How to attract health students to remote areas in Indonesia: a discrete choice experiment

Ferry Efendi[1,3], Ching-Min Chen[2]*, Nursalam Nursalam[3],
Nurul Wachyu Fitriyah Andriyani[3], Anna Kurniati[4] and
Susan Alison Nancarrow[5]

[1]*Institute of Allied Health Sciences, National Cheng Kung University, Taiwan*
[2]*Department of Nursing/Institute of Allied Health Sciences, National Cheng Kung University, Taiwan*
[3]*Faculty of Nursing, Airlangga University, Indonesia*
[4]*Center of Planning and Management of Human Resources for Health, Ministry of Health, Indonesia*
[5]*School of Health and Human Sciences, Southern Cross University, Australia*

SUMMARY

Background Remote areas of Indonesia lack sufficient health workers to meet the healthcare needs of the population. There is an urgent need for evidence regarding interventions to attract health workers and specifically health students to serve in remote areas. The aim of this research was to analyze the job preferences of health students to develop effective policies to improve the recruitment and retention of health students in remote areas.
Methods A discrete choice experiment was conducted to investigate health students' preferences regarding job characteristics. This study was conducted in three different regions of Indonesia, with a total included 400 health students. Mixed logit models were used to explore the stated preferences for each attribute.
Results Data were collected from 150 medical, 150 nursing and 100 midwifery students. Medical students gave the highest preference for receiving study assistance, while nursing students viewed salary as the most important. Midwifery students valued advanced quality facilities as an important attribute.
Conclusions This study confirmed the importance of combination interventions in attracting and retaining health workers in remote areas of Indonesia. Money is not the only factor affecting student preferences to take up a rural post; good management and better facilities were viewed as important by all health students. Addressing health student preferences, which are the candidate of future health workforce, would help the nation solve the recruitment and retention issues. Copyright © 2015 John Wiley & Sons, Ltd.

KEY WORDS: Discrete Choice Experiment; health students; retention; remote area

*Correspondence to: C. M. Chen, Department of Nursing/Institute of Allied Health Sciences, National Cheng Kung University, Taiwan. E-mail: chingmin@mail.ncku.edu.tw

INTRODUCTION

Governments in every nation, regardless of their economic status, struggle to achieve equity in health. One of the biggest challenges to achieving equity is the lack of availability of health workers, particularly in rural and remote areas (Dussault and Franceschini, 2006; World Health Organization, 2006, 2010). Remote areas of Indonesia suffer from shortages in the number, variety and training of health workers (Kurniati and Efendi, 2010; Efendi, 2012). Uneven distribution of health workers in rural and remote areas of Indonesia has long been a concern of Indonesia's government. In 2006, the World Health Organization stated that Indonesia suffers from some of the greatest health workforce shortages in South-east Asia (World Health Organization, 2006). Despite the increasing evidence that more health personnel are essential for the Indonesian population, a recent white document stated that the nation experienced a shortage (Kemenkokesra, 2013).

This inequity is illustrated in recent data. In DKI Jakarta, the capital city of Indonesia, there are 155 doctors per 100 000 population, while in Sulawesi Barat province, the ratio is eight doctors per 100 000 population (MoH, 2014a). These inequities are also reflected in nursing and midwifery ratios (Kurniati and Efendi, 2013). Delivering healthcare services to underserved populations is a critical aspect in achieving the Millenium Development Goals and the Health Long-term Development Plan (RPJPK) 2005–2025 (MoH, 2009). Underserved populations are defined as those living in remote and very remote areas as designated by Indonesia's Ministry of Health Decree No. 949 of 2007 as having geographical barriers, limited access to transport and limited social economy opportunity (MoH, 2007). The health workforce crisis in remote areas risks hampering national development, particularly the target to establish Universal Health Coverage (UHC) by 2014 (DJSN and MoH, 2012).

Several strategies have been implemented by the Indonesian government to recruit and retain health staff in remote areas. Compulsory service, contracted staff and special assignment of health workers were implemented to try to overcome the problems (Efendi, 2012). In 2010, the World Health Organization (WHO) recommended the use of educational interventions to increase retention in rural areas. Interventions included recruiting students with a rural background and embedding a rural curriculum so students would become familiar with remote conditions (World Health Organization, 2010). However, retaining staff in remote areas remains a challenge (AusAid, 2014). Part of the solution includes understanding the health workforce needs and expectations (Rockers *et al.*, 2013). There is limited research related to human resources for health specifically in the Indonesian context. Therefore, policy makers and governments need robust research to understand the situation and actions that may make a difference.

The Discrete Choice Experiment (DCE) is a quantitative method used to elicit the value of different preferences that influence job choices (World Health Organization *et al.*, 2012). DCE is an increasingly popular methodology as a general preference tool and have been used widely in healthcare setting particularly in valuing health worker preferences (Blaauw *et al.*, 2010; Huicho *et al.*, 2012; Rockers *et al.*, 2013). Determining the appropriate policy to effectively recruit and retain health

workers can be informed by data from a DCE. One DCE study, conducted by Blaauw *et al.* (2010), compared preferences for remote job posting attributes among nurses in Kenya, South Africa and Thailand. However, more evidence is needed particularly comparing different professions, institutions and regions. This study aims to investigate the preferences of health students enrolled in different health study programs in Indonesia to help develop appropriate policies for recruitment and retention of health professionals to remote areas.

