Understanding community health worker employment preferences in Malang district, Indonesia, using a discrete choice experiment

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ABSTRACT

Background Community health workers (CHWs) play a critical role in supporting health systems, and in improving accessibility to primary healthcare. In many settings CHW programmes do not have formalised employment models and face issues of high attrition and poor performance. This study aims to determine the employment preferences of CHWs in Malang district, Indonesia, to inform policy interventions.

Methods A discrete choice experiment was conducted with 471 CHWs across 28 villages. Attributes relevant to CHW employment were identified through a multistage process including literature review, focus group discussions and expert consultation. Respondents' choices were analysed with a mixed multinomial logit model and latent class analyses.

Results Five attributes were identified: (1) supervision; (2) training; (3) monthly financial benefit; (4) recognition; and (5) employment structure. The most important influence on choice of job was a low monthly financial benefit (US\$~2) (β=0.53, 95% CI=0.43 to 0.63), followed by recognition in the form of a performance feedback report (β=0.13, 95% CI=0.07 to 0.20). A large monthly financial benefit (US\$~20) was most unappealing to respondents (β=−0.13, 95% CI=−0.23 to −0.03). Latent class analysis identified two groups of CHWs who differed in their willingness to accept either job presented and preferences over specific attributes. Preferences diverged based on respondent characteristics including experience, hours' worked per week and income.

Conclusion CHWs in Malang district, Indonesia, favour a small monthly financial benefit which likely reflects the unique cultural values underpinning the programme and a desire for remuneration that is commensurate with the limited number of hours worked. CHWs also desire enhanced methods of performance feedback and greater structure around training and their rights and responsibilities. Fulfilling these conditions may become increasingly important should CHWs work longer hours.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Effective community health worker (CHW) programmes require adequate training and support, including a mix of financial and non-financial incentives.
⇒ The Indonesian CHW programme is one of the largest and longest-standing programmes globally yet has been subject to limited research regarding conditions that support motivation and performance.

WHAT THIS STUDY ADDS

⇒ A discrete choice experiment with CHWs in Malang district, Indonesia, found a strong preference for a small monthly financial benefit, increasing levels of dissatisfaction as the amount increased and preference for recognition in the form of a report that shows the results of their work.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Preference for a lower financial benefit suggests that the value placed by CHWs on such remuneration may be symbolic, as recognition of their contribution to the community, reinforcing the cultural values that underpin the programme.
⇒ Our findings also suggest that kaders value greater feedback of their work and more structure around training and employment conditions.

INTRODUCTION

Community health workers (CHWs) play an integral role in strengthening primary healthcare systems by linking communities to healthcare services.[1] They are directly connected to the communities they serve—they live in them and are accountable to them—and, in many cases, receive limited training to provide basic preventive healthcare services.[2] Beyond these commonalities, CHW programmes vary widely in terms of training, scope of practice and remuneration.[3] Staffing models for CHW programmes range from salaried and relatively well-trained workers to volunteers with minimal training.[3 4]

Since the 1978 Alma Ata Declaration, a substantial body of evidence has emerged

demonstrating the contribution of CHWs to improved population health outcomes to reducing health disparities.[5–7] Similarly, the factors that influence the performance and motivation of CHWs are also much better understood.[8 9] Recent evidence reviews identify a combination of technical enablers such as training, supervision and remuneration, and contextual factors including sustained political support and funding, community embeddedness and integration with the health system.[8–10] Yet despite these advances, CHW programmes continue to face the same challenges that have constrained them for decades: inadequate financing, lack of supplies and commodities, low compensation of CHWs and inadequate supervision.[11 12] These factors serve to demotivate CHWs and detrimentally affect retention, thus threatening the sustainability of community-based health programmes.[13]

Indonesia is home to one of the largest and longest-standing CHW programmes globally yet has been subject to relatively limited research.[3] The community health workforce, known as kaders, are village health volunteers whose primary task is to organise monthly village health posts, known as *Posyandu*, where they assist village midwives to provide activities including health and nutrition counselling, immunisation campaigns, monitoring and screening activities for diabetes and hypertension, and maternal and child healthcare.[3]

In addition to their usual duties, kaders in Malang district of East Java province play a crucial role in the SMARThealth programme—a mobile health-supported community-based intervention to optimise preventative care and treatment for cardiovascular diseases. Kaders screen community members for cardiovascular risk using a tablet-based application, which provides individual risk information, management plans and decision aids to assist nurses and doctors decide on the appropriate treatment for high-risk patients. Over a 2-year trial period in eight villages of Malang district the SMARThealth programme reduced the number of people at high risk of cardiovascular disease by 14.5% and was found to be cost-effective.[14 15] In 2020, the programme was adopted by the Malang District Health Authority to be scaled up to all 390 villages in the district, a targeted population (those aged 40 years and older) of one million residents. Ensuring that kaders are well-supported and motivated to perform at a high level will be critical to the continued impact of the SMARThealth programme at scale.

The development of appropriate strategies to support kaders requires an understanding of their preferences for their working conditions. A discrete choice experiment (DCE) is a quantitative survey-based approach to eliciting individual preferences. Respondents are presented with a series of hypothetical choices between two or more alternatives, each of which is described by a set of attributes of varying levels.[16] For instance, for patient preferences, respondents may be asked to choose between treatment options that vary in terms of efficacy, cost and side effects. This method allows the analyst to assess the value placed by patients on each attribute and the trade-offs they are

prepared to make between them (eg, how much additional cost would they be willing to bear for more efficacious treatments?) and determine overall treatment configurations that optimise overall patient preferences. Furthermore, heterogeneity in preferences between different types of respondents can be assessed.

