

Research Article

Building the capacity of community health volunteers for non-communicable disease prevention in low-income urban communities in Malaysia

Wan Fariyah Ahmad Fahmy¹, Nabihah Haron¹, Shiang Cheng Lim¹, Angela Jackson-Morris², Feisul I. Mustapha³

¹ RTI International, Selangor, Malaysia, ² Center for Global Noncommunicable Diseases, RTI International, Selangor, Malaysia, ³ Disease Control Division, Ministry of Health, Putrajaya, Malaysia

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Background

To address the rising non-communicable diseases (NCDs) in Malaysia, the Better Health Programme Malaysia (BHP MYS) engaged and trained community health volunteers (CHVs) to undertake health promotion activities with poor urban communities in Kuala Lumpur to reduce their NCD risk. This study evaluates the extent that the capacity-building programme achieved the objectives of increasing knowledge and confidence in NCD prevention and adopting personal lifestyle changes.

Methods

A capacity-building programme was designed to emphasise active learning approaches and blended learning (in-person and digital) and was delivered between January to December 2021 (during the Malaysian Government “Movement Control Orders” in response to the COVID-19 pandemic). Thirty CHVs participated in the capacity-building programme. A mixed methods evaluation approach was used, including quantitative surveys and routine data, focus group discussions, and semi-structured interviews.

Findings

Community Health Volunteers increased their NCD knowledge (85.2% provided correct answers in post-programme assessment compared to 43.3% at pre-programme assessment), made changes to their dietary and physical activity practices (100%), and adopted new engagement techniques, particularly a digital social influencer role for NCD behaviour change. The most important factors for sustaining participation were individual motivation and a supportive environment. CHVs were satisfied with the blended in-person-digital approach and perceived that the usefulness and applicability of the health information received was the primary benefit across all delivery modes. Cohort-based, active learning approaches and actionable messages can encourage learning retention and facilitate application. Dedicated technical support and ‘job aid’ tools are required for CHVs to perform and sustain NCD prevention roles effectively.

Conclusions

The capacity-building programme effectively increased CHV capacities to address NCDs in their own lives and communities and was acceptable to CHVs. The findings suggest the value of cohort-based, active learning approaches in building capacity. Expanding on capacity-building and sustaining involvement are important considerations for this cohort and, in general, for health volunteer capacity-building in Malaysia and elsewhere.

Malaysia’s burden of non-communicable diseases (NCDs) has increased substantially in recent decades. In 2019, 73% of deaths were attributable to NCDs,¹ with ischemic and cardiovascular diseases being the primary causes² and strongly associated with the growing prevalence of risk factors such as hypercholesterolemia and hy-

pertension. The National Health and Morbidity Survey 2019 found that half of the Malaysian adults were estimated to be overweight or obese,³ with major contributing factors being sedentary lifestyles, rising incomes, and changing dietary preferences, particularly towards energy-dense, nutritionally poor food and drinks.^{4,5}

In low- and middle-income countries (LMICs), community health volunteers (CHVs) have effectively prevented and managed NCDs in poor urban communities.^{6,7} The Malaysia Ministry of Health introduced the Komuniti Sihat Pembina Negara (KOSPEN) programme in 2013.⁸ However, maintaining volunteer motivation to sustain their roles in promoting healthy living has been challenging.^{8,9} Other issues include obtaining buy-in from multiple stakeholders such as community members and multiple levels of implementers, identifying and engaging health influencers within communities, lack of ongoing volunteer training, perception of health as a low priority, and an overall environment unsupportive of healthy lifestyles.^{8,9}

The Better Health Programme Malaysia (BHP MYS) was a multi-faceted health promotion programme including a range of interventions to reduce NCD risks, particularly obesity, among poor urban communities in Kuala Lumpur, known as the 'B40' (households with the lowest 40% of household incomes).¹⁰ One strategy was training CHVs to undertake community engagement and activities to increase health literacy and encourage healthy behaviours in practice. This study evaluated the capacity-building programme to assess its reach, impact, and lessons for policy and practice.