MATERIALS AND METHODS

Methods

The Discrete Choice Experiment applied in this study is a tool in the form of a questionnaire relating to job preferences. The initial step was identification of the attributes through literature review and a Focus Group Discussion (FGD). The FGD was conducted in Airlangga University. From our literature review, several potential attributes have been identified from the World Health Organization (2010) and Uganda study on DCE (Rockers *et al.*, 2012) including salary, remoteness, housing, equipment and drugs at the facility, length of commitment, study assistance, management, training and type of employment. The FGD was attended by nine students from three different major (medical, nursing and midwifery), and one policy maker from the Ministry of Health. FGD participants were explained about the health care services in rural and remote areas and the current strategies on recruitment and retention of the health workers. Then the participants were given a general question on what aspects they would consider to accept rural posting upon graduation. Based on their opinions on those aspects, we asked the participants to discuss each attribute until they reach a consensus for the final version of attributes. The FGD recommended six attributes, which were the quality of facility, housing, length of commitment, study assistance, salary and management as shown in Table 1.

The first attribute is the quality of facility, as the FGD participants thought that quality of health facilities varied across regions and were mostly worst in rural areas. They viewed that the infrastructure (building, clean water and electricity) as well as the health equipment and drugs should be considered as important element in health facility. Informed by the policy maker, this attribute is relevant to the real situation as the physical condition of the public hospitals and community health centers varied ranging from good, slightly damaged and severely damaged.

The second attribute is housing; as many health workers in rural areas are not local people, students thought that it would be difficult if they come to a new place as a newly worker and have to find housing. Finding an appropriate house in rural areas can be very challenging. The policy maker stated that central government also concerns about housing for health workers deployed in rural areas. The MoH provided financial aid to assist local government constructing health worker housing through Special Allocation Fund (Dana Alokasi Khusus) program. However, not all-local governments have capacity to provide enough housing for all health workers.

Table 1. DCE attributes and level of responses from nursing students, medical students and midwifery students

Attribute	Level
DCE 1 Quality of Facility	1 = Basic (insufficient electricity, equipment and drugs)
	2 = Advanced (sufficient electricity, equipment and drugs)
DCE 2 Housing	1 = No housing or allowance provided
	2 = Housing allowance provided, enough to afford basic housing
	3 = Free basic housing provided
DCE 3 Length of Commitment	1 = 1-year posting in remote area
	2 = 2-year posting in remote area
DCE 4 Study Assistance	1 = The government will not provide any financial assistance for a future study
	2 = The government will pay full tuition for a future study
DCE 5 Salary	IDR 3 000 000 per month
	IDR 5 000 000 per month
	IDR 7 000 000 per month
	IDR 10 000 000 per month
DCE 6 Management	1 = Limited support by district health office
	2 = Full support by district health office

Note: 1 USD = 10 000 IDR.

The third attribute is length of commitment, the FGD participants thought that staying too long in remote areas would hamper their work performance because of lack of professional network and boredom. They also raised a concern on probability of deteriorating their academic capability which would reduce the chance to pass the entry exam of higher education in the future. They thought that staying in rural jobs for 1 to 2 years would be sufficient before pursuing jobs in other places or continuing education. The policy maker stated that actually MoH has a policy for deployment of health workers on contract basis with duration of services ranging from 1 to 2 years depending on the hardshipness or remoteness.

The fourth attribute is study assistance. The FGD participants felt that working in rural areas could be regarded as a trade-off with the provision of government scholarship to pursue higher education. Most of them considered that the cost of higher education is quite expensive for them to afford. Having scholarship policy will increase their willingness to serve longer in rural areas. The policy maker also agreed that providing a bonding scholarship also have a positive impact on rural retention.

The fifth attribute is salary. Students thought that regardless of the employment status, health workers posted in rural areas should receive the same amount of basic salary and incentive with the new civil servant who hold bachelor degree and work at the same working place. This fair treatment would prevent jealousy among workers with the similar education level background and workload at the same location. The policy maker argued that there were no uniformity of salary and incentive among current workers with different employment status. In addition each local government has different incentive schemes depending on the local fiscal capacity and the local political will.

The last attribute is management. Students thought that the district health office support in the personnel management was very important especially in hiring, firing and payroll system. Policy maker informed that district health office has responsibility in providing adequate managerial support such as payment mechanism, standard operating procedure, effective supervision and performance appraisal.

The attribute level was determined by asking the participants on what appropriate options for each kind of attribute. For instance, when discussing about housing, participants were asked to identify what they expected to be the realistic housing level in rural deployment. Each attribute was then broken down into levels of attribute and subsequently accommodated into questionnaire.

Out of six determined DCE attributes, four attributes had two levels, one attribute had three levels and one attribute had four levels. This DCE design generated 192 ($2^4 \times 3^1 \times 4^1$) possible scenarios. To have manageable scenarios, Sawtooth Software Market Research Tool was used to pair the DCE alternative scenarios. This tool improved the level of balance and orthogonality, and minimized the overlap among attribute levels (Rockers *et al.*, 2012; World Health Organization *et al.*, 2012). The final DCE design resulted in 12 choice sets (11 random and 1 fix). Examples of the choice sets that the respondents faced were demonstrated in Table 2. The full questionnaire was piloted among health students at Airlangga University, aiming to have a useful feedback for the questionnaire improvement. Students found that the questionnaire was acceptable, but they suggested providing a clear explanation on the meaning of the attributes and their levels before the respondents fill in the questionnaire. Final questionnaire was then modified based on the respondent's recommendations.