DCEs have been widely used in health economics research and, more recently, to inform health workforce policies in low-and-middle-income countries.[17] The use of DCEs to assess the preferences of CHWs, particularly volunteer CHWs, has steadily grown since 2014.[17–23] Findings often highlight that a mix of financial and non-financial incentives are critical to support the motivation, performance and retention of CHWs. For instance, in Kenya, Abuya and colleagues found that transport was considered the most important incentive attribute for volunteer CHWs, followed by tools of trade and job incentives that offered higher monthly stipends.[24] Most of these studies have been conducted in African countries, with relatively few in Asia and none were identified carried out in Indonesia.

In this study we conducted a DCE with kaders in Malang district, Indonesia, to assess their preferences for their employment conditions. Results of the DCE will provide health system planners important information on the working conditions that best promote the motivation, performance and retention of kaders and support the scale up of the SMARThealth programme.

METHODS
Study setting and participants
Malang is the second largest district in East Java province with a population of 2 874 204 people distributed across 33 subdistricts and 390 villages: 273 (70%) rural and 117 (30%) urban (2018 Census). Kaders are appointed from within their own village by a village committee, to which they are accountable. Kaders are required to receive 3 days of training on the *Posyandu* curriculum, but previous research has questioned the efficacy of kader training.[3 25] According to Puskesmas law (Indonesian Health Ministry Regulation No. 75 Year 2014), kaders are to be guided and supported at the monthly *Posyandu* by a staff member from the local health centre (*puskesmas*).[3]

There is no formalised employment model for kaders and they do not receive a salary. However, kaders typically receive a monthly financial 'gift', the amount of which is set at the discretion of the Village Government and commonly varies between 25 000–50 000 (US$2–4) Indonesian rupiah (IDR). Research on incentives for kaders is very limited and somewhat contradictory. Of two small qualitative studies, one found that programme administrators questioned the necessity of financial incentives for kaders while the other reported that administrators thought that a relatively large monthly financial incentive (500 000 IDR, US$~20) was an appropriate amount for kaders.[26 27]

Table 1 Final set of attributes and levels

Attribute	Level 1	Level 2	Level 3	Level 4
Supervision	District Health Authority (DHA) representative	Nurse and/or midwife		
Training frequency	Sporadic unstructured training	3-day training course +periodic additional training		
Benefits per month	25 000 IDR	100 000 IDR	300 000 IDR	500 000 IDR
Form of recognition	No recognition	Kaders' screening and referral skills officially endorsed by government	Bi-annual award for kaders with good performance from the DHA and Head of Village	Report available for kaders to see results of their work
Employment structure	Employment contract with fixed number of days to work per month	No employment contract and flexible work hours to complete duties		

IDR, Indonesian rupiah.

Attribute development

Identification and selection of DCE attributes was conducted in a multistage process in accordance with the International Society of Pharmacoeconomics and Outcomes Research checklist for conjoint analysis applications in health.[28] First, a literature review was conducted to identify employment characteristics of importance to CHWs across a variety of contexts. Second, the transcripts of two focus group discussions with kaders were analysed to understand enablers and barriers faced while performing duties. These focus group discussions were conducted as part of the SMART*health* programme in Malang district.

Emerging themes from the literature review and focus group discussions were used as the basis for attributes that were iteratively refined by the authors in consultation with an expert panel of clinicians and public health researchers from the University of Brawijaya, Indonesia. From this process, five attributes were included in the pilot DCE (table 1). Following translation of the attributes and levels from English into Bahasa Indonesia language, a 'think aloud' process was conducted with CHWs (n=5) in Malang district, to test the cognitive intelligibility of attributes and levels.[29]

Piloting

The DCE was pilot tested using approximately 10% (n=30) of the intended sample size to test comprehension and determine whether adjustments in design, descriptions of the attributes and/or administration were required. Once the final DCE content was decided, it was programmed into an Android-based application for data collection and field-tested for a final check of usability and comprehension.

DCE design

The software Ngene V.1.2.0 was used to design a d-efficient, fractional factorial design using a multinomial logit model. Estimated coefficients for each level were derived from pilot data and used as prior estimates to generate the final survey tool. The final survey consisted of 24 unlabelled choice sets, asking participants to choose between two hypothetical jobs that varied in levels of the attributes. Blocking—whereby the total number of questions is divided equally between two respondent groups—was used to limit respondent fatigue such that each respondent was asked to complete 12 questions. Each choice set included an opt out option; respondents were asked to make an unforced choice (job A, job B or neither job), followed by a forced choice (job A or job B) if 'neither' was selected. Figure 1 shows an example choice set in English.

The DCE was preceded by a questionnaire assessing respondent sociodemographic characteristics, years of experience as a kader, hours worked per week and whether they are the main source of income for the household.

Data collection

Data collection was conducted face-to-face in the local language (Bahasa) using an offline Android-based application on computer tablets. The efficiency and feasibility of conducting DCEs through an Android platform has been previously demonstrated.[30] In total, 25 villages were visited for data collection. In each village a member of the research team invited all kaders to the village meeting hall and explained the nature of the study to the participants, went through the introductory statement with them, explained the job sets and how to use the tablet device. Kaders completed the questionnaire themselves. Data collection took place between November 2020 and February 2021.

