

Exploring The Employment Preferences Of Public Sector Nurses: Results From A Discrete Choice Experiment In Malawi

Lindsay Mangham, University of Oxford

Kara Hanson, London School of Hygiene and Tropical Medicine

SUMMARY

With a global shortage of health workers many developing country governments face problems retaining health professionals. The objective of this study was to determine the range and relative importance of factors that influence the motivation of public sector registered nurses in Malawi. Qualitative methods were used to identify the range of factors and a discrete choice experiment was used to elicit weights reflecting the relative importance of these attributes. The significance of the selected job attributes was analyzed using a random-effects probit estimator. The marginal rate of substitution between the different attributes was estimated to indicate the relative importance of the job attributes. All of the attributes except the difference between basic and superior government housing had a statistically significant effect on the utility associated with the employment alternatives. Pay was found to be the most important attribute, followed by further education and basic housing. Few socioeconomic factors were found to influence employment preferences. This is one of the few studies to make a quantitative assessment of the relative importance of job attributes for health workers in a developing country context and provides important new insights into the employment preferences of registered nurses in the Malawian public service.

INTRODUCTION

There is a global shortage of health workers, with some of the most serious shortfalls occurring in sub-Saharan Africa. The situation in many African countries reflects the devastating impact of HIV/AIDS on health workers, accelerating labour migration and the legacy of underinvestment in human resources [1]. The literature on human resources for health identifies a range of generic reasons for the shortage of health workers, including poor remuneration and difficult working conditions. However, there has only been a limited quantitative exploration of

the importance of job attributes for health worker motivation in a developing country context and we know of only two previous studies that have applied a discrete choice experiment: a study to develop incentives for doctors to work in rural Indonesia and a review of nursing staff dynamics in South African maternal services [2, 3].

This objective of the research was to determine the range and relative importance of factors that influence the motivation of public sector registered nurses in Malawi, and the extent to which remuneration is a motivating factor. The research involved a two-stage process. First, qualitative methods were used to identify the range of factors that influence the employment preferences of public sector registered nurses. Second, a discrete choice experiment (DCE) was used to elicit weights reflecting the relative importance of these job attributes.

CONTEXT

Even by African standards the human resource shortage in Malawi's health sector is severe, as Malawi was estimated to have less than 4000 doctors, nurses and midwives serving a population of approximately 12 million in 2003 [1]. The supply of health workers depends on the number of new recruits and the retention of existing personnel. The number of newly qualified health workers entering the public service is currently insufficient to meet the human resource requirements. This reflects the capacity of the training institutions, but also the limited appeal of employment in the public (including NGO) health sector. The high rates of attrition are a widely reported problem, and although death is reported to be the main cause there appear to be increasing number opting for voluntary resignation and emigrating in search of higher salaries and better working conditions [4, 5]. The retention of registered nurses has been highlighted as a particular problem with vacancy rates of almost 80% in 2003 [6, 7]. With such a low density of professional health workers the coverage and quality of health services are inevitably constrained, with negative consequences for health outcomes [8].

The Malawi government has worked with international donors to design a comprehensive programme to address the human resource crisis in the health sector. The implementation of the six-year programme, known as the Emergency Human Resources Programme, began in April 2005 and contained three key components: a 52% taxable salary increase for health workers in

eleven professional cadres, measures to enhance the capacity of training institutions, and the recruitment of additional expatriate volunteer doctors and nurse tutors to fill key posts in the short-term [9]. Of the three elements, the salary top-up scheme is designed to improve the working conditions for existing staff, and aims to increase retention of health workers in the public service.¹

The Malawi government's primary strategy for retaining health workers rests on the assumption that improving monetary benefits will positively affect health worker motivation and their retention in the public service. The decision to prioritize monetary benefits over other motivating factors suggests that the Government of Malawi believes that the low level of remuneration is the main reason for the shortage of human resources in Malawi's health sector.²

The data available on the employment of registered nurses in Malawi are insufficient to adequately reveal their employment preferences. Consolidated government data simply indicate the number and distribution of public sector nurses by district and, other than the number of registered nurses approaching the Nurses and Midwives Council to have their qualifications validated, very little is known about those leaving Malawi to seek employment overseas. Moreover, as the Ministry of Health appoints nurses to those health facilities most in need, and personal circumstances are only taken into account when an individual submits a transfer request, the current distribution of nurses is not indicative of their employment preferences.