Data collection

Data were collected from final year students across three health professions: medicine, nursing and midwifery. These three professions were identified by the Indonesian Ministry of Health as "strategic" health workers (Government of Indonesia, 2007). Participants were recruited from three different regions of Indonesia; the western region, the central region and the eastern region using cluster sampling. This sampling method generated three universities namely Airlangga University (western), Udayana University (central) and Hasanudin University (eastern). Target recruitment was a minimum of 50 respondents for each health student group, based on recommendations of a minimum of between 20 and 50 respondents per experiment group (Lancsar and Louviere, 2008).

A member of the research team distributed the questionnaire to class groups in each designated university following approval from the University. After explaining the study and obtaining consent, the questionnaire was distributed to students. All responses were anonymous. Students were advised that they were not obliged to complete the questionnaire and could return a blank form. Questionnaires were returned in a box outside the classroom provided by the researchers.

The study was approved by the ethics committee of the Research Center and Community Services (LPPM) Airlangga University, Surabaya.

Table 2. Example of a choice pair among DCE attributes. After graduation, which job you will choose as your preferences

Scenario	Attribute	Job A	Job B
I Which job will you choose?	Quality of Facility	Basic (insufficient electricity, equipment and drugs)	Advanced (sufficient electricity, equipment and drugs)
	Housing	Free basic housing provided	Housing allowance provided, enough to afford basic housing
	Length of Commitment	1 year	2 years
	Study Assistance	The government will provide scholarship for future study	The government will not provide scholarship for future study
	Salary	IDR 3 000 000 per month	IDR 5 000 000 per month
	Management	Full support by district health office	Limited support by district health office
II Which job will you choose?	Quality of Facility	Advanced (sufficient electricity, equipment and drugs)	Basic (insufficient electricity, equipment and drugs)
	Housing	No housing or allowance provided	Free basic housing provided
	Length of Commitment	1 year	2 years
	Study Assistance	The government will not provide scholarship for future study	The government will provide scholarship for future study
	Salary	IDR 10 000 000 per month	IDR 7 000 000 per month
	Management	Full support by district health office	Limited support by district health office

Data analysis

Univariate statistics were calculated for demographics and background of origin. Bivariate analyses were used to test the differences between gender and preferences to live in a rural area. A mixed logit model was used to analyze the variables using Stata's mixed logit command. The mixed logit model generated two parameter estimates: mean utility and standard deviation. The mean utility coefficients are interpreted as relative importance weights with larger values corresponding to greater preference (Kruk *et al.*, 2010; Rockers *et al.*, 2012).

RESULTS

Of 400 eligible health students, data were received from 400 respondents; no blank forms were returned.

Demographic findings

The majority of participants from all three-student groups were female, with a mean age of 21 years (Table 3). Most of the respondents were single. Few had lived in a remote area for more than 1 year. There were large variations in preferences for working in a remote area on graduation with 76% of medical students, 48% of nursing students and 39% of midwifery indicating that they would consider working in remote area after graduating. Male students were less likely to choose a rural posting than female students (OR = 0.440, CI = 0.268–0.721). The majority of respondents expressed a preference to be a civil government employee while working in remote areas of Indonesia.

DCE analyses

Medical students. Medical students had the highest preference for study assistance ($\beta = 0.85$, $p < 0.01$) and supportive management ($\beta = 0.79$, $p < 0.01$) (Table 4).

Table 3. Descriptive statistic for end-year student in three health profession category of Indonesia

Variable	Medical	Nursing	Midwifery
Female* (%)	56	80	100
Age (years in average) SD = 2.04	21 (SD = 1.08)	21 (SD = 0.89)	21 (SD = 3.47)
Unmarried (%)	92.7	89.3	85
Currently married (%)	7.3	10.7	15
Has children (%)	0.7	2.7	7
Lived in remote areas for at least 1 year (%)	6	6.7	1
Would consider working in remote area* (%)	76	48	39
Future career path in remote area as civil servant (%)	98	100	100

*Logistic regression showed significant value at $p < 0.05$.

Table 4. Results of a DCE data of mixed logit model of health students in Indonesia

Attribute	Medical student Mean (SE)	Medical student SD (SE)	Nursing student Mean (SE)	Nursing student SD (SE)	Midwifery student Mean (SE)	Midwifery student SD (SE)
Advance quality of facility	0.55 (0.12***)	0.95 (0.12***)	0.92 (0.15***)	1.17 (0.14***)	1.57 (0.27***)	1.68 (0.22***)
Housing:						
Allowance provided	0.16 (0.13***)	0.73 (0.16***)	0.40 (0.13***)	0.59 (0.16***)	0.52 (0.20***)	0.37 (0.29)
Basic housing provided	0.21 (0.13)	0.01 (0.23)	0.07 (0.15)	0.58 (0.16)	0.32 (0.22)	0.63 (0.24)
Length of commitment 1 year (ref: 2 year)	0.68 (0.10***)	0.80 (0.12***)	0.40 (0.10***)	0.67 (0.12***)	0.74 (0.18***)	0.97 (0.16***)
Study assistance	0.85 (0.11***)	0.81 (0.12***)	0.57 (0.11***)	0.80 (0.12***)	0.62 (0.17***)	1.10 (0.20***)
Supportive management	0.79 (0.12***)	1.08 (0.13***)	0.95 (0.15***)	1.34 (0.14***)	1.28 (0.21***)	1.41 (0.21***)
Salary (7 000 000* IDR/mo.)	0.14 (0.12***)	0.70 (0.16***)	2.04 (2.30***)			
Alternative-specific constant	−0.19 (0.14)		−0.23 (0.15)		−0.23 (0.21)	
Model diagnostic						
Number of respondents	150		150		100	
Number of observations	3598		3600		2398	
Log likelihood	−1002.6		−981.9		−565.1	
Likelihood ratio X²	155.5		205.3		191.6	

*p < 0.10. **p < 0.05. ***p < 0.01.
*1 USD = 10 000 IDR.