Sample size

Methods for calculating the required sample sizes for DCEs are debated in the literature, with studies commonly relying on 'rule-of-thumb' estimates or the use of efficient experimental designs.[24 31 32] The sample
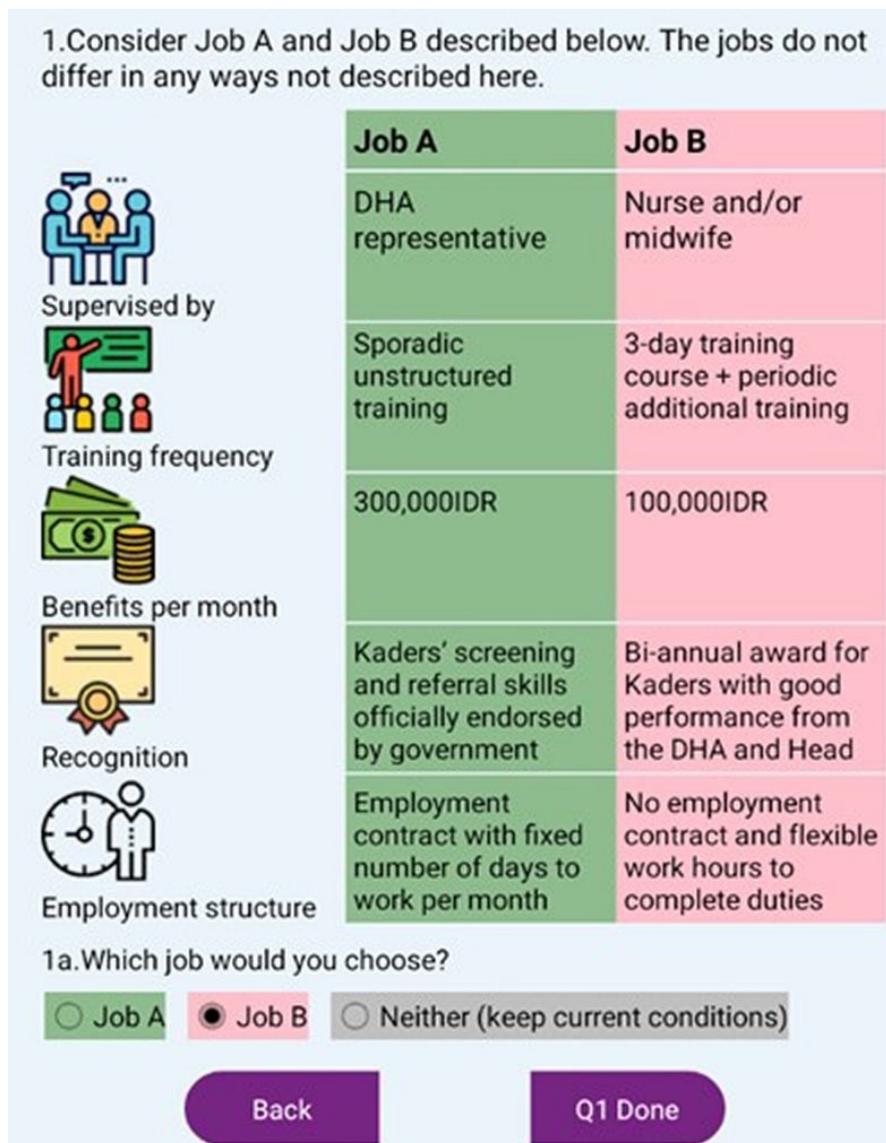
Figure 1 Example choice set presented to respondents. DHA, District Health Authority; IDR, Indonesian rupiah.

size calculation for this study was guided by the rule-of-thumb approach, pragmatic considerations around data collection and informed by published DCEs in similar cohorts.[19 33 34] According to the rule-of-thumb by Johnson and Orme, the minimum sample size for this study was 84 respondents. However, we aimed to improve statistical precision and allow for examination of subgroups by targeting a sample size of 350–400 respondents.

Statistical analysis

DCEs are based on the random utility theory, which assumes that each respondent will select the alternative that best maximises their individual utility. In this context, utility can best be understood as an indication of the relative preference that respondents attach to each attribute. The sign of each coefficient (β) reflects whether it has a positive or negative influence for respondents, while the magnitude of the coefficient reflects the size of this influence. Descriptive statistics were used to summarise

demographic characteristics of the questionnaire preceding the DCE.

Unforced choice data (with options coded as A, B or neither job) were used for all analyses with the respondents' choices as the dependent variable. All attributes were specified as categorical variables and effects coded. Consistent with current guidance, we first tested the financial attribute as a categorical variable to explore linearity.[35] Results suggested a non-linear pattern and better model performance than categorising the attribute as a continuous variable; therefore, we coded the financial attribute as three separate parameters. All analyses were conducted using NLOGIT software V.6.

Three models were estimated to harvest a rich variety of information about respondent preferences. Initial exploratory analysis was undertaken using a multinomial logit model to estimate preferences across all participants (see online supplemental file 1). However, as this model assumes homogeneity of preferences, which is unlikely

to be the case, a mixed multinomial logit model was conducted. The mixed model takes preference heterogeneity among participants into account by allowing attribute coefficients to be randomly distributed with a specified probability distribution.[36] All parameters were modelled as random with a normal distribution, including the monthly financial benefit since the base multinomial logit model found both positive and negative coefficients for this attribute.

Next, a latent class model was estimated. This method explores whether there are underlying subgroups (classes) within the sample with similar preferences and can be particularly useful to inform policy recommendations.[37] The analyst must stipulate the number of classes and which observed variables to include in the model. A two-class model was assessed by the authors to be the most appropriate to interpret the data as larger class models showed minimal gains in model fit statistics and class sizes became too small for meaningful interpretation (online supplemental file 3). Estimated probabilities of group membership were used to examine the characteristics associated with each group, with the largest probability used to determine the group for each respondent.

