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ORIGINAL RESEARCH

Retention of Doctors and Dentists to Serve in Remote Areas in Indonesia: A Discrete Choice Experiment

Anna Kurniati[1], Ferry Efendi[2,3], Ismawiningsih Ismawiningsih[1], Nila Mulyani[1], Zakaria Zakaria[1], Retno Ambarwati[1], Hutomo Tuhu Prasetyo[1], Endro Muljandari[1], Irni Damayanti[1], Arif Yustian Maulana Noor[4], Lisa McKenna[3], Iin Nurlinawati[5]

[1]Directorate of Health Workforce Deployment, Directorate General of Health Workforce, Ministry of Health, Jakarta, Indonesia; [2]Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia; [3]School of Nursing and Midwifery, La Trobe University, Melbourne, Australia; [4]Agriculture Socio-Economic Department, Faculty of Agriculture, Brawijaya University, Malang, Indonesia; [5]Badan Riset Inovasi Nasional, Jakarta, Indonesia

Correspondence: Ferry Efendi, Faculty of Nursing, Universitas Airlangga, Campus C Mulyorejo, Surabaya, East Java, 60115, Indonesia, Tel +62 31 591 3754, Email ferry-e@fkp.unair.ac.id

Introduction: Retaining doctors and dentists in remote areas of Indonesia remains a national priority of the Indonesian government. The purpose of this study was to analyze the interventions for retention of doctors and dentists in remote areas using the discrete choice experiment (DCE) approach.

Materials and Methods: A DCE was conducted to investigate preferences of doctors and dentists for retention in remote areas. This research was conducted in 78 primary healthcare settings across 15 provinces in Indonesia. The conditional logit model was used to explore stated preferences for each attribute.

Results: The total number of respondents was 158, including 113 doctors and 45 dentists. In general, doctors placed the highest preference on getting priority for government scholarships to facilitate retention in remote areas (OR=5.65, p<0.001). Specifically, dentists preferred security guarantees from local government (OR = 4.87, p<0.001). Both groups valued having an official residence (OR=3.6, p<0.001) as a factor for retention in remote areas.

Conclusion: Scholarship, security guarantees, housing facilities, and medical facilities were the most considered factors for retaining doctors and dentists in a remote area. This study confirms the importance of a combination of interventions in maintaining doctors and dentists in remote areas. Policy options in the form of non-financial and financial intervention packages can be combined to improve their retention.

Keywords: preferences, health systems, health workers, rural area, health workforces, DCE

Introduction

Doctors and dentists play an important role in improving health, especially in primary care settings for disease detection and screening.[1] Health workers can provide effective health services based on their availability and distribution in the population.[2] However, the global shortage of health workers is expected to reach 10 million by 2030. Even within countries, rural areas experience greater shortages of adequate staff than urban areas.[3] A recent document from the World Health Organization (WHO) identifies ten global health issues that must be addressed which includes strengthening the availability of the global health workforce[4]. According to WHO recommendations, there should be one doctor for every 1000 people; however, the national ratio of doctors in Indonesia is reported to be 0.68 per 1000 people; and in 88% of provinces, the ratio is even lower, such as in the Maluku-Nusa Tenggara Timur-Papua region, where the ratio is 0.24 per 1000 people.[5] The proportion of remote area districts are 12.1% of the total districts in Indonesia, while the proportions of doctors and dentists in remote areas is only 2.2% and 1.4% of the national total, respectively.[6] The majority of doctors and dentists are concentrated on the islands of Java and Sumatra, as opposed to Papua, East Nusa Tenggara, and Maluku.[7] Papua Province has the highest reported proportion of doctors and dentists shortages in the country (49.5% and 79.0%, respectively)[7].