METHODS

SITE SELECTION

The capacity-building programme involved CHVs from three public housing communities under the People's Housing Programme¹¹ [*Program Perumahan Rakyat* (PPR) or *Perumahan Awam* (PA)]. Study locations were PPR Pekan Kepong Setia and PA Sri Negeri Sembilan in Kepong district, and PA Sri Kota in Cheras district. These three public low-cost apartment schemes were selected by purposive sampling based on the geographic representation of east and west Kuala Lumpur. Although activity intensity varied, all sites were already involved in existing community health programmes.

CHV RECRUITMENT AND ROLE

We recruited CHVs aged 18 or older, who had completed at least primary education, were literate in Malay or English, and could speak at least one local language (Malay/Tamil/Mandarin/Cantonese). CHVs were mainly recruited via community leaders and health volunteers who had participated in previous health programmes or KOSPEN. Briefings on the programme and the CHV role were conducted in person. A total of 30 CHVs out of 51 who fulfilled the criteria were recruited. Recruited CHVs agreed to act as community change agents and support community members towards better health outcomes via face-to-face interactions and periodically delivering activities in their community.

CAPACITY-BUILDING FRAMEWORK AND PROCESS

A capacity-building curriculum was developed to build CHV knowledge and skills and foster positive attitudes regarding

NCD and obesity prevention for themselves, their families, and communities. Curriculum development was informed by a literature review of existing CHV capacity-building to identify effective approaches and content,¹² and based on the findings of a 2020 Knowledge, Attitudes, Practices (KAP) survey¹³ and digital needs assessment conducted with the CHVs. The KAP survey indicated that although CHVs had a superficial knowledge of NCDs such as cardiovascular diseases, diabetes, and hypertension, they were less knowledgeable about healthier eating, and their consumption patterns and physical activity levels suggested that unhealthy practices were relatively widespread.

The finalised curriculum comprised six modules introducing NCDs, addressing risk factors, healthier eating and physical activity, and community organising for health promotion. Given the ongoing COVID-19 pandemic, a module on COVID-19, obesity, and NCDs was added. Modules were delivered in three modalities: group workshops, e-learning mini-courses, and informal check-in sessions. Capacity-building workshops covered all modules and included guided life reflections, mini-lectures, and interactive, game-based learning with quizzes, simulations, and card-based games. Informal check-ins elicited CHV reflections and intended actions related to their dietary practices, physical activity, and community outreach strategies. These were initially conducted in person but migrated to telephone texts and calls during the pandemic. E-learning was a key capacity-building component. A digital needs assessment was initially conducted to understand capacities and needs related to using and accessing digital devices and platforms. It found that a very large proportion of CHVs (96.3%) used smartphones daily, 75% knew how to use apps, and 89% knew how to use internet browsers on mobile phones (Table S1 and Table S2 in the Online Supplementary Document). E-learning design reflected these findings and 44 mini-courses comprising short videos, graphic slides, and quizzes delivered through an app (MyBHP app) to support asynchronous, self-paced learning on healthy dietary practices and physical activity.

The curriculum development was also guided by health experts from the Ministry of Health Malaysia and the United Kingdom National Health Service Consortium for Global Health before deployment. The CHV capacity-building programme was delivered from January to December 2021, mainly in Malay and supported by English if needed.

DATA COLLECTION

A mixed methods approach was used to evaluate the capacity-building programme. Quantitative and qualitative data were collected from January 2021 to February 2022 and included:

1. Knowledge assessment questionnaire: To measure knowledge of NCDs and risk factors and self-efficacy in sharing this with family and community members before and after the capacity-building.
2. BHP MYS data: 9 training reports from group workshops, monthly informal check-in logs, and monthly Facebook engagement analyses.