Further, they preferred a commitment to the job posting of 1 year as compared to 2 years ($\beta = 0.68$, $p < 0.01$) and good quality health facility infrastructure and equipment ($\beta = 0.55$, $p < 0.01$). Finally, they preferred being provided a housing allowance ($\beta = 0.16$, $p < 0.01$) and receiving a salary of 7 000 000 IDR ($\beta = 0.14$, $p < 0.01$) (Table 4).

Nursing students. Nursing students had a greatest preference for a salary of IDR 7 000 000 per month ($\beta = 2.04$, $p < 0.01$) followed by supportive management ($\beta = 0.95$, $p < 0.01$). They also preferred a good quality facility, which included reliable electricity, equipment and availability of drugs and supplies ($\beta = 0.92$, $p < 0.01$). Furthermore, they preferred study assistance to be paid by the government ($\beta = 0.57$, $p < 0.01$). Nursing students had similar preferences as medical students for being provided a housing allowance ($\beta = 0.40$, $p < 0.01$) as compared with 2-year length of commitment ($\beta = 0.40$, $p < 0.01$) (Table 4).

Midwifery students. The most important attribute for the midwifery students in Indonesia was providing a good quality health facility infrastructure and equipment ($\beta = 1.57$, $p < 0.01$). Furthermore, as described in Table 4, they chose a supportive management ($\beta = 1.28$, $p < 0.01$) followed by a 2-year length of commitment as their preferences ($\beta = 0.74$, $p < 0.01$). Fully paid tuition by the government was their fourth preference ($\beta = 0.62$, $p < 0.01$), followed by provision of a housing allowance as the final preference ($\beta = 0.52$, $p < 0.01$) (Table 4).

Based on Table 4, supportive management was the top two preferences among three health profession students. The important support of district health office was the first top preference mentioned by these health workers. The second top preference was having a good facility as mentioned by nursing and midwife health students. These top preferences reflected the need of detailed investigation for further discourse as shown in the discussion part.

Validity tests

We found that between health students, there were no participants with dominant preferences. Between student groups, medical, nursing and midwifery students, respectively, 9%, 6% and 5% chose a dominant scenario that is within acceptable standard for DCE (Johnson *et al.*, 2007).

DISCUSSION

This paper presents the results of a study that was designed to inform policies to encourage health students to work in remote areas after graduation. We elicited preferences for job attributes among medical, nursing and midwifery students in Indonesia. As strategic health workers, all health facilities must employ at least one of each of these professions (MoH, 2010b).

The majority of respondents said that they were willing to consider working in a remote region after graduation, given better working conditions. The descriptive data

also suggest that being a civil government employee would increase staff's interest to work in rural and remote areas. Recent data from the bureau of personnel under the MoH of Indonesia showed that 87 328 applicants were competing for 1753 civil servant vacancies in 2013 (MoH, 2013a). This fact partially reflects that the current domestic market may have insufficient capacity to absorb the labor workforce despite the high number of annual production of health worker educational institution. Based on data from MoH (2013b) public health centers estimated experiencing shortage of 3035 general physician, 14 359 nurses and 6783 midwifes. On the other hand, health educational institution produces 8757 physicians and 35 821 nurses per year (Ministry of Education and Culture, 2010a, 2010b). Health worker motivation to be a civil servant is assumed not only for financial reason but also as a job security guarantee, prestige and a clear career path. This option needs further exploration to understand to what extent the employment as a civil servant may attract participants and affect policy implications.

Medical students seem to value non-financial interventions (particularly study assistance) more than other attributes. This study reinforces previous research undertaken in Ghana (Kruk *et al.*, 2010), in which medical students preferred better working conditions over increased salary. In Indonesia, the cost of studying medicine is high and is borne by the student (Trisnantoro, 2011), which may explain why study assistance is valued so highly by medical students. The average cost of medical education per year is 60 million Indonesia Rupiah (equivalent to 6000 USD), and the duration of training is 5 years (Kemenkokesra, 2013). On the other hand, income per capita of the nation was 3563 in 2012 (World Bank, 2014). This may also be a barrier to access for lower income people. Salary may not be the most valuable choice as doctor may expect to generate more income from their private practice. It should be noted that Indonesian doctors are allowed to perform dual practice or hold a job within and outside the public sector (Berman and Cuizon, 2004; Kiwanuka *et al.*, 2011). The opportunities to hold multiple jobs are limited in remote areas; therefore, some local government offered higher financial incentive to attract medical doctors to stay longer in rural posts (Kurniati and Efendi, 2010). Disparity in fiscal capacity and other benefits creates favorable and non-favorable areas to health workers. For example, another study found that 'favorable' remote areas are those with shorter waiting lists, and those which might lead to a longer contract in a more favorable area (Kurniati and Efendi, 2010). Often the more favorable remote areas have high economic activity such as oil production and logging, which bring benefits for the local population. These settings have the potential to offer a bonding scheme and a commitment not to leave the area for a specified time and until a replacement doctor is available. In addition, study assistance for future specialist programs may be available. Scholarships are provided to support the completion of Bachelor degrees for prospective students from rural and remote area of Indonesia, for example, the *Afirmasi Scholarship* from the Ministry of Education and Culture (MoEC) to undertake undergraduate program in medicine, nursing and midwifery. Funding from MoH or MoEC is open to the whole population, privileging candidates of rural origin or who work in bonded services in rural areas (MoEC, 2012; MoH, 2014b). In addition, it might be appropriate to attract health students to serve in remote areas from the point of university admission. The government has quotas

on rural recruitment, so integrating this system with a bonding scheme may be appropriate for future recruitment.