THEORETICAL FRAMEWORK

Techniques for eliciting preferences have primarily emerged from a desire to understand consumer preferences for different goods and services. Stated preference techniques have been used where revealed preference data on choices that individuals have actually made are not available. Stated preference techniques are founded in random utility theory. Although utility

¹ In addition, some factors that affect the motivation and retention of health workers, such as the availability of drugs and other supplies, are undergoing reform as part of the Malawi government's sector-wide programme to improve the health of the population and the provision of health care.

² Although the MoH has chosen to focus its initial efforts on increasing remuneration, it accepts that non-monetary factors can also be important influences on the retention and motivation of health workers. Accordingly, there is some work underway to review human resource management policies, including consideration of the likely impact of improved provision of government subsidised housing on the deployment and retention of health workers in rural and remote areas.

cannot be directly observed it is possible to observe the choices of individuals or to ask them to state their preference between alternative hypothetical choices, and it is assumed that individuals choose the alternative that yields the highest utility [10]. Discrete choice is a form of conjoint analysis, which assumes that utilities for goods and services can be decomposed into utilities for composing characteristics and individual valuations depend on the levels of those characteristics [11].

Discrete choice experiments involve asking respondents to indicate their preference between hypothetical alternatives, where each alternative is described by a bundle of attributes. In making choices individuals face a range of alternatives that each yield an indirect utility, Y^* . As utility cannot be directly observed, Y^* is a latent variable, and we only observe whether or not an alternative is chosen. The utility yielded by an option is assumed to be a function of choice-specific attributes:

$$Y_{iq} = X_i \beta_i + \varepsilon_{iq}$$

where Y_{iq} is the utility of individual q for the i th alternative, X_i is a vector of choice-specific attributes for the i th alternative accompanied by a set of weights, β_i , that establish the relative contribution of each attribute to the utility associated with the i th alternative, and ε_{iq} is the residual capturing the unobserved variation in the characteristics of different options, any errors in measurement and human idiosyncrasies. In its simplest form the observed sources of utility can be defined as a linear expression in which each attribute is weighted by a unique parameter to account for that attribute's marginal utility. As respondents are asked to consider multiple choice pairs it cannot be assumed that the error terms are independent and panel data estimation techniques are required.

It is usual to specify the regression model in terms of differences in attribute levels between the two choices being analyzed:

$$\Delta Y = \beta_0 + \beta_1 (X_{1i} - X_{1j}) + \beta_2 (X_{2i} - X_{2j}) + \dots + \beta_K (X_{Ki} - X_{Kj}) + (\varepsilon_i - \varepsilon_j)$$

The estimated parameters represent the marginal utility associated with a change in the attribute level in moving from one alternative to the other. The marginal rate of substitution between two attributes is given by the ratio of their respective parameters. As the dependent variable is binary, a probit or logit specification is used.

METHODS

A discrete choice experiment was designed to elicit employment preferences from registered nurses working in the Malawian public service. The research was discussed with the Malawian Ministry of Health and permission was obtained from the National Health Sciences Research Committee to undertake the research and survey public sector employees.

Establishing attributes and levels

The attributes and attribute levels were established using information collected from in-depth interviews with public sector registered nurses [12]. The discussion topics included their current working conditions, preferences and priority areas for reform. Interviews were conducted with registered nurses located in three districts, Lilongwe, Ntchisi and Nkhotakota over four days in February 2006. The districts were purposively sampled to include both urban and rural settings, though nurses were chosen at random within each district. The sample included registered nurses working at three grades (I, J and K) in a central hospital, maternity hospital, two district hospitals and three urban health centres. Interviews were conducted in English by research assistants employed by the Centre for Social Research at the University of Malawi. With the individuals' consent the discussions were tape recorded and transcribed.³

Twenty interviews were conducted, which ensured a variety of perspectives but also sufficient repetition and depth to be able to establish attributes and attribute levels. Manual content analysis was used to identify the issues raised by respondents and determine the frequency with which an issue was raised. Of the attributes always or frequently mentioned by participants six were included in the questionnaire (Table 1). In order to avoid inter-attribute correlation three of the issues frequently mentioned (in-service training, promotion prospects and transport) were excluded. For example, there was conceptual overlap between promotion prospects and opportunities to upgrade qualifications.

³ Although English is unlikely to be their first language, it is widely spoken amongst educated Malawians and is the language used for the formal training of nurses. It was therefore not considered a limitation of the research.