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One reason for shortages is the difficulty in retaining health workers, particularly in rural or remote areas, which depends on both macro- and micro-level factors.[8,9] Large proportions of doctors working in remote areas have very short periods of assignment.[10] According to findings of a 2014 study in Argentina, 21% of doctors had a strong desire to leave remote areas, while 57.3% had a moderate desire.[11] When a health worker's position becomes vacant and is not filled immediately, the health worker, health organization, and community all suffer.[12,13] This impact is especially pronounced in rural and remote areas, where the workforce may be low in terms of availability.[10,14]

Since 2010, WHO has released several recommendations on four major interventions to improve the retention of health workers in remote areas: education, regulation, financial incentives, and professional and personal support for health workers in remote and rural areas.[14] As mandated by Indonesia's health transformation, the Indonesian Ministry of Health (MoH) is committed to accelerating the distribution of doctors, particularly in remote areas.[5] The government's efforts to increase health worker retention include special assignments placed in remote areas, such as Nusantara Sehat (NS) program and the doctor internship program. These are bundled with incentives and scholarships. However, these mechanisms are only temporary.[5] Part of the solution includes understanding the needs and expectations of health workers in the health services.[15]

The Discrete Choice Experiment (DCE) is a quantitative method used to explain preferences that influence job choices.[16] DCE has been used extensively in the health sector, especially in examining the preferences of health workers.[17,18] A study using DCE was conducted in Indonesia with medical, nursing, and midwifery students as subjects in 2016.[19] Another DCE study conducted by Shrestha in 2017, explored preferences of prospective dentists in taking job in remote areas in Nepal.[20] DCE studies have also been conducted in Timor Leste (2016)[21] and India (2013)[22] to assess preferences of doctors and nurses in working in rural areas. However, more evidence is needed, especially when viewed from the context of doctors and dentists in Indonesia. Therefore, the purpose of this study was to analyze interventions for retention of doctors and dentists in remote areas using the DCE approach.

Materials and Methods

Design

This was a cross-sectional study using the DCE approach to explore the preferences of doctors and dentists regarding retention attributes in remote areas. Respondents were presented with several alternatives within a set of inherent attributes to make their choices.[23]

Sampling and Sample Size

The study was conducted in 78 public health centres included in the remote area category across 22 districts spread over 15 provinces in Indonesia. The selection of these locations was based on the criteria for remote areas based on the Decree of the Director General of Health Services No. HK.02.02/11/0373/2019[24] and based on the availability of doctors and dentists in regional representation in Indonesia. Data collection was carried out in November 2022 for 20 days by trained enumerators. The sample consisted of 158 doctors and dentists selected through non-probability sampling (purposive) with the inclusion criteria of doctors and dentists who were placed in primary health care in remote areas for at least for 1 years. We determined the sample size based on recommendations from Pearmain et al[25] and Lancsar and Louviere.[18] Pearmain et al advised that over 100 participants are sufficient for modeling preference data in DCE studies. Additionally, Lancsar and Louviere noted that while around 20 respondents per questionnaire can yield reliable results, a larger sample size may be needed for many attributes and more detailed analysis.

Attributes and Levels Development

Attributes and levels were identified through a literature review and focus group discussions (FGDs). Literature studies from academic databases such as Scopus, Web of Science, EBSCO, Proquest, and PubMed were used to determine the attributes and levels. The search technique employed keywords such as retention, doctor, dentist, rural areas, and remote areas. The FGD involved doctors, dentists, the National Research and Innovation Agency, MoH, and academics. The participants discussed various aspects that would influence their decision to work in remote areas. The discussions yielded eight attributes with 2–3 levels each, encompassing both non-monetary and monetary factors (see Table 1 for details).