In this study, nursing students viewed a higher salary as more important than other attributes. This confirms previous DCE studies in South Africa (Penn-Kekana *et al*., 2005), Malawi (Mangham and Hanson, 2008) and Ethiopia (Hanson and Jack, 2008), where nurses valued salary increases more than other job characteristics. This might be because of the fact that nurses in Indonesia are less satisfied with their salaries. Unlike doctors, Indonesian nurses have a less opportunity in private practice as by law they are not allowed to perform medical treatment (Government of Indonesia, 2004). Interesting phenomenon existed in rural health care services; study showed that because of the absence of doctor in remote areas, Indonesian nurses subtly forced to give a cure treatment, not care anymore (Sciortino, 2008). This situation is acknowledged by the government with the issuance of the policy to grant nurse and midwife an authority to perform certain medical treatment with certain conditions (MoH, 2010a, 2013c; Government of Indonesia, 2014). A career as a civil servant nurse entitles the worker to a basic salary of 2 278 900 Indonesia Rupiah per month (Government of Indonesia, 2013). In the private sector the salary depends on the financial capacity of the institution. Although Indonesia has minimum wage, there are several reports of Indonesian nurses being underpaid (Suara Surabaya, 2013). One Kenyan study found that nurses prefer a higher salary, regardless of whether they work in the public or private sector (Mullei *et al*., 2010). However, it should be noted that very few private institutions operate in rural areas, with the exception of some Faith Based Organizations (FBO). Various FBO provide services and employ nurses and doctors in rural areas—for example, FBO managed by Muhammadiyah, Nahdlatul Ulama and others that are managed by non-Moslem party based on social oriented philosophies (Sciortino *et al*., 2010). Therefore, working opportunities in rural areas in Indonesia will depend more on the government capacity both at country and local levels.

Midwifery students had a preference for reliable electricity, equipment and drugs and availability of supplies. This study concurs with research in Ghana, where midwifery students viewed advanced facilities as one of the top three motivating factors to accepting a rural post (Ageyi-Baffour *et al*., 2013). Midwives might perceive that advanced facilities are particularly important in enhancing maternal and baby outcomes. Employing a midwife in each village will be more effective by providing an adequate and appropriate equipment. One study in Riau province showed that the placement of village midwife in rural and remote areas lacks of birth equipment (bidan kit) and poor basic infrastructure (Zahtamal and Harniwita, 2011). The research from Ghana found that non-financial incentives (additional education) were an important strategy to attract midwives to stay in remote posts (Lori *et al*., 2012). In Indonesia's context, the deployment of one midwife in one village should be supported by consistent supply of equipment and drugs.

The importance of financial incentives was reinforced by the three professional groups. Several studies show the significance of financial incentives to attract and retain health workers in rural area (Sempowski, 2004; Bärnighausen and Bloom, 2009; Grobler L *et al*., 2009). Workers who serve in remote or very remote areas receive extra salary and incentives from central government. The

amount of financial incentive should be embedded with other non-financial in-centives such as the social recognition. The nature of the rewards depends on the nature of the program (e.g. contracted staff or special assignment) and geographical location. For example, contracted doctors receive an incentive of around 3 350 000 IDR for a remote posting and 5 800 000 IDR for very remote posting (Sedyaningsih, 2011).

According to the latest data, the Maternal Mortality Ratio (MMR) in Indonesia was estimated 190 per 100 000 live births with skilled births attendance at birth was 66.3% (World Health Organization, 2013). These data highlight the need for more skilled or strategic health workers particularly in remote areas. It is well documented that the availability of health workers is positively associated with de-creased maternal and child mortality (Speybroeck *et al.*, 2006). Indonesia's health worker numbers fell below target for all professions in year 2010 (Kemenkokesra, 2013). This creates an important incentive for the Indonesian Government to im-prove access to skilled birth attendants, deploying the health workers to meet the needs of the most vulnerable groups to reduce mother and infant mortality and to achieve the future target.

The most valued policy incentive in this study is enhancing the quality of the fa-cilities and increasing access to supportive management. The nationwide data of 8981 public health centers showed that 71% have an access to clean water and 17% have limited access to electricity, while 26.3% public health centers have sub-standard equipment (MoH, 2012). This reflects the fact that remote areas of Indonesia lack of basic infrastructure. Indonesia has implemented UHC since early 2014, for which the availability of an appropriately skilled and distributed workforce is a necessity. This is particularly critical as there are still 50% of Indonesians living in rural areas (Statistics Indonesia *et al.*, 2013). Based on this study, several possible policy levers could be implemented by the Indonesian government. Some might be easy to implement (such as increased salary) while others will require more sustained input (quality facility, management support). Our study also found that health students from a rural background were more likely to choose to work in remote areas, in line with previous research (Brooks *et al.*, 2002; Curran and Rourke, 2004; Playford *et al.*, 2006; Pagaiya *et al.*, 2010).