Using the qualitative data, base levels were established for each attribute that reflected the prevailing working conditions for public sector registered nurses. Additional levels were then determined, and were intended to represent a reasonable improvement from the base level. For example, K30,000 (approximately US \$240) represented an average monthly salary for registered nurses working at grades I, J or K. Two higher salary levels were also included, K40,000 (\$320) and K50,000 (\$400), which corresponded to a 33% and 67% salary increase, respectively.

Generating the questionnaire

Once the six attributes and their corresponding levels were established the alternative hypothetical job descriptions were generated. There were a total of 216 possible alternatives ($3^3 \times 2^3$), though a fractional factorial design was used to reduce this to a practical number. SPSS Conjoint was used to generate a main effects design, which selected 16 job descriptions to include in the questionnaire. One of the job descriptions was chosen as a constant comparator, which provided 15 choice pairs for each respondent to consider. Four sets of the choice pairs were produced, in which the sequence of job descriptions was varied to minimize any bias related to early cognitive difficulties or boredom when completing the questionnaire, and respondents were randomly allocated to one of the four versions of the questionnaire [10]. For each choice pair the respondent was asked two questions. First, they were asked which of the two jobs shown they considered to be the best job. The respondent was then asked to take into account their personal circumstances and state which job they would choose, with the option of answering, “Job 1”, “Job 2” or “Neither Job”. An example choice pair is shown Figure 1. The final questionnaire also contained questions about socio-demographic and employment.

Pre-testing, sampling procedures and administering of survey

The questionnaire was pre-tested on 21 respondents located in three districts: Zomba, Balaka and Chiradzulu over two days in April 2006. In each location all available registered nurses at grade I, J or K were interviewed. Minor modifications were made to the questionnaire. The most substantive change was to redefine the attribute levels for place of work in order to overcome the apparent inter-attribute correlation between the type of health facility and other attributes, including typical workload and resource availability.

The total number of registered nurses working for the Malawi government was 330 in January 2005 and they were distributed in approximately equal shares across central hospitals in urban areas (the four cities in Malawi) and district hospitals in rural areas (the main town in the remaining districts) [13]. There were also some registered nurses working in the larger health centres in urban areas close to the four cities. A stratified sampling approach was applied in which the target was to interview 150 registered nurses, with 75 from urban areas and 75 from rural areas, in order to allow for non-availability or refusals. Originally the survey was to be administered to all urban areas though it was later necessary to exclude Zomba from the full survey since almost all potential respondents had participated in the pre-testing. Random sampling was used to select the rural districts, with Chitipa excluded from the sampling for practical reasons due to its extreme remoteness. Districts were selected as clusters, with probability proportional to the number of registered nurses in each district, and in each district all nurses at grade I, J, and K were included in the sample.

Five research assistants from the Centre for Social Research administered the questionnaire in May 2006. All health facilities were given prior notification of the field work visit and authorization was obtained from senior management. Research assistants administered the questionnaires, providing each respondent with an overview of the research and supplementary written documentation. Written consent was obtained. The overview explained the purpose of the research, introduced the discrete choice experiment and provided two example choice pairs for the respondent to consider before commencing the questionnaire.

The data were independently double-entered into a Microsoft Access database, by clerks from the Centre for Social Research and checked for consistency using EPI Info. All data entry errors found during the consistency check were manually corrected.

Data analysis

The survey results corresponding to each question were analyzed using a random effects probit estimator in STATA version 9.2. The dependent variable was binary and indicated, for a given choice pair, whether the individual chose “Job 1”, “Job 2” or “Neither Job”. The probit model

estimated the probability of choosing Job 1, which was assumed to be equivalent to the probability that the utility associated with Job 1 was greater than the utility associated with Job 2. A general-to-specific approach was taken for estimating the model that best fits the data, and the baseline model assumed that there were non-linear effects for those independent variables for which there were three attribute levels: pay, workload and housing. For example, the effect on utility of the difference between K30,000 and K40,000 was allowed to differ from that of the difference between K40,000 and K50,000. The baseline empirical model was:

$$\begin{aligned} \text{Prob} [Y = 1 | x] &= \text{Prob} [U_{\text{Job 1}} > U_{\text{Job 2}}] \\ &= (\beta_{01} - \beta_{02}) + \beta_1 \text{dplace} + \beta_2 \text{dpay}_{(40-50)} + \beta_3 \text{dpay}_{(40-30)} + \beta_4 \text{dres} + \\ &\quad \beta_5 \text{dwork}_{(\text{heavy-medium})} + \beta_6 \text{dwork}_{(\text{heavy-light})} + \beta_7 \text{dhouse}_{(\text{basic-superior})} + \\ &\quad \beta_8 \text{dhouse}_{(\text{basic-none})} + \beta_9 \text{dupg} + \varepsilon + \mu \end{aligned}$$

where: Y was the dependent variable and equalled one if Job 1 was chosen and zero if Job 2 was chosen; $(\beta_{01} - \beta_{02})$ was the alternative-specific constant; dplace, dpay₍₄₀₋₅₀₎, dpay₍₄₀₋₃₀₎, dres, dwork_(heavy-medium), dwork_(heavy-light), dhouse_(basic-superior), dhouse_(basic-none) and dupg were dummy variables representing the difference in the attribute levels between Job 1 and Job 2; and corr(ε , μ)= ρ , which took account of the correlation among individual choices.

The dummy variables were generated using the coding in Table 1. Table 2 presents the results on what respondents considered the best job and Table 3 present the results of what job respondents would choose having taken into consideration their circumstances. Models 1 and 4 are the baseline model for the two scenarios.

The assumption of non-linear effects of pay, workload and housing was examined using the Wald test. Tests of joint significance of multiple linear restrictions were undertaken using a likelihood ratio test. The revised models (Models 2 and 5) show the results following the empirical tests for non-linear effects on utility of differences in pay, workload and housing.

Socio-demographic and employment characteristics were interacted with the attributes to determine the degree to which individual characteristics influence employment preferences. For example, interactions were used to assess whether an individual's marital status affected the utility associated with the place of work or the provision of government housing. Other

interactions examined were the impact of urban / rural residence on place of work; age on place of work, pay, workload and upgrading; grade on pay and upgrading; and current provision of housing on place of work and provision of housing. A likelihood ratio test was used to exclude insignificant interaction terms from the expanded model and to test the final expanded model (Models 3 and 6) against the restricted model (Models 2 and 5).

The internal consistency of an individual's responses was investigated by including one choice pair in which one job was superior or equal to the other on all attributes. This was based on the assumption that a higher level of net monthly pay, better resource availability, a lighter workload, a shorter time before being eligible to upgrade qualifications, and the provision of government housing were all superior options and would yield higher utility. Individuals who failed to choose the superior job were thought to have misunderstood the questionnaire or were unable to provide consistent answers for other reasons and all answers from those individuals were excluded from the analysis.

The theoretical validity of valuations was assessed by reviewing whether the estimated employment attribute parameters were of the anticipated sign. The sign of the parameters was examined with reference to attribute levels taken by the constant comparator, with a positive sign indicating that the attribute level in Job 1 was superior and a negative sign indicating it was inferior. Higher levels of pay, better resource availability, a lighter workload and shorter time before having the opportunity to upgrade qualifications were all expected to increase utility and should have a positive sign. As before the provision of a government house was assumed to be better than none, with superior housing yielding more utility than basic housing. No assumption was made about how differences in place would affect utility.

The marginal rate of substitution between the different independent variables was estimated by calculating the ratio of their coefficients using the valuations in the revised models (Models 2 and 5). The coefficients relating to individual attribute levels were divided by the coefficient representing a pay increase (from K30,000 to K40,000), indicating the extent to which an individual was willing to forego income to obtain improvements in other employment attributes. These results indicate the relative importance of different attributes and are presented in Table 4.

RESULTS

A total of 107 registered nurses working for the Malawi government completed the questionnaire, of which 50 (47%) were urban and 57 (53%) were rural. In general registered nurses were very keen to participate in the research and the refusal rate was very low at less than 3%, with only 3 nurses declining to participate. Six of the respondents, or 5.6%, failed to choose the superior job, which reduced the effective sample size to 101, of which 45 (45%) were urban and 56 (55%) were rural. .

Characteristics of respondents

90% of the respondents were female. Most participants were married (55%), with 27% single, 6% engaged and 11% widowed or divorced. 63% of respondents had children. In terms of their employment characteristics, 49% were grade I, which usually indicates that they have qualified with a degree in nursing, 13% and 38% were grades J and K respectively and were likely to hold a nursing diploma. When asked to describe their working environment, 90% said that there were usually inadequate resources and 82% described their workload as heavy, with 16% reporting a medium and just 2% a light workload. Around a quarter of respondents (26%) were currently provided a government house.