Table 1 Attributes and Levels of DCE

Attributes	Levels	Description
Location (The placement locations for doctors and dentists)	(1) Rural or urban*	Areas with good basic living facilities and adequate healthcare services. Transportation accessibility is relatively easy and does not hinder mobility.
	(2) Remote	Areas with challenging geographical conditions, such as mountainous regions or remote hinterlands. Transportation takes more than 6 hours round trip from the district capital. These areas often struggle to meet basic needs and face security challenges.
	(3) Very remote	Areas that are extremely difficult to access geographically, like remote islands or border areas. Transportation takes more than 8 hours round trip. These areas often face difficulties in meeting basic needs and have challenging security conditions.
Medical facilities (Refer to the resources and supplies necessary for the delivery of healthcare services including promotion, prevention, treatment, and rehabilitation. Such as drugs and medical devices)	(1) Inadequate*	Medical facilities are insufficient to support the provision of healthcare services.
	(2) Adequate to standard	There are healthcare facilities and pharmaceutical products available, along with standard medical devices, sufficient to support the provision of healthcare services.
	(3) More than standard	There are healthcare facilities along with pharmaceutical products and advanced medical devices that are adequate and superior, supporting the provision of healthcare services.
Housing facilities (Places where people live or stay, providing them with housing and basic amenities for daily living)	(1) Not available*	No housing facilities provided.
	(2) Official residence	Provided with housing facilities in the form of an official residence during service/employment.
	(3) Housing allowance	Provided with housing facilities in the form of a housing allowance, which will be given in the form of money and paid monthly.
Specialist study opportunities (Chances for individuals to pursue advanced education and training in specialized fields)	(1) Less priority for those who pay for independent studies*	Specialist study opportunities are less prioritized for individuals financing their studies through personal or self-funded means.
	(2) Priority for those who study independently	Specialist study opportunities are prioritized for individuals financing their studies through personal or self-funded means.
	(3) Priority for government scholarships recipients with 2–3 years of assignment	Specialist study opportunities are prioritized for recipients of government scholarships with service tenure, with placements in regular areas for 3 years or 2 years in remote, very remote, or conflict-prone areas.
Security (Measures taken to protect individuals from threats or harm)	(1) No security guarantee from the government*	There is currently no government assurance of security and safety for doctor and dentist, especially in remote and very remote areas.
	(2) Security guarantees are available from the local government	Local government provides security and safety assurance for doctor and dentist, especially in remote and very remote areas.

(*Continued*)

Table 1 (Continued).

Attributes	Levels	Description
Length of commitment (The period of time that an individual commits to staying in a specific place before considering relocation)	(1) Willing to work in the same place for 2 years*	Committed to working in the same location for 2 years and not allowed to move elsewhere.
	(2) Willing to work in the same place for 4 years	Committed to working in the same location for 4 years and not allowed to move elsewhere.
	(3) Willing to work in the same place until retirement	Committed to working in the same location until retirement and not allowed to move elsewhere.
Incentive (Rewards offered to individuals as encouragement to take certain actions or achieve specific goals)	(1) Medical services*	Provision of monetary incentives for medical services provided as compensation for individual medical services rendered, typically included in hospital tariff components.
	(2) Regional/central incentives	Provision of monetary incentives based on the region of assignment, educational level, and employment status.
	(3) All incentives (medical and regional/central incentives)	Provision of incentives in the form of service/medical services incentives and regional/central incentives in monetary form based on the region and services provided.
Net income (Income, including basic salary and allowances in a month)	(1) IDR 15 million[a]	Totalling income of IDR 15 million monthly.
	(2) IDR 20 million[a]	Totalling income of IDR 20 million monthly.
	(3) IDR 30 million[a]	Totalling income of IDR 30 million monthly.

Notes: Description: *Level of comparison or control. [a]1 United States Dollar (USD) = 15,129 Indonesian Rupiah (IDR) as 18 January 2023.

DCE Questionnaire Design

A DCE questionnaire was created after finalizing the attributes and levels. Each attribute was divided into levels before being incorporated into the questionnaire. Seven of the eight determined DCE attributes had three levels, and one had two levels. The questionnaire design was created using the package "support.CEs" from the R software[26] through an orthogonal fractional factorial design, resulting in 18 choice sets, each with two alternative options. To gather more information about dentists' and doctors' preferences regarding the offered attributes, the design purposefully omitted the "opt-out" option.[27] We developed the questionnaire with rigor to overcome the content validity issue based on WHO guidelines.[28]

The questionnaire was divided into three sections (Figure 1): the characteristics question section included demographic variables and profession-related attributes for doctors and dentists (Figure 1A); a cheap talk script provided an explanation about the attributes and levels, assisting respondents in understanding the purpose of each question in the early stages of the questionnaire (Figure 1B); and the DCE retention section contained 18 choice sets with two alternative options for dentists and doctors to choose (Figure 1C). Each choice set was presented on a separate page to ensure respondents could focus on the options provided.