Sufficient human resources for health in terms of the amount, variation and qualified of workers are required to ensure the implementation of UHC. More-over, the post-2015 agenda will involve addressing the challenge on Human Re-sources for Health on achieving universal health coverage (Vega, 2013). These issues become a critical challenge for the Indonesian government, particularly on the aspects of accessibility, portability and equality. Public Health Centers, as the gatekeeper of UHC, need to be strengthened in terms of having a suffi-cient health workforce. The number of PHC is increasing annually; however data showed that in 2010 there was still a deficit of 1600 PHC physicians, with the greatest deficit in remote areas (Ministry of Education and Culture, 2011). Doctors, nurses and midwives are obviously strategic health workers in implementing robust UHC. This paper highlights the need to differentiate recruit-ment and retention strategies for each cadre when addressing staffing issues at a national level.

CONCLUSION

This study provides valuable information for policy makers to determine strategies to attract and retain health workers in remote areas of Indonesia. Pre-service training as the first stage of producing health workers plays an important role in supplying the need of health workforce. Understanding student preferences could help determining appropriate policies for recruitment and retention. This study suggests that changes in a salary scheme provide scholarship, and better quality facilities are required to overcome the problems of retaining health workers in remote areas. Sufficient technical and managerial support is strongly advised for enhancing health worker recruitment and retention strategies in rural area. For future strategy, we recommend that recruitment of student from rural areas should be more prioritized by provision of higher quota in designated university. Re-arranging salary scheme may be necessary to determine the amount of salary based on at least the level of expensiveness, hardshipness and reward to the profession.

Limitations

Only students from public universites are included in this research that might affect the expected results.

REFERENCES

Ageyi-Baffour P, Rominski S, Nakua E, Gyakobo M, Lori J. 2013. Factors that influence midwifery students in Ghana when deciding where to practice: a discrete choice experiment. *BMC Med Educ* **13**(1): 1–6.

AusAid. 2014. Human resources for health: what is still lacking? Retrieved 1 March, 2014, from http://aiphss.org/sumber-daya-manusia-kesehatan-apa-yang-masih-kurang/

Bärnighausen T, BloomDE. 2009. Financial incentives for return of service in underserved areas: a systematic review. *BMC Health Serv Res* **9**: 86–86. doi: 10.1186/1472-6963-9-86

Berman P, Cuizon D. 2004. *Multiple public–private jobholding of health care providers in developing countries*. DFID Health Systems Resource Center: London.

Blaauw D, Erasmus E, Pagaiya N, *et al*. 2010. Policy interventions that attract nurses to rural areas: a multicountry discrete choice experiment. *Bull World Health Organ* **88**(5): 350–356.

Brooks RG, Walsh M, Mardon RE, Lewis M, Clawson A. 2002. The roles of nature and nurture in the recruitment and retention of primary care physicians in rural areas: a review of the literature. *Acad Med* **77**(8): 790–798.

Curran V, Rourke J. 2004. The role of medical education in the recruitment and retention of rural physicians. *Med Teach* **26**(3): 265–272.

DJSN, MoH. 2012. *Peta Jalan Menuju Jaminan Kesehatan [Roadmap Toward Health Coverage]*. Kemenkokesra-DJSN-Kemkes: Jakarta.

Dussault G, Franceschini MC. 2006. Not enough there, too many here: understanding geographical imbalances in the distribution of the health workforce. Human Resources for Health. *Hum Resour Health* **4**(12): 1–16.

Efendi F. 2012. Health worker recruitment and deployment in remote areas of Indonesia. *Rural Rem Health* **12**(2008): 1–6.

Government of Indonesia. 2004. *Undang-Undang Republik Indonesia Nomor 29 Tahun 2004 tentang Praktik Kedokteran*. Setneg RI: Jakarta.

Government of Indonesia. 2007. *Peraturan Pemerintah Republik Indonesia No.38 Tahun 2007 tentang Pembagian Urusan Pemerintahan Antara Pemerintah, Pemerintahan Daerah Provinsi dan Pemerintahan Daerah Kabupaten/Kota*. Sekretariat Kabinet RI: Jakarta.

Government of Indonesia. 2013. *Peraturan Pemerintah Republik Indonesia Nomor 22 Tahun 2013 Tentang Perubahan Kelima Belas Atas Peraturan Pemerintah Nomer 7 Tahun 1977 Tentang Peraturan Gaji Pegawai Negeri Sipil* [Indonesian government regulation no. 15 year 2012 on the fifteenth amendment on government regulation number 7 of 1977 concerning civil servants salaries]. Kementerian Sekretariat Negara RI.

Government of Indonesia. 2014. *Undang-undang Republik Indonesia Nomor 36 Tahun 2014 Tentang Tenaga Kesehatan*. Kemenkes: Jakarta.

Grobler L, Marais BJ, Mabunda S, Marindi P, Reuter H, Volmink J. 2009. Interventions for increasing the proportion of health professionals practising in rural and other underserved areas. *Cochrane Database Syst Rev*, **1**(1).