Table 1. Definition of RE-AIM framework

Reach		The number or proportion of the intended target CHVs willing to participate or to come into contact with the intervention
Implementation	Dose	The quantity or amount of each intervention component delivered or provided and the extent to which CHVs actively engaged with the intervention
	Fidelity	The extent to which the intervention was delivered as planned in relation to the quality and integrity of the intervention as conceived by the developers The adaptations made on the implementation
Adoption		Factors for adoption or non-adoption on capacity-building among CHVs
Effectiveness		The impact of an intervention on important outcomes The proportion and representativeness of the CHVs that adopt the intervention
Maintenance		Due to the 9-month programme duration, the long-term maintenance cannot be assessed yet. Recommendations on capacity-building for CHVs moving forward will be provided instead of maintenance

3. Post-programme questionnaires: To evaluate CHV satisfaction and perceived usefulness of the capacity-building at the end of workshops.
4. Semi-structured interviews: To understand CHV's capacity-building experience, barriers or challenges, and recommendations.
5. Focus Group Discussions (FGDs): To gather CHV reflections on their capacity-building experience.

DATA ANALYSIS

Descriptive analysis was undertaken for quantitative data collected from questionnaires and programme data. Categorical variables were analysed using Microsoft Excel. All qualitative data from monthly informal check-ins, semi-structured interviews and FGDs were recorded, transcribed, and translated into English. Data were inductively coded, mapped and categorised after reviewing all information. Triangulation and synthesis of results were conducted across multiple data sources to achieve reliability and validity. The RE-AIM implementation research (Reach, Effectiveness, Adoption, Implementation, Maintenance) framework was used to structure the analysis of process and outcomes (Table 1).

RESULTS

REACH

Thirty CHVs from three different intervention sites in Kuala Lumpur were recruited and retained between October 2020 and December 2021. The majority were of Malay ethnicity, had completed secondary school education, the average age was 50 years, and average monthly household income was RM3000-RM4999 (USD 700-1100) (Table 2). The cohort comprised 43% men and 57% women. Most were home-makers, retirees, and non-government employees. Women generally participated in more programme activities than males.

“Usually, more women participate in such activities. Out of all participants, 90% were women. Younger men are very hard to engage, but if you can get one young man who can be an influencer and are very interested in the

programme, they can really expand the programme. But <name redacted> was not interested in BHP because he was very busy with work commitments.”—CHVs, PPR Pekan Kepong

Approximately half of CHVs had previously volunteered in health promotion activities, especially those from PA Sri Kota and PA Seri Negeri Sembilan. They had established a strong volunteer group identity and were well-networked into multiple community volunteer associations.

“We knew each other even before the programme. We joined many other programmes before this one and are committee members of other associations. We are close to each other.”
—CHVs, PA Sri Kota

IMPLEMENTATION

DOSE

The capacity-building programme was developed as an interactive, gender-responsive and actionable programme, with the unifying principles of making CHVs' lived experience central and including game-based learning tailored to CHVs' context. Between January and December 2021, the CHV capacity-building programme was delivered via three in-person and two virtual workshops, 80 face-to-face and informal virtual check-ins, and 44 e-learning courses. Gender, social roles and community norms were considered throughout the programme's implementation, for example, conducting training and informal check-ins during hours and periods that accommodated the CHVs' gender and social roles and responsibilities. While all CHVs attended at least one workshop and one check-in, the frequency and intensity of CHV participation differed within the group depending on CHVs' work and life commitments, digital presence, and responsiveness.

FIDELITY

In response to national COVID-19 measures, the original BHP MYS plans, including the CHV capacity-building programme, were adapted, and almost all activities were re-designed for virtual delivery. For CHVs, this translated their

Table 2. Sociodemographic characteristics among community health volunteers (CHVs)

Intervention Sites	Total n=30 (%)
Gender	
Men	13 (43.3%)
Women	17 (56.7%)
Ethnicity	
Malay	28 (93.3%)
Indian	2 (6.7%)
Age group, years	
≤30	4 (13.3%)
31-50	7 (23.3%)
>50	19 (63.4%)
Education	
Lower secondary	3 (10.0%)
Higher secondary	23 (76.7%)
Higher education level	4 (13.3%)
Occupation	
Government employee	2 (6.7%)
Non-government employee	8 (26.7%)
Self-employed	2 (6.7%)
Homemaker	7 (23.3%)
Retired/Pensioner/Unemployed	11 (36.7%)
Monthly household income	
RM 1000-RM 2999	11 (36.6%)
RM 3000-RM 4999	15 (50.0%)
RM 5000-RM 9999	2 (6.7%)
Refused to answer	2 (6.7%)
Health volunteers before?	
Yes	12 (40.0%)
No	18 (60.0%)