To ensure content validity, a group of experts in the field, including the Director of Health Worker Empowerment, the National Research and Innovation Agency, the Health Development Policy Agency, as well as doctors and dentists, assessed the content validity of the instrument. Their insights and expertise greatly aided this process. Furthermore, to validate the content further, input on the qualities and levels of relevance and clarity of the questionnaire was sought throughout the 30-health worker through pilot test. Due to expert evaluation and revision following target audience comments during the pilot test, the questionnaire's acceptability and relevance were maintained.

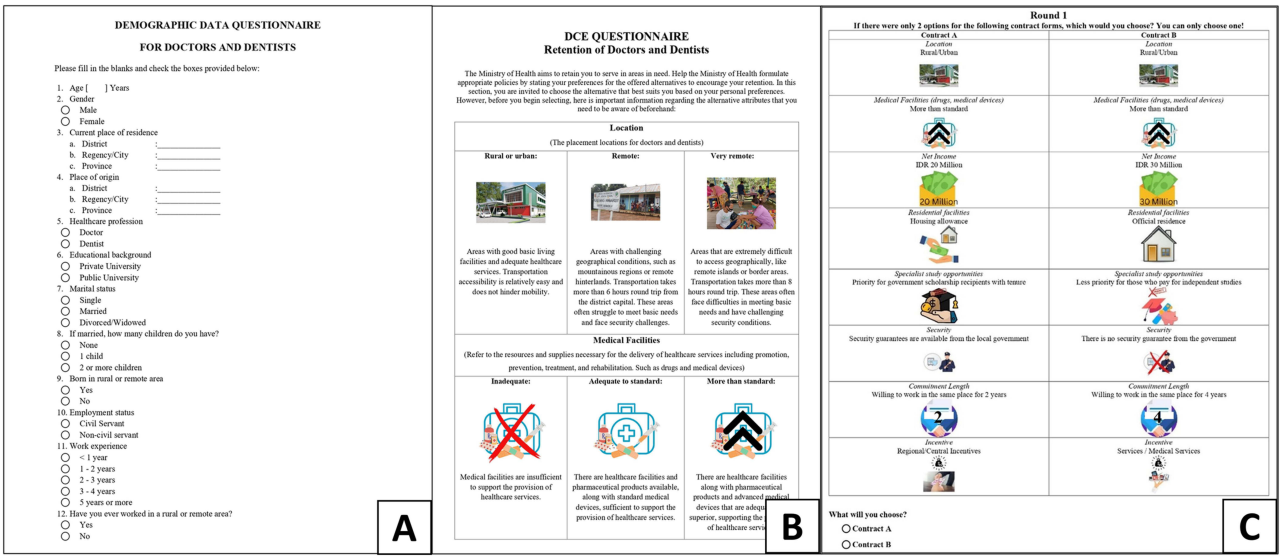

Figure 1 The DCE Questionnaire. ((**A**) Respondent Characteristics Question; (**B**) Cheap Talk Script; and (**C**) Round 1 from 18-Choice set DCE Recruitment Section).

Data Analysis

Demographic characteristics were examined through univariate statistics. Descriptive statistics were employed to analyze respondent profiles, providing detailed insights into their characteristics. The DCE question variables underwent evaluation using conditional logit regression, generating mean utility coefficients and odds ratios. Statistical significance was determined at a 5% p-value, with 95% confidence intervals (CI) established. Conditional logit regression was applied to estimate preferences in DCE retention questions, analyzing the entire sample and subgroups. This approach facilitated the exploration of preference variations among different respondent segments. Positive coefficients indicated a preference for a specific attribute level over the reference level, while odds ratios (OR) were utilized to assess the likelihood of liking or disliking attribute levels.