Ethics
The questionnaire was prefaced by an electronic participant information statement in simple Bahasa Indonesia. Participants were required to confirm that they had understood the participant information statement in order to proceed to the questionnaire; completion of the DCE constituted consent.

Patient and public involvement
This research was done without patient involvement due to the subject area and methods chosen. Patients were not invited to comment on the study design, interpret the results or to contribute to the writing or editing of this document for readability or accuracy.

In online supplemental file 2, we present a reflexivity statement on the partnership between high-income and low-income and/or middle-income countries.

RESULTS
Characteristics of respondents
A total of 480 kaders participated in the DCE and demographic questionnaire, with 471 complete results available (table 2). Nearly all (98.9%) CHWs identified as women, the mean age was 42 years and CHWs had, on average, 11.2 years of work experience. Just under half of the cohort (45.4%) had a senior high school education, 46.9% reported an average weekly household income of more than 500 000 IDR (US$35) and 46.5% reported working less than 2 hours per week as a CHW.

Preferences
All 471 participants completed all 12 choice tasks, giving 5652 observations. The opt-out option was selected 1181 times (20.9%); thus, we did not analyse the forced choice

Table 2 General characteristics of cohort

Respondent characteristics	N	%
Total respondents	471	100
Age		
20–29	57	12.1
30–39	143	30.4
40–49	163	34.6
50 and above	108	22.9
Female	466	98.9
Education		
Elementary school	85	18.1
Junior high school	144	30.6
Senior high school	214	45.4
University degree	28	5.9
Weekly average household income (IDR)		
250 000–500 000 (US$17–35)	250	53.1
500 000–1 000 000 (US$35–70)	193	41.0
1 000 000+ (US$70–105)	28	5.9
Hours worked as a kader per week		
<2	219	46.5
2–4	152	32.3
4+	100	21.2
Years' experience as a kader		
1–9	230	48.8
10–19	157	33.3
20+	84	17.9
Main source of household income		
Yes	66	14.0
No	405	86.0

IDR, Indonesian rupiah.

data as there was sufficient information to run the model with the opt-out option.

Results of the mixed multinominal logit model are presented in table 3. Results show that respondents have a strong preference for the lowest monthly benefit amount (β=0.53, 95% CI=0.43 to 0.63) and found higher amounts unappealing. Regarding forms of recognition, the only option that appealed to respondents was receiving a report to see the results of their work (β=0.13, 95% CI=0.06 to 0.20). While respondents expressed a marginal preference for having an employment contract (β=0.10, 95% CI=0.07 to 0.14), the opt-out option was very unappealing (β=−0.76, 95% CI=−0.86 to −0.67) suggesting the range of hypothetical job scenarios presented were generally not extreme enough to warrant not working under those conditions. Supervision format and training frequency did not have an influence on respondents choices.

Latent class analyses
The latent class model detect two distinct groups with heterogeneity in preferences, comprising 68.8%, and

Table 3 Results from mixed multinomial logit model for full sample (R²=0.182, AIC=10 200.1, BIC=10 332.9)

Attribute	Level	β	SE	95% CI		SD
Supervision	District Health Authority	0.03	a	a	a	a
	Nurse and/or midwife	−0.03	0.02	−0.07	0.01	**0.21****
Training frequency	Sporadic training	−0.03	a	a	a	a
	3-day training course	0.03	0.02	−0.01	0.06	0.02
Benefits per month (IDR)	25 000	**0.53****	0.05	0.43	0.63	**0.54****
	100 000	**−0.12**	0.07	−0.25	0.01	**1.25****
	300 000	**−0.13***	0.05	−0.23	−0.03	**0.16****
	500 000	−0.28	a	a	a	a
Form of recognition	None	−0.03	a	a	a	a
	Official endorsement	−0.06	0.04	−0.13	0.02	**0.08***
	Award for good performance	−0.04	0.04	−0.11	0.03	**0.08***
	Report on results	**0.13****	0.04	0.06	0.20	0.00
Employment structure	No employment contract	−0.10	a	a	a	a
	Employment contract	**0.10****	0.02	0.07	0.14	0.03
Neither job	NA	**−0.76****	0.05	−0.86	−0.67	**1.58****

*, ** denotes significance at p<0.1 and 0.5, respectively; *a* Reference level.
AIC, Akaike Information Criterion; BIC, Bayesian Information Criterion; IDR, Indonesian rupiah.

31.2% of our cohort, respectively (table 4). The general characteristics of the groups are shown in online supplemental file 4. Kaders in group 1 (68.8% of the sample, n=324) were more likely to be older, have more years' experience, work less hours per week and have a higher average income. Comparatively, those in group 2 (n=31.2%, n=147) were younger, less experienced, had a lower income and work more hours per week.