Magnitude and statistical significance of attributes

The results for the baseline empirical models (1 and 4) are presented in Tables 2 and 3. For both scenarios, all of the coefficients, except the difference between basic and superior housing, were found to be statistically significant with p-values of less than 0.05. The coefficients for the variables can be interpreted as the effect of the difference between Job 1 and Job 2 on the likelihood of choosing Job 1 over Job 2. For example, in Model 1 for what is considered the best job, an increase in material resources from “usually inadequate” to “usually adequate” was associated with a 50% decrease in the probability of choosing Job 1 over Job 2 (with the level of resources held constant as “usually inadequate” in Job 1).

The estimated employment attribute parameters were all of the anticipated sign. For example, the positive sign for the coefficient $dpay_{4030}$ showed that the level of the attribute was regarded

to be superior in Job 1. As the coefficient represents the difference in net monthly pay, the positive sign indicated that the level of pay in Job 1 (K40,000) was superior to that in Job 2 (K30,000). No assumption was made about the superiority of place, though the negative sign showed that a job in the city was considered inferior to one in a district town. Although this was found both in terms of what constitutes the best job and which job they would choose, the preference for a district town was less pronounced when individual circumstances were taken into consideration.

Testing for non-linear effects of pay, workload and housing attributes

Non-linear effects were investigated for pay, workload and housing attributes individually. A null hypothesis that the marginal effect on utility was linear was tested against an alternative hypothesis that the effect on utility was non-linear. The results for both scenarios found differences in pay had non-linear marginal effects, while workload had linear marginal effects. When tested on its own the effect of housing provision was linear, though only marginally insignificant ($p=0.07$ and $p=0.06$ for best job and the job they would choose, respectively). However, when the expanded model included non-linear terms for both pay and housing compared with a restricted model with non-linear effects for pay only, the null hypothesis was rejected ($p=0.02$ and $p=0.01$ for best job and the job they would choose respectively). On these grounds, the revised models 2 and 5 include non-linear effects for both housing and pay, but not for workload.

Comparing marginal utilities across socioeconomic groups

Of the interactions between socioeconomic characteristics and attributes considered three were found to significantly improve the fit of the model to the data. The final models for individual valuations of best job, and the job they chose are shown in Models 3 and 6.

In both scenarios an individual's residence, in either an urban or rural district, affected the utility associated with the place attribute. The valuations showed that both urban and rural residents thought the best jobs were those located in a district town, though the effect on utility was more pronounced for those living in rural areas. The same preference for jobs in district towns

remained when individuals were asked to indicate which job they would choose given their circumstances.

In response to the question of which is the best job, the interaction between whether an individual currently lives in a government house and the attribute for the provision of government housing was found to be significant for the difference between the provision of none and basic government housing. Although all individuals valued the provision of basic housing over none, the impact on utility associated with the housing attribute was significantly greater for those that were not currently provided government housing. Finally, in response to the question of which job they would choose, the interaction between age and the time before being eligible to upgrade qualifications was found to be significant, with the marginal utility associated with the opportunity to upgrade diminished by increases in age.

Marginal rate of substitution of employment attributes

The relative valuations of the independent variables were calculated. The results showed that the difference in net monthly pay between K40,000 and K50,000 had the greatest effect on the utility associated with a job, both in terms of what constitutes the best job and which job respondents' would choose. The next most important attribute was the difference in the time period before having the opportunity to upgrade qualifications, followed by the difference between none and the provision of basic government housing. Although the results for the two scenarios were very similar, there were some differences in the middle of the distribution. For example, place of work was relatively unimportant in what constitutes the best job (ranked 7 of 8), though comparatively more important for what job the respondent would choose given their circumstances (ranked 4 of 8). In contrast, resource availability was ranked higher in terms of what constitutes the best job than in what job they would choose. The difference between basic and superior government housing was not only statistically insignificant, but was also ranked lowest in both scenarios.

DISCUSSION

The research provides a valuable insight into the employment preferences of registered nurses. The preliminary qualitative research provided a good description of the working conditions and

environment of registered nurses employed by the Malawi government and some indication of their employment preferences. When asked what changes they felt would improve the retention of registered nurses in the public service, the overwhelming response was that salaries should be increased, though other factors such as improved resource availability and access to further education were also highlighted.