Furthermore, we performed a Willingness to Accept (WTA) analysis specifically for non-monetary attributes. The WTA values were denominated in Indonesian Rupiah (IDR), with a larger value indicating a higher compensation required for accepting a contract change. This analysis aimed to estimate the compensation doctors and dentists desired for alterations in non-monetary attributes. The Marginal Willingness to Accept (mWTA) values, also expressed in Indonesian Rupiah (IDR), denote the compensation respondents are willing to accept due to changes in attribute levels. Higher mWTA values signify a greater compensation that respondents seek for specific attribute levels. The mWTA calculation is grounded in the assumption of maximizing respondent utility and is expressed as follows:[29]

$$mWTA = \frac{\text{Coefficient of non} - \text{monetary attribute level}}{\text{Coefficient of monetary attribute level}}$$

Ethical Approval

This research was approved by the Ethics Committee of Faculty of Nursing, Universitas Airlangga (Number 2683-KEPK) on 10 November 2022. Participants were informed about the study, and provided informed consent prior to study participation. Respondents participated voluntarily and had given their written consent.

Results

Respondent Profile

A total of 158 respondents answered DCE questions which were divided into 113 doctors and 45 dentists. The respondents were mostly female (69%) and between the ages 20 and 29 years (72.8%). The majority were graduates of private universities (60.1%) with marital status data showing most were single (75.9%) and did not have children (84.2%).

According to their birthplace, 110 (69.6%) were born in non-rural or remote areas. Furthermore, 141 (89.2%) of those surveyed were not civil servants. The majority of respondents (61.4%) had work experience of 1–2 years. According to current placement status 57.6% respondents were from the Nusantara Sehat program, with 63.9% placed outside from their home province. The region with the highest number of respondents was the western region (41.8%) (Table 2).

Preferences for Retention of Doctor and Dentists in Remote Areas

Table 3 presents the findings of a study examining the factors influencing doctors' and dentists' decisions to remain in remote areas. Non-monetary attributes such as location, facilities, study opportunities, security, commitment length, and incentives significantly influence their preferences. Overall, respondents' preferences for most attributes did not differ between the two professions. However, differences in the importance level of certain attributes were observed. Specialist study opportunities

Table 2 Respondents Profile (N=158)

Characteristics		**n**	**%**
Gender	Female	109	69
	Male	49	31
Age	20–29 years	115	72.8
	30–39 years	37	23.4
	≥40 years	6	3.8
Profession	Dentist	45	28.5
	Doctor	113	71.5
Education graduate	Public university	63	39.9
	Private university	95	60.1
Marital status	Divorced/widowed	1	0.6
	Single	120	75.9
	Married	37	23.4
Number of children	Have no children yet	133	84.2
	Have 1 child	10	6.3
	Have 2 or more children	15	9.5
Born in a rural or remote area	Not	110	69.6
	Yes	48	30.4
Job status	Non civil servants	141	89.2
	Civil servant	17	10.8
Work experience	1–2 years	97	61.4
	2–3 years	22	13.9
	3–4 years	20	12.7
	Over 5 years	19	12
Have worked in rural or remote areas	Not	67	42.4
	Yes	91	57.6

(*Continued*)

Table 2 (Continued).

Characteristics		n	%
Placement status	Nusantara Sehat Program	91	57.6
	Organic doctors and dentists	20	12.7
	Indonesian doctor internship program	47	29.7
Placement location	Inside the province as region of origin	57	36.1
	Outside the province as region of origin	101	63.9
Placement Region	Western	66	41.8
	Central	47	29.7
	Eastern	45	28.5

ranked highest in importance for the retention of doctors, whereas for dentists, it was the fourth highest important attribute (for dentist OR = 3.56; and for doctor OR = 5.65; with p-value < 0.001). Security guarantees from the local government emerged as the second most preferred attribute for doctors (OR 4.17, p-value < 0.001) and the first preferred for dentists (OR