role into acting as social influencers on digital platforms, sharing their NCD learning and healthy lifestyle practices with their social networks, and encouraging their network to join the journey towards better health outcomes via the BHP MYS MYJomSihat Facebook group. BHP MYS delivery pivoted to build capacity and provide support to help CHVs undertake these roles. [Table 3](#) compares the original capacity-building plan with actual delivery during the second year of the COVID-19 pandemic. As well as modifying the mode and pattern of delivery, the capacity-building modules and activities were also expanded to include COVID-19-related strategies for diet, exercise, and mental health, and a Facebook Live session included medical expert advice and CHVs sharing their communities' pandemic experiences.

ADOPTION

The majority of CHV participants remained committed throughout the programme, although the extent and type of participation varied within the cohort. On average, CHVs participated in at least three in-person or virtual workshops and one individual check-in as part of the programme. The individual motivation was essential for sustained participation. Other facilitating factors were family and peer support, a concern for personal health and wellbeing, and personal satisfaction from becoming community role models.

"I do it because of family support. I like to cook and post [online] because of my grandchildren. I once taught him about Quarter-Quarter-Half (portion sizes of a quarter protein, quarter carbohydrates and half plate of fruits and vegetables), but he is the one who consistently asks for it at meals."

(CHV, woman, PA Sri Kota)

"I feel very satisfied and very proud of the work that I did in implementing the programme. I also feel very proud that I was able to share this information and the programme to the communities here."

(CHV, woman, PPR Pekan Kepong)

"I want to be healthy. I am afraid of getting [chronic] diseases, so I have diligently done all my medical check-ups and practised a healthy lifestyle. I want to be a role model for the community members since I am the one who conducts health screening for the community."

(CHV, woman, PA Sri Negeri Sembilan)

Workshop attendance differed due to circumstances, such as COVID-19 illness or restrictions, work, and family commitments. To mitigate knowledge gaps due to any missed sessions, learning points were shared from the workshops during informal check-ins and subsequent communications with relevant individuals.

CHVs expressed the highest satisfaction with in-person group workshops, with 92% and 7.9% indicating that they were "very satisfied" and "satisfied" ([Table 4](#)). This was followed by virtual workshops (67% very satisfied and 21% satisfied) and informal check-ins (67% very satisfied and 29% satisfied). Although e-learning was less popular in comparison to the more familiar mode of face-to-face sessions, three-quarters of CHVs still reported being very satisfied or satisfied with virtual sessions. A few CHVs were less positive about virtual sessions - with 8.3% neutral and 4.2% dissatisfied.

This reinforced verbal feedback about a general CHV preference for in-person workshops. Reasons included perceived programme value, the sense of community built across KRTs, and the social connection of face-to-face groups. CHVs perceived that the usefulness and applicability of the health information received was the primary benefit across all delivery modes, in addition to their enjoyment of the active learning methods, such as games and roleplay. In-person workshops also enabled the maximum application of active methods, which contributed to the popularity of these workshops.

Table 3. Capacity-building - Comparison of original plan versus adapted COVID-19 delivery

Component	Delivery (Dose)	Original Plan	COVID-19 Period Adapted Delivery
Capacity-building workshops	Three in-person, small-group workshops Workshop 1: January 2021 Workshop 2: April 2021 Workshop 4: December 2021	Whole group in-person CHV workshops All workshops planned for in-person settings for January, April, and July 2021	Small group CHV workshops, according to KRT Workshops delivered in January, April, and December 2021
	Two virtual workshops Workshop 1 (virtual): February 2021 Workshop 3: September 2021	Not part of the initial programme planning	Three sessions were delivered via Zoom in February and September 2021
Informal check-ins	In-person individual sessions	All sessions planned for in-person one-on-one conversations conducted monthly on location	Only 19 informal check-ins in-person
	Virtual individual sessions through text or call	Not part of the initial programme planning	61 informal check-ins conducted via text and calls
e-Learning	44 courses released until December 2021	Weekly course releases until August 2021	Bi-weekly course releases until December 2021