The most significant divergence of preferences was in relation to the opt-out option. Group 1 kaders were highly unlikely to reject either of the jobs presented (β=−4.41, 95% CI=−3.89 to −4.92), while those in group 2 preferred not to accept either job (β=1.46, 95% CI=1.35 to 1.57). Reflecting this sentiment, group 1 kaders expressed marginal preference for the current supervision format (β=1.23, 95% CI=0.55 to 1.92), while those in group 2

Table 4 Latent class logit model results (n=471, McFadden pseudo R²=0.269, AIC=9121.6, BIC=9261.1)

Attribute	Level	Group 1%–68.8% of sample			Group 2%–31.2% of sample		
		β	SE	P value	β	SE	P value
Supervision	District Health Authority	−0.03	a	a	0.28	a	a
	Nurse and/or midwife	**0.03***	0.02	0.07	**−0.28*****	0.05	0.00
Training frequency	Sporadic training	−0.03	a	a	0.02	a	a
	3-day training course +refreshers	**0.03***	0.02	0.09	−0.02	0.04	0.65
Benefits per month (IDR)	25 000	**1.00*****	0.26	0.00	**0.72*****	0.07	0.00
	100 000	**−0.73*****	0.26	0.01	**−0.54*****	0.10	0.03
	300 000	**−0.86*****	0.27	0.00	0.06	0.08	0.47
	500 000	0.59	a	a	−0.12	a	a
Form of recognition	None	−0.09	a	a	0.99	a	a
	Official endorsement	−0.01	0.03	0.73	**−0.23*****	0.08	0.01
	Award for good performance	−0.01	0.04	0.79	−0.07	0.08	0.39
	Report on results	**0.11*****	0.03	0.00	0.07	0.08	0.34
Employment structure	No employment contract	−0.08	a	a	−0.02	a	a
	Employment contract	**0.08*****	0.02	0.00	0.02	0.04	0.73
Neither job	NA	**−4.41*****	0.26	0.00	**1.46*****	0.06	0.00

*, *** denotes significance at p<0.1 and 0.01, respectively; *a* Reference level.
AIC, Akaike Information Criterion; BIC, Bayesian Information Criterion; IDR, Indonesian rupiah.

strongly disliked it (β=1.23, 95% CI=0.55 to 1.92). Preference for a small monthly financial benefit was consistent across both groups.

DISCUSSION

To our knowledge, this is the first DCE to be conducted with the community health workforce, known as kaders, in Indonesia. While we find some level of preference heterogeneity among kaders in Malang district, the majority valued jobs that provide a lower monthly financial benefit, recognition in the form of a report on their performance and more structure around training and contract status. CHWs expressed indifference towards recognition in the form of government endorsement, an award for good performance and higher amounts of the monthly financial benefit. Latent class analysis suggested that the main drivers of preference heterogeneity are age, years' of experience, the number of hours worked per week and income.

The most salient finding from this study is that the majority of respondents expressed a strong and consistent preference for the lowest monthly financial benefit and opposition to higher amounts. This unexpected result contrasts with findings studies of community health worker employment preferences conducted elsewhere.[18 21 22 24] This may be partly explained by the strong prosocial foundation underpinning Indonesia's kader programme, which emphasises the cultural and religious value of 'gotong royong', a concept that promotes communal service and volunteering for one's neighbourhood.[38–40] Recent qualitative research suggests that these values remain relevant to kaders, finding that not only did they not expect a financial incentive for their work, but that it may even weaken their motivation.[25 26] Furthermore, the preference for a lower monthly financial benefit found among our study cohort—the majority of whom reported working less than 4 hours per week—may suggest that kaders prefer a financial benefit that is commensurate with their workload: previous research has found that kaders who were engaged in a more time-intensive healthcare intervention were open to receiving a larger monthly financial benefit.[27]

Recognition is a key motivator of CHWs, yet it can be a challenging concept to capture within a DCE. Similar studies have relied on broad statements indicating a high or low level of support from the community or described forms of recognition that are more akin to incentives such as 'priority healthcare for family members' or 'career progression'.[20 22] Our levels for the recognition attribute were informed by the evidence base and highlighted by kaders in our source material, yet only one level influenced respondent choices. Respondent's preference for recognition in the form of a report on their work suggests that kaders prefer some form of performance feedback and appraisal which provides them the means to improve their work. This is consistent with our finding that kaders favour a more structured approach

to training opportunities. Assessments of current support systems for kaders are limited, but these findings ties in with previous research that characterised the support provided by village midwives to kaders as unstructured and 'not very supportive or motivating'.[25] Previous research has shown that enhanced training and supervision of kaders can lead to improved community health outcomes.[41–43]

Latent class analysis revealed heterogeneity among respondent preferences. Notably, preferences diverged based on respondent characteristics including experience, hours' worked per week and income. The majority of respondents were more likely to be experienced kaders who worked a small number of hours per week. Results suggest they are satisfied with current working conditions but prefer more structured training, performance feedback and an employment contract. Their dislike of a higher financial benefit may suggest that a small incentive is seen as commensurate with their duties and a higher amount may be perceived to come with the expectation of increased hours and responsibility. Comparatively, around a third of respondents, who are younger and work more per week, expressed dissatisfaction with current conditions. Should the SMARThealth programme require kaders to work longer hours, these differences will need to be considered.

While it is important to acknowledge these discrepancies, from a policy perspective decisions need to be contextualised to the overall preferences of kaders. In terms of policy relevance, there are a few clear take-aways from this study. First, our finding regarding the current monthly financial benefit suggests that the current policy (of approximately 25000–50000 IDR per month) is appropriate and acceptable to the majority of kaders in Malang district. Second, kaders' preference for a report on their work suggests that there may be scope to provide additional forms of appraisal or feedback on their performance suggesting support for the idea of ongoing quality improvement. Previous studies have shown that similar interventions have led to improvements in kader performance.[42 44] Third, marginal preferences for the training attribute and an employment contract suggests that kaders favour a more structured approach to their positions and greater certainty about roles, responsibilities and rights.