Hanson K, Jack W. 2008. Health worker preferences for job attributes in Ethiopia : results from a discrete choice experiment. World Bank: Washington, DC. http://documents.worldbank.org/curated/en/2008/04/11830852/health-worker-preferences-job-attributes-ethiopia-results-discrete-choice-experiment

Huicho L, Miranda JJ, Diez-Canseco F, *et al*. 2012. Job preferences of nurses and midwives for taking up a rural Job in Peru: a discrete choice experiment. *PLoS One* **7**(12). doi: 10.2471/blt.09.066290

Johnson FR, Kanninen B, Bingham M, Özdemir S. 2007. Experimental design for stated-choice studies. In *Valuing Environmental Amenities Using Stated Choice Studies*, Kanninen B (ed). Springer Netherlands: Dordrecht, Netherland; Vol. **8**, 159–202.

Kemenkokesra. 2013. *Keputusan Menteri Koordinator Bidang Kesehajteraan Rakyat Republik Indonesia Nomor 54 Tahun 2013 Tentang Rencana Pengembangan Tenaga Kesehatan Tahun 2011-2025*. Kemenkokesra: Jakarta.

Kiwanuka SN, Rutebemberwa E, Nalwadda C, Okui O, Ssengooba F, Kinengyere AA, Pariyo GW. 2011. Interventions to manage dual practice among health workers. *Cochrane Database Syst Rev* (7), CD008405. doi: 10.1002/14651858.CD008405.pub2

Kruk ME, Johnson JC, Gyakobo M, *et al*. 2010. Rural practice preferences among medical students in Ghana: a discrete choice experiment. *World Health Organ Bull World Health Organ* **88**(5): 333–341. doi: 10.1016/s0140-6736(04)17482-5 pmid:15567015

Kurniati A, Efendi F. 2010. Viewing decentralization as an opportunity in improving availability of health workers in underserved areas. Paper presented at the 4th Conference of AAAH, Vietnam. http://www.aaahrh.org/4th_conf_2009/Kurniati_INDONESIA.pdf

Kurniati A, Efendi F. 2013. *Human Resources for Health Country Profile of Indonesia*. WHO SEARO: Thailand.

Lancsar E, Louviere J. 2008. Conducting discrete choice experiments to inform healthcare decision making. *Pharmacoeconomics* **26**(8): 661–677.

Lori JR, Rominski S, Richardson J, Agyei-Baffour P, Kweku NE, Gyakobo M. 2012. Factors influencing Ghanaian midwifery students' willingness to work in rural areas: a computerized survey. *Int J Nurs Stud* **49**(7): 834–841. doi: 10.1016/j.ijnurstu.2012.02.006

Mangham LJ, Hanson K. 2008. Employment preferences of public sector nurses in Malawi: results from a discrete choice experiment. *Trop Med Int Health* **13**(12): 1433–1441.

Ministry of Education and Culture. 2010a. Potret Ketersediaan dan Kebutuhan Tenaga Dokter [Portrait of availability and demand of health workforce]. Retrieved January 14, 2014, from http://hpeq.dikti.go.id/v2/images/Produk/Potret_Ketersediaan_Dan_Kebutuhan_Tenaga_Dokter.pdf

Ministry of Education and Culture. 2010b. *Potret Ketersediaan dan Kebutuhan Tenaga Perawat [Portrait of Availability and Demand of Nurses]*. Dirjen Dikti: Jakarta.

Ministry of Education and Culture. 2011. Potret Ketersediaan dan Kebutuhan Tenaga Dokter [Portrait of availability and demand of health workforce]. Retrieved January 14, 2014, from hpeq.dikti.go.id/v2/images/Produk/Potret_Ketersediaan_Dan_Kebutuhan_Tenaga_Dokter.pdf

MoEC. 2012. Program Afirmasi Pendidikan Tinggi [Afirmasi program of higher education]. Retrieved January 8, 2014, from http://www.dikti.go.id/?p=5523

MoH. 2007. *Kepmenkes Nomor 949 Tahun 2007 tentang kriteria sarana pelayanan kesehatan terpencil dan sangat terpencil [Kepmenkes No. 949 in 2007 on the Criteria of Remote and Very Remote Health Care Facilities]*. Ministry of Health: Jakarta.

MoH. 2009. Rencana Pembangunan Jangka Panjang Bidang Kesehatan (RPJPK) tahun 2005–2025 [Long-term plan for the health sector year 2005–2025]. Retrieved July 7, 2013, from http://www.depkes.go.id/…/rancangan_RPJPK_20…

MoH. 2010a. *Peraturan Menteri Kesehatan Republik Indonesia Nomor 1464/Menkes/Per/X/2010 Tahun 2010 tentang Izin dan Penyelenggaraan Praktik Bidan*. Kemenkes: Jakarta.

MoH. 2010b. *Rencana Strategis Kementerian Kesehatan Tahun 2010–2014 [Strategic Plan of Ministry of Health year 2010–2014]*. Kemenkes: Jakarta.

MoH. 2012. Laporan Akhir Riset Fasilitas Kesehatan Tahun 2011. from http://www.litbang.depkes.go.id/sites/download/buku_laporan/LAPORAN_RIFASKES_NASIONAL_PKM_2011.pdf

MoH. 2013a. 1.519 Peserta Dinyatakan Lulus Sebagai CPNS Kementerian Kesehatan RI tahun 2013 [1.519 Applicants Pass CPNS of Ministry of Health RI year 2013]. Retrieved 1 Januari, 2014, from http://www.depkes.go.id/index.php?vw=2&id=SNR.13120019

MoH. 2013b. *Pemenuhan Tenaga Kesehatan Dalam Jaminan Kesehatan SJSN [Health Workers Availability in Health Isurance SJSN]*. BPPSDMK: Jakarta.