The discrete choice experiment provided a useful mechanism for assessing the significance of alternative employment attributes and indicating their relative importance. All of the six attributes used in the discrete choice experiment were found to have a statistically significant effect on the utility associated with the employment alternatives. In other words, in stating preferences and making choices over different hypothetical jobs, registered nurses were not only taking into account net monthly pay, but also other employment attributes: the availability of material resources, the typical workload, the place of work, the provision of government housing and the time before having the opportunity to upgrade their qualifications. This implies, therefore, that the Malawi government has a range of interventions available that would improve how registered nurses value their employment in the public service.

Although registered nurses were found to value the provision of government housing, the difference in quality between basic and superior housing was not found to have a significant impact on utility. This suggests that improvements in the quality of housing would have a limited effect on how registered nurses value their employment, though further work would be required to ascertain what they understand by the distinction between “basic” and “superior” housing and to gauge the likely impact of improved housing on the motivation and retention of other cadres of health workers.

Although no assumption was made in the research about the merits of a job located in a city compared to a district town, it is generally perceived that the best and the most popular jobs are those located in cities, particularly in Lilongwe and Blantyre. It was surprising, therefore, that the results of the discrete choice experiment found that respondents preferred jobs located in a district town, both in terms of what they considered to be the best job and when asked to take into account their circumstances and state which job they would choose.

From the present analysis it was not possible to determine the factors underlying this preference, though it was clear from the qualitative results that preferences over location generated some of the most varied responses. For example, individuals differed in the extent to which they were willing to accept the higher costs of living in a city in order to access the range of amenities, choice of schools and other benefits. Other geographical preferences included a cooler climate, good transport links to cities and close proximity to the family home. Some nurses preferred district hospitals, as the work was more varied, often with management responsibilities, and there were more opportunities to attend in-service training. Others preferred central hospitals and valued, for example, the opportunity to have a specialist role. The qualitative research showed that registered nurses have preferences about their employment options, though nurses said in practice they have a very little choice about where they work as nurses are appointed to a health facility by the Ministry of Health.

In terms of their employment preferences few differences in nurses' preferences were observed by socioeconomic characteristics. Only current residence had a significant impact on what registered nurses' considered to be a good job and on which job they would choose. Following the qualitative interviews, in which several nurses explained that they would be unwilling or unable to move elsewhere often because of family commitments, it was assumed that urban residents would have a preference for jobs located in cities. It was, therefore, surprising to find that both urban and rural residents chose jobs located in district towns. Several explanations are possible. For example, it is possible that some employment attributes, such as higher levels of pay, may make it feasible for a family to move to a district town. However, it is also possible that respondents failed to fully take into account their circumstances, either because they found it hard to relate the generic terms for place to their specific circumstances or because they have limited experience in making these types of choices. Methodologically, it would also be interesting to examine whether the choice of constant comparator affects the results, as the comparator in this case was located in a city and also exhibited some of the least desirable attribute levels (including a heavy workload, inadequate resources and the longer period before being eligible to upgrade qualifications).

The finding that net monthly pay had a statistically significant impact on the utility associated with the alternative hypothetical job descriptions was important and suggests that the Malawi government's strategy of increasing remuneration is likely to have a positive impact on how registered nurses value their employment. Moreover, the relative ranking of pay compared to other attributes was high in responses on both which is the best job and which job they would choose. The opportunity for further education was also highly valued and ranked second in relative importance. The emphasis placed on the opportunity to upgrade qualifications was also striking in the qualitative research, and perceived to be an advantage of working for the Malawi government.

Other studies that have applied a discrete choice experiment to elicit employment preferences of health workers have found that both monetary and non-monetary job attributes have a statistically significant impact on how individuals value their work [2, 3, 14-16]. The work by Penn-Kekana et al appears to be the only other discrete choice experiment to consider the employment preferences of African nurses. They also found that remuneration had a relatively large impact on job valuation, though good management and a fully equipped health facility were also considered relatively important attributes. The urban-rural dimension was a key element in analysing the preferences of doctors in Indonesia, with the results showing a strong preference for urban locations [2]. Access to specialist training was also found to be an important job attribute.