Limitations

Our study sample was not nationally representative and thus, while the findings can be generalised to the Malang district, they may not be applicable to other areas of Indonesia. Second, we did not perform any tests to ensure internal validity of the DCE among participants. Instead, we used a 'think aloud' technique to cognitively test our DCE and blocking of the questionnaire to limit the number of scenarios presented and cognitive burden on respondents. Last, due to time and cost considerations kaders were non-randomly sampled for inclusion in the DCE yet this should be mitigated by the large sample size and large number of diverse villages visited for data collection.

CONCLUSION

In this DCE kaders in Malang district, Indonesia indicated a strong preference for a small monthly financial benefit, recognition in the form of a report that shows the results of their work and an employment contract with a fixed number of days to work per month. Importantly, kaders expressed a strong dislike for higher levels of financial benefits, perhaps suggesting resistance to the associated expectations this may bring and the undermining of altruistic motives driving their activities. These findings reinforce the cultural values that underpin the kader programme and highlights potential avenues to improve how kaders are supported.

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REFERENCES

1 Tulenko K, Møgedal S, Afzal MM, *et al*. Community health workers for universal health-care coverage: from fragmentation to synergy. *Bull World Health Organ* 2013;91:847–52.
2 Lehmann U, Sanders D. *Community health workers: what do we know about them? The state of the evidence on programmes, activities, costs an impact on health outcomes of using community health workers*. Geneva: World Health Organization, 2007.
3 Perry H, Zulliger R, Scott K. *Case studies of large-scale community health worker programs: examples from Afghanistan, Bangladesh, Brazil, Ethiopia, Niger, India, Indonesia, Iran, Nepal, Pakistan, Rwanda, Zambia, and Zimbabwe*. USAID, 2017.
4 Singh D, Negin J, Otim M, *et al*. The effect of payment and incentives on motivation and focus of community health workers: five case studies from low- and middle-income countries. *Hum Resour Health* 2015;13:58.
5 Glenton C, Scheel IB, Lewin S, *et al*. Can lay health workers increase the uptake of childhood immunisation? Systematic review and typology. *Trop Med Int Health* 2011;16:1044–53.
6 Lassi ZS, Bhutta ZA. Community-based intervention packages for reducing maternal and neonatal morbidity and mortality and improving neonatal outcomes. *Cochrane Database Syst Rev* 2015;3.
7 Lewin S, Munabi-Babigumira S, Glenton C, *et al*. Lay health workers in primary and community health care for maternal and child health and the management of infectious diseases. *Cochrane Database Syst Rev* 2010;3:CD004015.
8 Kok MC, Dieleman M, Taegtmeyer M, *et al*. Which intervention design factors influence performance of community health workers in low- and middle-income countries? A systematic review. *Health Policy Plan* 2015;30:1207–27.
9 Scott K, Beckham SW, Gross M, *et al*. What do we know about community-based health worker programs? A systematic review of existing reviews on community health workers. *Hum Resour Health* 2018;16:39.
10 Pallas SW, Minhas D, Pérez-Escamilla R, *et al*. Community health workers in low- and middle-income countries: what do we know about scaling up and sustainability? *Am J Public Health* 2013;103:e74–82.
11 Perry HB, Chowdhury M, Were M, *et al*. Community health workers at the dawn of a new era: 11. CHWs leading the way to "Health for All". *Health Res Policy Syst* 2021;19:111.
12 Agarwal S, Kirk K, Sripad P, *et al*. Setting the global research agenda for community health systems: literature and consultative review. *Hum Resour Health* 2019;17:22.
13 Nkonki L, Cliff J, Sanders D. Lay health worker attrition: important but often ignored. *Bull World Health Organ* 2011;89:919–23.
14 Angell B, Lung T, Praveen D, *et al*. Cost-effectiveness of a mobile technology-enabled primary care intervention for cardiovascular disease risk management in rural Indonesia. *Health Policy Plan* 2021;36:435–43.
15 Patel A, Praveen D, Maharani A, *et al*. Association of multifaceted mobile technology-enabled primary care intervention with cardiovascular disease risk management in rural Indonesia. *JAMA Cardiol* 2019;4:978–86.
16 Mangham LJ, Hanson K, McPake B. How to do (or not to do)… designing a discrete choice experiment for application in a low-income country. *Health Policy Plan* 2009;24:151–8.
17 Mandeville KL, Lagarde M, Hanson K. The use of discrete choice experiments to inform health workforce policy: a systematic review. *BMC Health Serv Res* 2014;14:367.
18 Agarwal S, Abuya T, Kintu R, *et al*. Understanding community health worker incentive preferences in Uganda using a discrete choice experiment. *J Glob Health* 2021;11:07005.

19 Abdel-All M, Angell B, Jan S, *et al*. What do community health workers want? Findings of a discrete choice experiment among Accredited Social Health Activists (ASHAs) in India. *BMJ Glob Health* 2019;4:e001509.

20 Saran I, Winn L, Kipkoech Kirui J, *et al*. The relative importance of material and non-material incentives for community health workers: evidence from a discrete choice experiment in Western Kenya. *Soc Sci Med* 2020;246:112726.

21 Kok M, Abdella D, Mwangi R, *et al*. Getting more than "claps": incentive preferences of voluntary community-based mobilizers in Tanzania. *Hum Resour Health* 2019;17:1–9.

22 Lamba S, Arora N, Keraga DW, *et al*. Stated job preferences of three health worker cadres in Ethiopia: a discrete choice experiment. *Health Policy Plan* 2021;36:1418–27.

23 Shiratori S, Agyekum EO, Shibanuma A, *et al*. Motivation and incentive preferences of community health officers in Ghana: an economic behavioral experiment approach. *Hum Resour Health* 2016;14:53.