Table 3 Conditional Logit Estimation of Retention Doctors and Dentists

Attribute	Levels	Dentist (N=45)			Doctor (N=113)		
		coef	OR	mWTA (IDR)[a]	coef	OR	mWTA (IDR)[a]
Location	Remote (Rural or urban)	−0.0601 (0.2044)	0.9416	427,131	−0.2322 (0.1281)	0.7928	1,725,111
	Very remote (Rural or urban)	−1.7080*** (0.3412)	0.1812	12,130,682	−1.5580*** (0.2148)	0.2106	11,575,037
Medical facilities	Adequate to standard (Inadequate)	1.3190*** (0.2758)	3.7410	−9,367,898	1.0810*** (0.1838)	2.9490	−8,031,204
	More than standard (Inadequate)	1.4880*** (0.2012)	4.4290	−10,568,182	1.1890*** (0.1140)	3.2830	−8,833,581
Housing facilities	Official residence (Not available)	1.2870*** (0.2061)	3.6230	−9,140,625	1.3070*** (0.1323)	3.6940	−9,710,253
	Housing allowance (Not available)	0.4075 (0.2301)	1.5030	−2,894,176	0.6700*** (0.1478)	1.9540	−4,977,712
Specialist study opportunities	Priority for government scholarships recipients with years tenure (Less priority for those who pay for independent studies)	1.2710*** (0.1866)	3.5630	−9,026,989	1.7330*** (0.1309)	5.6580	−12,875,186
	Priority for those who study independently (Less priority for those who pay for independent studies)	−0.2887 (0.2847)	0.7492	2,050,426	0.3759* (0.1794)	1.4560	−2,792,719
Security	Security guarantee are available from the local government (No security guarantee from the government)	1.5840*** (0.2417)	4.8740	−11,250,000	1.4290*** (0.1452)	4.1730	−10,616,642
Commitment Length	Willing to work in the same place for 4 years (Willing to work in the same place for 2 years)	−0.6278 (0.3230)	0.5338	4,458,807	−0.4981* (0.2109)	0.6077	3,700,594
	Willing to work in the same place until retirement (Willing to work in the same place for 2 years)	−0.9983*** (0.2724)	0.3685	7,090,199	−1.6520*** (0.1878)	0.1916	12,273,403

(*Continued*)

Table 3 (Continued).

Attribute	Levels	Dentist (N=45)			Doctor (N=113)		
		coef	OR	mWTA (IDR)[a]	coef	OR	mWTA (IDR)[a]
Incentive	Regional/central incentives (Services/medical services)	1.0170** (0.3221)	2.7660	−7,223,011	0.5475** (0.2051)	1.7290	−4,067,608
	All incentives (Services/medical services)	0.5712* (0.2595)	1.7700	−4,056,818	0.1950 (0.1696)	1.2150	−1,448,737
Net income		0.0000*** (0.0000)	1.0000		0.0000*** (0.0000)	1.0000	

Notes: *p<0.05. **p<0.01. ***p<0.001. [a]1 USD = 15,129 IDR as 18 January 2023.
Abbreviations: Coef, Coefficient; IDR, Indonesian Rupiah; mWTA, Marginal Willingness to Accept; OR, Odds Ratio; SE, Standard Error.

= 4.87, p-value < 0.001). Official housing facilities ranked third in their hierarchy of preferences (OR = 3.6, p-value < 0.001 for both professions), while medical facilities exceeding standard held substantial importance, especially for dentists, ranking second in preference (OR = 3.74, p-value < 0.001), and fourth for doctors (OR = 2.94, p-value < 0.001). They preferred incentives from regional or central government over medical services (dentist OR = 2.76 and doctor OR = 1.72; p < 0.001). When it comes to staying time, doctors preferred shorter commitments, like two years instead of four (OR = 0.6, p < 0.05), whereas dentists preferred not to stay until retirement, opting for shorter durations (OR = 0.36, p-value < 0.001). Both groups were less likely to want to work in very remote areas compared to rural or urban places (dentist OR = 0.18; doctor OR = 0.21; p < 0.001). In terms of the monetary attribute, namely net income per month, indicating that both dentists and doctors strongly desired a higher monthly net income.

Discussion

In general, respondents' preferences for most attributes in each group did not differ. The difference between the two professions was in the level of preference importance in several attributes. The opportunity for specialist study was the attribute rated as most important for retention in the doctor group, but in the dentist group, it was rated as the fourth most important attribute. Several existing studies show that specialist study opportunities can add skills in health services.[30–33] In addition, specialist study opportunities play a role in career advancement.[30,31] But the cost for specialist studies tends to be very high with quite fierce competition,[34] so that priority and scholarships provided by the government would be an attraction for doctors and dentists to be willing to be retained in remote areas. Specialist study opportunities are widely offered by the government through various mechanisms.[35,36] This opportunity may be seen by specialist candidates as a golden opportunity to advance their career.