MoH. 2013c. *Peraturan Menteri Kesehatan Nomor 17 Tahun 2013 tentang Perubahan Atas Peraturan Menteri Kesehatan Nomor Hk.02.02/Menkes/148/I/2010 tentang Izin dan Penyelenggaraan Praktik Perawat*. Kementerian Kesehatan: Jakarta.

MoH. 2014a. Profil Kesehatan Indonesia 2013 [Indonesia health profile year 2013].

MoH. 2014b. Program Pemberian Bantuan Biaya Pendidikan Dokter Spesialis dan Dokter Gigi Spesialis [Program on study assistance of specialist and dentist physician education]. Retrieved January 15, 2014, from http://202.70.136.26/ppds/

Mullei K, Mudhune S, Wafula J, *et al*. 2010). Attracting and retaining health workers in rural areas: investigating nurses' views on rural posts and policy interventions. *BMC Health Serv Res* **10**(Suppl 1): S1–S1. doi: 10.1186/1472-6963-10-s1-s1

Pagaiya N, Noree T, Tangcharoensathian V, Lagarde M, Laongbua C. 2010. Discrete choice experiment to elicit job preference of newly graduated nurses.

Penn-Kekana L, Blaauw D, Tint K, Monareng D, Chege J. 2005. Nursing staff dynamics and implications for maternal health provision in public health facilities in the context of HIV/AIDS: Frontiers in Reproductive Health, Population Council.

Playford D, Larson A, Wheatland B. 2006. Going country: rural student placement factors associated with future rural employment in nursing and allied health. *Aust J Rural Health* **14**(1): 14–19.

Rockers PC, Jaskiewicz W, Kruk ME, *et al*. 2013. Differences in preferences for rural job postings between nursing students and practicing nurses: evidence from a discrete choice experiment in Lao People's Democratic Republic. *Hum Resour Health* **11**(1): 22. doi: 10.1186/1478-4491-11-22

Rockers PC, Jaskiewicz W, Wurts L, *et al*. 2012. Preferences for working in rural clinics among trainee health professionals in Uganda: a discrete choice experiment. *BMC Health Serv Res*, **12**: 212–212. doi: 10.1186/1472-6963-12-212

Sciortino R. 2008. *Perawat Puskesmas Di Antara Pengobatan & Perawatan*. Gadjah Mada University Press: Yogyakarta.

Sciortino R, Ridarineni N, Marjadi B. 2010. Caught between social and market considerations: a case study of Muhammadiyah charitable health services. *Reprod Health Matters* **18**(36): 25–34. doi: 10.1016/S0968-8080(10)36528-1

Sedyaningsih ER. 2011. Strategi dan Kebijakan Kementerian Kesehatan Menuju Universal Coverage dan Pemenuhan Serta Pemerataan Fasilitas Tenaga [Policy and strategy of Ministry of Health toward universal health coverage and availability the distribution of health facility]. *Kebijakan Kesehatan Indonesia*. http://www.kebijakankesehatanindonesia.net/sites/default/files/images/Paper-Bu-Menkes.pdf

Sempowski IP. 2004. Effectiveness of financial incentives in exchange for rural and underserviced area return-of-service commitments: systematic review of the literature. *Can J Rural Med* **9**(2): 82–88.

Speybroeck N, Kinfu Y, Dal Poz MR, Evans DB. 2006. *Reassessing the Relationship Between Human Resources for Health, Intervention Coverage and Health Outcomes*. World Health Organization: Geneva.

Statistics Indonesia, National Population, Family Planning Board, Kementerian Kesehatan, ICF International. 2013. *Indonesia Demographic and Health Survey 2012*. BPS, BKKBN, Kemenkes, and ICF International: Jakarta.

Suara Surabaya. 2013. 12 Ribu Perawat di Jatim Masih Menganggur. Retrieved 1 Januari, 2014, from http://m.suarasurabaya.net/kelanakota/detail.php?id=78661b21f156a47d1500242e6b1dd7cc2012106782

Trisnantoro L. 2011. Rancangan Undang-undang Pendidikan Kedokteran: Perlukah? *Jurnal Manajemen Pelayanan Kesehatan* **14**(01): 1–2.

Vega J. 2013. Universal health coverage: the post-2015 development agenda. *The Lancet* **381**(9862): 179–180. doi: 10.1016/S0140-6736(13)60062-8

World Bank. 2014. Indonesia overview. Retrieved 31 January, 2015, from http://www.worldbank.org/in/country/indonesia/overview

World Health Organization. 2006. The world health report 2006: working together for health: World Health Organization.

World Health Organization. 2010. Increasing access to health workers in remote and rural areas through improved retention: global policy recommendations: World Health Organization.

World Health Organization. 2013. Global Health Observatory (GHO): maternal mortality country profiles. Retrieved 31 January, 2015, from http://www.who.int/gho/maternal_health/countries/idn.pdf?ua=1

World Health Organization, CapacityPlus-USAID, The World Bank. 2012. *How to Conduct a Discrete Choice Experiment for Health Workforce Recruitment and Retention in Remote and Rural Areas: A User Guide with Case Studies*. World Health Organization: Geneva.

Zahtamal, Harniwita. 2011. Analisis Pemetaan Tenaga Kesehatan Kebidanan di Provinsi Riau. *Teroka* **1**(1): 1–6.