24 Abuya T, Mwanga D, Obadha M, *et al*. Incentive preferences for community health volunteers in Kenya: findings from a discrete choice experiment. *BMJ Open* 2021;11:e048059.

25 Nasir S, Ahmed R, Kurniasari M. Context analysis: close-to-community maternal health providers in South West Sumba and Cianjur, Indonesia. REACHOUT Consortium 2014.

26 Ormel H, Kok M, Kane S, *et al*. Salaried and voluntary community health workers: exploring how incentives and expectation gaps influence motivation. *Hum Resour Health* 2019;17:59.

27 Gadsden T, Jan S, Sujarwoto S, *et al*. Assessing the feasibility and acceptability of a financial versus behavioural incentive-based intervention for community health workers in rural Indonesia. *Pilot Feasibility Stud* 2021;7:132.

28 Bridges JFP, Hauber AB, Marshall D, *et al*. Conjoint analysis applications in health-a checklist: a report of the ISPOR Good Research Practices for Conjoint Analysis Task Force. *Value Health* 2011;14:403–13.

29 Eccles DW, Arsal G. The think aloud method: what is it and how do I use it? *Qual Res Sport Exerc Health* 2017;9:514–31.

30 Abdel-All M, Angell B, Jan S, *et al*. The development of an android platform to undertake a discrete choice experiment in a low resource setting. *Arch Public Health* 2019;77:20.

31 de Bekker-Grob EW, Donkers B, Jonker MF, *et al*. Sample size requirements for discrete-choice experiments in healthcare: a practical guide. *Patient* 2015;8:373–84.

32 Orme BK. Getting started with conjoint analysis: strategies for product design and pricing research 2006.

33 Blaauw D, Erasmus E, Pagaiya N, *et al*. Policy interventions that attract nurses to rural areas: a multicountry discrete choice experiment. *Bull World Health Organ* 2010;88:350–6.

34 Kruk ME, Johnson JC, Gyakobo M, *et al*. Rural practice preferences among medical students in Ghana: a discrete choice experiment. *Bull World Health Organ* 2010;88:333–41.

35 Lancsar E, Fiebig DG, Hole AR. Discrete choice experiments: a guide to model specification, estimation and software. *Pharmacoeconomics* 2017;35:697–716.

36 Hauber AB, González JM, Groothuis-Oudshoorn CGM, *et al*. Statistical methods for the analysis of discrete choice experiments: a report of the ISPOR conjoint analysis good research practices Task force. *Value Health* 2016;19:300–15.

37 Zhou M, Thayer WM, Bridges JFP. Using latent class analysis to model preference heterogeneity in health: a systematic review. *Pharmacoeconomics* 2018;36:175–87.

38 Bowen JR. On the political construction of tradition: gotong royong in Indonesia. *J Asian Stud* 1986;45:545–61.

39 Suwignyo A. Gotong royong as social citizenship in Indonesia, 1940s to 1990s. *J Southeast Asian Stud* 2019;50:387–408.

40 Utomo ID, Arsyad SS, Hasmi EN. Village family planning volunteers in Indonesia: their role in the family planning programme. *Reprod Health Matters* 2006;14:73–82.

41 Shankar AV, Asrilla Z, Kadha JK, *et al*. Programmatic effects of a large-scale multiple-micronutrient supplementation trial in Indonesia: using community facilitators as intermediaries for behavior change. *Food Nutr Bull* 2009;30:S207–14.

42 Bait BR, Rah JH, Roshita A, *et al*. Community engagement to manage acute malnutrition: implementation research in Kupang district, Indonesia. *Bull World Health Organ* 2019;97:597–604.

43 Tumbelaka P, Limato R, Nasir S. Analysis of Indonesia's community health volunteers (kader) as maternal health promoters in the community integrated health service (Posyandu) following health promotion training 2018;5:8.

44 Limato R, Ahmed R, Magdalena A, *et al*. Use of most significant change (MSC) technique to evaluate health promotion training of maternal community health workers in Cianjur district, Indonesia. *Eval Program Plann* 2018;66:102–10.

1   **Online supplemental file 1**

2   **Results from multinomial logit model for full sample (AIC = 11822.8, BIC = 11889.2)**

Attribute	Level	β	SE	95%CI	
Supervision	District Health Authority	0.08	*a*	*a*	*a*
	Nurse and/or midwife	-0.08	0.02	-0.04	0.02
Training frequency	Sporadic training	-0.02	*a*	*a*	*a*
	3-day training course	0.02	0.02	-0.01	0.05
Benefits per month (IDR)	25,000	**0.37****	0.04	0.29	0.44
	100,000	**-0.10***	0.04	-0.18	-0.02
	300,000	**-0.15****	0.04	-0.23	-0.07
	500,000	-0.12	*a*	*a*	*a*
Form of recognition	None	-0.03	*a*	*a*	*a*
	Official endorsement	-0.04	0.03	-0.11	0.02
	Award for good performance	-0.03	0.03	-0.09	0.04
	Report on results	**0.10****	0.03	0.04	0.16
Employment structure	No employment contract	-0.07	*a*	*a*	*a*
	Employment contract	**0.07****	0.02	0.04	0.11
Neither job	NA	**-0.62****	0.03	-0.69	-0.56

3   * Significant at 5% level; **Significant at 1% level or less; *a* Reference level

Online supplemental file 2

Model fit statistics for latent class models.

