teacher $\geq$ 30 students	A teacher $\leq$ 20 students
Number of Years B/f Promotion	3 years	5 years
Opportunities for Further Studies	No study leave	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

ATTRIBUTES	JOB 5	JOB 8
Provision of Government Housing	House provided	House not provided
Net Salary	GH¢ 816	GH¢ 884
Work load	A teacher $\geq$ 30 students	A teacher $\leq$ 20 students
Number of Years B/f Promotion	3 years	3 years
Opportunities for Further Studies	No study leave	No study leave
Which of these two jobs do you prefer?	[ ]	[ ]

## APPENDIX II

## SAMPLE DATA TEMPLATE

id	alt	cno	choiceset	choice_se	hseprov	nohseprov	salary680	salary816	salary884	teact
1	1	1	1	1	1	0	1	0	0	
1	2	1	1	1	0	0	1	0	0	
1	1	2	2	2	0	1	0	0	1	
1	2	2	2	2	0	0	1	0	0	
1	1	3	3	3	0	1	1	0	0	
1	2	3	3	3	0	1	0	0	1	
1	1	4	4	4	1	0	0	0	1	
1	2	4	4	4	1	0	0	1	0	
1	1	5	5	5	1	0	1	0	0	
1	2	5	5	5	0	1	0	0	1	
1	1	6	6	6	0	1	0	1	0	
1	2	6	6	6	0	0	1	0	0	
2	1	5	33	5	1	0	1	0	0	
2	2	5	33	5	0	1	0	0	1	
2	1	6	34	6	0	1	0	1	0	
2	2	6	34	6	0	0	1	0	0	
2	1	7	35	7	0	1	0	1	0	
2	2	7	35	7	1	0	0	0	1	
2	1	8	36	8	1	0	0	0	1	
2	2	8	36	8	1	0	1	0	0	
2	1	9	37	9	0	1	0	1	0	
2	2	9	37	9	1	0	1	0	0	
2	1	10	38	10	1	0	1	0	0	
2	2	10	38	10	1	0	1	0	0	
2	1	11	39	11	1	0	0	0	1	
2	2	11	39	11	0	1	1	0	0	
2	1	12	40	12	0	1	0	1	0	
2	2	12	40	12	1	0	1	0	0	
2	1	13	41	13	0	1	0	1	0	
2	2	13	41	13	0	1	0	0	1	
2	1	14	42	14	1	0	1	0	0	
2	2	14	42	14	0	1	0	0	1	
3	1	15	43	1	1	0	1	0	0	
3	2	15	43	1	0	0	1	0	0	
3	1	1	1	2	0	1	0	0	1	
3	2	1	1	2	0	0	1	0	0	
3	1	2	2	3	0	1	1	0	0	
3	2	2	2	3	0	1	0	0	1	
3	1	3	3	4	1	0	0	0	1	
3	2	3	3	4	1	0	0	1	0	
3	1	4	4	5	1	0	1	0	0	
3	2	4	4	5	0	1	0	0	1	