Security assurance is an attribute that is highly considered by dentist and doctors.. Security in this assessment was aimed at guaranteeing security while they work in primary health care. Security and safety factors are the main factors that need to be of common concern, especially in areas of conflict and those prone to violence.[14,37,38] According to a physician working in Chad's rural district, security issues for unaccompanied female health workers in the periphery may arise and hinder them from working in difficult areas[39]. This security aspect needs to be discussed in the field with local government and local law enforcement agencies, because health workers' safety must be ensured if they are to remain in remote areas for an extended period of time.

This study shows that living facilities with official residence a higher preference than housing allowance. Similar results were found in a study of health workers in rural Zambia who were five times more willing to be retained if given official housing rather than housing allowances.[40] The existence of housing facilities is worth considering for doctors and dentists because they will be greatly assisted by basic living facilities. Ministry of Health decree number 75 of 2014[41] mandates that every primary health care centre must have housing facilities or official housing buildings for health workers. As they have been supporting those working in remote areas, this policy is a source of leverage for them.

Medical facilities that are more than just standard are preferred over those that are merely adequate for the retention of doctors and dentists. Medical facilities are closely related to the quality of care and readiness to practice. Doctors and dentists without adequate medical facilities will experience limited skills in providing health services to patients.[30,42,43] In addition, medical facilities can influence people's confidence in their abilities to produce a specified level of performance in remote areas.[43,44] Efforts to improve medical facilities will support the attraction and retention of doctors and dentists in remote areas.[45,46] The fulfillment of health facilities, infrastructure and medical devices at the primary healthcare level must be accompanied by increased good governance and financial allocation.

In this study, regional or central incentives were more likely preferred by doctors and dentists than all other incentives. Previous studies have assessed that incentives, both financial and non-financial, have less effect on retention of doctors and dentists.[46–49] However, the effectiveness of incentives, both financial and non-financial, on retention has been questioned, possibly due to limited work facilities in remote areas.[50] Junior doctors tend to place more importance on incentives than senior doctors.[49,51] It is crucial to identify and enhance the available incentives, considering the fiscal capacity of the district. Although income ranks relatively low in importance, several studies suggest that higher income is associated with better retention rates and fewer movements of healthcare professionals.[52–54] Insufficient income may hinder doctors and dentists in remote areas from meeting their daily needs and impede their motivation to improve service quality.[52,53,55] The government has established income regulations, especially for civil servants, to address this issue.[56] Additionally, the income gap among doctors and dentists in remote areas is relatively narrow, particularly for those working in primary healthcare settings.

Placement location and length of commitment were found to be the least concerning for both doctors and dentists. Although this attribute is considered not very important, our results find that doctors and dentists have a positive preference for working in rural or urban areas compared to remote areas. This is reasonable considering that village or city infrastructure is better when compared to remote areas.[57] Previous research has shown that length of commitment is beneficial for the community in remote areas, because the presence of doctors and dentists allows access to the healthcare through an inclusive approach.[14,58–60] To retain doctors and dentists in remote areas, it is critical to consider the unique challenges and benefits of each location.

Conclusion

In conclusion, both doctors and dentists prefer special study scholarships with assigned duties. Dentists also place significant importance on government security guarantees. To keep doctors in remote Indonesia, giving them chances for more education through government scholarships is crucial, especially if they commit to serving for a certain time. This study provides valuable information to policymakers in determining strategies for retaining doctors and dentists in remote areas of Indonesia. Understanding doctors' and dentists' preferences can support determining the best retention policy. This study demonstrates that maintaining a medical workforce in remote areas of Indonesia requires a variety of interventions, with a primary focus on non-financial interventions, and giving priority for government scholarship recipients with bonding assignment. Policy options in non-financial and financial intervention packages can be combined, adapted to local circumstances, and linked to stakeholder interests. The study's outcomes carry substantial health equity implications. By identifying the preferences of doctors and dentists and tailoring retention strategies to meet their needs, the healthcare workforce in remote areas can be stabilized. This directly contributes to enhancing access to quality healthcare services for remote and underserved populations.

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Disclosure

The authors report no conflicts of interest in this work.

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