The decision to include two choice questions was rooted in an interest not only to ascertain preferences over different employment attributes, but also to understand the extent to which individual circumstances constrain those preferences. Overall there was considerable similarity in the results, with the both scenarios obtaining the same results for the statistical significance of the variables and non-linear effects. It was also interesting to find that the interaction with socioeconomic and employment characteristics had a limited impact in both cases, as it would have been reasonable to assume that when asked to take into account their circumstances individual characteristics would have had more of an impact on the utility associated with different jobs. Lack of power due to small sample size may be responsible for this. Although the magnitude of the attribute parameters cannot be directly compared across the two questions,

it was possible to review the ranked order of importance. Location was relatively more important when an individual had taken into account their circumstances, though its middle order ranking indicates that it was not considered a prerequisite for which job they would choose nor having dominant effect on decision making.

Some research limitations should be noted. For practical and financial reasons it was necessary to limit the research to a single cadre. Registered nurses were chosen as this cadre faces acute shortages and particular difficulties retaining staff. The small sample size, was a limiting factor, though largely reflects the low numbers of registered nurses working for the Malawi government. Nevertheless, as only one district was excluded from the sampling, it was a nationally representative sample and results can be generalised to the population of RNs in Malawi. A further limitation is that the research focuses on the likely benefits of alternative strategies, without reference to their implementation costs. In policy formulation the research findings should be supplemented by information on the expected cost of alternative strategies.

In summary, this is one of the few studies to make a quantitative assessment of the relative importance of job attributes for health workers in a developing country context. Together, the qualitative research undertaken during the preparation and design phase, and the discrete choice experiment, provide important new insights into the working conditions and job preferences of registered nurses in the Malawian public service.

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Table 1: Attributes and Levels included in the discrete choice experiment

Attribute	Variable Name	Levels	Regression Coding
Place of work	place	City District Town	0 1
Net monthly pay	pay	K30,000 (approx. \$240) K40,000 (approx. \$320) K50,000 (approx. \$400)	30 40 50
Availability of material resources	res	Usually inadequate supply Usually adequate supply	0 1
Typical daily workload	work	Light: more than enough time to complete duties and works no extra hours each day Medium: enough time to complete duties and works one extra hour each day Heavy: barely enough time to complete duties and works two extra hours each day	0 1 2
Provision of government housing	house	No government housing provided Basic government housing provided Superior government housing provided	0 1 2
Opportunity to upgrade qualifications	upg	After 3 years After 5 years	3 5

Table 4: Marginal substitution of employment attributes:

Independent Variables	Registered Nurses' responses for what constitutes the best job			Registered Nurses' responses for what job respondents would choose		
	Magnitude of coefficient in revised model (Model 2)	Ratio relative to the diff. btwn. K30,000 & K40,000	Order of importance (1=most & 8=least)	Magnitude of coefficient in revised model (Model 5)	Ratio relative to the diff. btwn. K30,000 & K40,000	Order of importance (1=most & 8=least)
Place: difference between city and district town	0.43***	0.65	7	0.56***	1.10	4
Net Monthly Pay: diff btwn K40,000 and K50,000	1.12***	1.66	1	1.22***	2.38	1
Net Monthly Pay: diff btwn K30,000 and K40,000	0.67***	1.00	4	0.51***	1.00	5
Availability of Material Resources: diff btwn inadequate and adequate resources	0.48***	0.72	5	0.32**	0.61	7
Typical Workload: diff btwn one unit change in the level of workload (light to medium or medium to heavy)	0.46***	0.68	6	0.38***	0.74	6
Provision of Government Housing: diff btwn basic and superior	0.25*	0.38	8	0.08	0.16	8
Provision of Government Housing: diff btwn none and basic	0.86***	1.28	3	0.85***	1.65	3
Opportunity to upgrade: diff btwn waiting time of 3 and 5 years	0.97***	1.45	2	1.05***	2.04	2

* p<0.10; ** p<0.05; ***p<0.01

Table 2: Empirical Model for RNs' responses on what constitutes "The Best Job"