Model fit statistics	2	3	4
Log-likelihood function	-4539.82	-4457.21	-4042.92
Pseudo R^2	0.269	0.282	0.349
AIC	9121.6	8984.4	8171.8
BIC	9261.1	9216.8	8457.35
Size of the smallest group (proportion of sample)	31.2%	12.3%	2.1%
Size of the smallest group (estimated respondents)	147	58	10

AIC: Akaike information criterion

BIC: Bayesian information criterion

Online supplemental file 3

Reflexivity statement

Domain	Guiding questions	Author's response
Study conceptualisation	1. How does this study address local research and policy priorities?	In 2020, a technology-enabled community-based model of care for cardiovascular diseases was adopted by the Malang District Health Authority to be scaled up to all 390 villages in the district, a targeted population (those aged 40 years and older) of 2.5 million residents. Volunteer community health workers (Kaders) play a central role in delivering the model of care, including the screening and follow-up of patients at high risk of cardiovascular disease. This study provides important information about Kaders' preferred job characteristics. Findings may be used by local authorities to ensure the community health workforce is appropriately supported and motivated to deliver the scaled-up program.
	2. How were local researchers involved in study design?	This study was designed in collaboration with researchers from the University of Brawijaya, Malang District, Indonesia. Local researchers informed development of the DCE attributes and levels, conducted the pilot testing, implemented data collection and provided review of the manuscript as co-authors.
Research management	1. How has funding been used to support the local research team(s)?	Funding for this research supported costs associated with local research team time, the implementation of the study pilot and data collection for the full DCE.
Data acquisition and analysis	1. How are research staff who conducted data collection acknowledged?	The data collection team leader is a co-author on the paper and the data collection team is recognised in the acknowledgements section.
	2. How have members of the research partnership been provided with access to study data?	All members of the partnership have access to study data.
	3. How were data used to develop analytical skills within the partnership?	Conducting a discrete choice experiment was a new experience for many members of the research team. Thus, development of the survey, data collection and analysis were learning opportunities for several co-authors.
Data interpretation	1. How have research partners collaborated in interpreting study data?	All researchers – both local and non-local – critically reviewed and evaluated the manuscript, including interpretation of study data.

Drafting and revising for intellectual content	1. How were research partners supported to develop writing skills?	All research partners were encouraged to provide feedback and review of the manuscript.
	2. How will research products be shared to address local needs?	This study and associated pieces of research will be included in a policy brief written in the local language (Bahasa Indonesia) for local research partners, including local government bodies.
Authorship	1. How is the leadership, contribution and ownership of this work by LMIC researchers recognised within the authorship?	The data collection team leader is a co-author on this paper, as are other members of the research team associated with the University of Brawjiaya and who provided insight into the development and conduct of the project. The data is co-owned by the relevant LMIC institution, and the researchers involved are able to use it for further analysis, teaching or other non-commercial purposes.
	2. How have early career researchers across the partnership been included within the authorship team?	Early career researchers have played crucial roles in the design of the discrete choice experiment, leading the pilot study and data collection, and conducting analysis of the results. More than half of the author group is early- or mid-career, including the first author.
	3. How has gender balance been addressed within the authorship?	Seven authors are male (TG, SS, GT, DO, DP, BA, SJ) and 3 are female (NHP, AM, AP).
Training	1. How has the project contributed to training of LMIC researchers?	Certain early career members of the research team (and co-authors) from Indonesia played a critical role in the design of this study, development and delivery of the discrete choice experiment. This was a new methodology to them and thus has provided a valuable learning opportunity and new skills.
Infrastructure	1. How has the project contributed to improvements in local infrastructure?	The project has not directly contributed to improvements in local infrastructure.
Governance	1. What safeguarding procedures were used to protect local study participants and researchers?	All potential participants were provided with detailed information about the study at the time they were invited to participate as part of the informed consent process. This included information about the significance of the research, methods of data collection, confidentiality, risks and benefits and contact details of the research team. This information emphasised that their decision whether or not to participate in this research would have no detrimental impact on the training and support received from local government authorities. All data collected from participants remained completely anonymous. Local researchers involved in data collection followed health

		and safety guidelines (including those related to COVID-19) established by the local government, and were guided by a study-specific safety protocol.

Supplemental material

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Online supplemental file 4

Table 1. Socio-demographic characteristics of estimated groups

Socio-demographic characteristics of estimated groups	Group 1 (%)	Group 2 (%)	X^2 p-value
Average age	43	40	
Proportion aged <29 years	9.3	18.4	0.07
Proportion aged 30 – 39 years	31.2	28.6	0.07
Proportion aged 40 – 49 years	35.2	33.3	0.07
Proportion aged 50 years plus	24.4	19.7	0.07
Proportion with <10 years' experience	47.8	51.0	0.02
Proportion with 10 – 19 years' experience	30.9	38.8	0.02
Proportion with more than 20 years' experience	21.3	10.2	0.02
Proportion with primary school education obtainment	17.6	19.1	0.64
Proportion with secondary school education obtainment	76.9	74.2	0.64
Proportion with university education obtainment	5.6	6.8	0.64
Proportion who work <2 hours per week	55.3	27.2	<0.01
Proportion who work 2 – 4 hours per week	34.9	26.5	<0.01
Proportion who work 4 plus hours per week	9.9	46.3	<0.01
Proportion with avg. weekly income of 250,000 – 500,000 IDR	46.9	66.7	<0.01
Proportion with avg. weekly income of 500,000 IDR – 1 million IDR	46.0	29.9	<0.01
Proportion with avg. weekly income above 1 million IDR	7.1	3.4	<0.01
Proportion who are main source of household income	17.6	6.1	<0.01
Proportion who are not main source of household income	82.4	93.9	<0.01