Variable name	Variable definition	Base (Model 1)			Revised (Model 2)			Final (Model 3)		
		Coeff	Std Error	P value	Coeff	Std Error	P value	Coeff	Std Error	P value
dplace	city-town	-0.45	0.11	<0.001	-0.43	0.11	<0.001	-0.31	0.13	0.014
dplaceres	(city-town)*residence	.	.	.	.	.	.	-0.22	0.13	0.087
dpay4050	40,000-50,000	-1.10	0.15	<0.001	-1.12	0.14	<0.001	-1.11	0.14	<0.001
dpay4030	40,000-30,000	0.67	0.11	<0.001	0.67	0.11	<0.001	0.68	0.11	<0.001
dres	inadequate-adequate	-0.50	0.13	<0.001	-0.48	0.11	<0.001	-0.48	0.12	<0.001
dworkhm	heavy-medium	-0.49	0.12	<0.001	.	.	.			
dworkhl	heavy-light	-0.90	0.15	<0.001	.	.	.			
dwork	light-medium or medium-heavy	.	.	.	-0.46	0.07	<0.001	-0.46	0.07	<0.001
dhousebs	basic-superior	-0.28	0.16	0.086	-0.25	0.15	0.085	-0.20	0.16	0.198
dhousebshouse	(basic-superior)*house	.	.	.	.	.	.	-0.21	0.22	0.337
dhousebn	basic-none	0.83	0.17	<0.001	0.86	0.12	<0.001	0.97	0.13	<0.001
dhousebnhouse	(basic-none)*house	.	.	.	.	.	.	-0.41	0.15	0.008
dupg	5yrs-3yrs	-0.96	0.10	<0.001	-0.97	0.10	<0.001	-0.97	0.10	<0.001
constant		0.40	0.25	0.116	0.36	0.22	0.102	0.36	0.22	0.101
N		1510			1510			1510		
Log likelihood		-724.35			-724.40			-718.86		
Prob(Chi2)		<0.001			<0.001			<0.001		
Rho		0.201	0.04		0.201	0.04		0.186	0.04	

Table 3: Empirical Model for RNs' responses on what job respondents chose when asked to take into account their circumstances

Variable name	Variable definition	Base (Model 4)			Revised (Model 5)			Final (Model 6)		
		Coeff	Std Error	P value	Coeff	Std Error	P value	Coeff	Std Error	P value
dplace	city-town	-0.60	0.14	<0.001	-0.56	0.13	<0.001	-0.30	0.16	0.060
dplaceres	(city-town)*residence	.	.	.	.	.	.	-0.51	0.17	0.003
dpay4050	40,000-50,000	-1.20	0.17	<0.001	-1.22	0.17	<0.001	-1.22	0.17	<0.001
dpay4030	40,000-30,000	0.49	0.13	<0.001	0.51	0.13	<0.001	0.52	0.13	<0.001
dres	inadequate-adequate	-0.36	0.14	0.012	-0.32	0.14	0.021	-0.33	0.14	0.019
dworkhm	heavy-medium	-0.49	0.15	0.001	.	.	.	.	.	.
dworkhl	heavy-light	-0.71	0.19	<0.001	.	.	.	.	.	.
dwork	light-medium or medium-heavy	.	.	.	-0.38	0.09	<0.001	-0.40	0.09	<0.001
dhousebs	basic-superior	-0.14	0.18	0.441	-0.08	0.17	0.628	-0.09	0.17	0.621
dhousebn	basic-none	0.76	0.18	<0.001	0.85	0.16	<0.001	0.86	0.16	<0.001
dupg	5yrs-3yrs	-1.03	0.13	<0.001	-1.05	0.13	<0.001	-1.90	0.32	<0.001
dupage	(5yrs-3yrs)*age	.	.	.	.	.	.	0.02	0.01	0.004
constant		0.42	0.30	0.173	0.29	0.27	0.291	0.33	0.27	0.227
N		1020			1020			1020		
Log likelihood		-457.22			-457.63			-449.11		
Prob(Chi2)		<0.001			<0.001			<0.001		
Rho		0.354	0.06		0.352	0.06		0.318	0.06	

Figure 1: An example of a choice pair

Choice Set: A

Job 1	
Location:	City
Net Monthly Pay:	K40,000
Availability of Material Resources (equipment, drugs and other supplies):	Usually Inadequate
Typical Workload:	Heavy: Barely enough time to complete duties, works two hours extra each day (without extra pay)
Provision of Government Housing:	Basic Housing Provided
Opportunity to Upgrade Qualifications:	After 5 years

Job 2	
Location:	District Town
Net Monthly Pay:	K50,000
Availability of Material Resources (equipment, drugs and other supplies):	Usually Adequate
Typical Workload:	Medium: Enough time to complete duties, works one hour extra each day (without extra pay)
Provision of Government Housing:	No Housing Provided
Opportunity to Upgrade Qualifications:	After 3 years

Question 1:

In your opinion, of the two jobs described which one do you think is the best job?

- Job 1** **Job 2**

Question 2:

Taking into account your circumstances, would you choose to take

- Job 1** **Job 2** **Neither Job**