Table 4. Comparison of satisfaction related to capacity-building components

Statement	Response					
How satisfied are you with the following capacity-building components?	Very satisfied (67%)	Satisfied (21%)	Neutral (4.2%)	Dissatisfied (0%)	Very dissatisfied (0%)	Not applicable (N/A) (8.3%)
a. Virtual workshops						
b. In-person group workshops	Very satisfied (92%)	Satisfied (7.9%)	Neutral (0%)	Dissatisfied (0%)	Very dissatisfied (0%)	N/A (0%)
c. Informal check-ins	Very satisfied (67%)	Satisfied (29%)	Neutral (0%)	Dissatisfied (0%)	Very dissatisfied (0%)	N/A (4.2%)
d. e-Learning on the MyBHP app	Very satisfied (50%)	Satisfied (29%)	Neutral (8.3%)	Dissatisfied (4.2%)	Very dissatisfied (0%)	N/A (8.3%)

"The first workshop in the hotel was the most memorable moment for me because it was fun. We competed in the MasterChef game and exercised together. I learned about quarter-quarter-half and began changing the way I ate."
(CHV, woman, PA Sri Kota)

"I feel like I am in a family with all the participants of the programme, although some come from Pekan Kepong and PA Negeri Sembilan. I can see how they are running their activities which are similar to ours. I feel supported by my own family as well as the friends around me."
(CHV, woman, PA Sri Kota)

EFFECTIVENESS

The knowledge assessment survey indicated that CHVs substantially increased their knowledge of NCDs and risk factors. The proportion of CHVs who achieved full marks after the capacity-building programme (85.2%) doubled compared to the pre-assessment (43.3%) (Table 5). Following the programme, the entire CHV cohort (100%) could answer 12 of 14 NCD questions correctly – an 85.7% accuracy rate, suggesting that the whole group had benefited from the capacity-building programme.

CHVs' self-perceived knowledge and confidence accurately mirrored their knowledge gain and demonstrated a shift towards greater confidence throughout the pro-

Table 5. Pre- and post-programme comparison of knowledge of NCDs and their risk factors

Variable	Pre-programme (%)	Post-programme (%)
	Total (N = 30)	Total (N = 27)
CHVs who answered correctly for all risk factor questions*	13 (43.3)	23 (85.2)
Question statements		
1. Engaging in regular physical activity reduces the risk of developing non-communicable/chronic diseases	27 (90.0)	27 (100)
2. Lack of physical activity can contribute to high blood cholesterol	27 (90.0)	27 (100)
3. Drinking sugary drinks can lead to being overweight	28 (93.3)	26 (96.3)
4. Eating a lot of sugar can contribute to obesity	29 (96.7)	27 (100)
5. Low intake of vegetables can contribute to obesity	22 (73.3)	27 (100)
6. When people watch TV or phones while eating, they are less thoughtful about what and how much they eat	27 (90.0)	27 (100)
7. Soy sauce increases the salt content in food	27 (90.0)	27 (100)
8. Eating a lot of salt can contribute to heart problems	24 (80.0)	27 (100)
9. Eating a lot of fried food can contribute to high blood cholesterol	29 (96.7)	27 (100)
10. Gaining weight increases risk of heart problems	27 (90.0)	27 (100)
11. Obesity increases the risk of developing hypertension	28 (93.3)	26 (96.3)
12. Smoking can contribute to heart disease	29 (96.7)	27 (100)
13. Obesity increases the risk of developing diabetes	29 (96.7)	27 (100)
14. High blood pressure increases the risk of developing diabetes	25 (83.3)	27 (100)
15. Eating jamu (traditional herbs) can control diabetes	13 (43.3)	26 (96.3)

*NCD risk factors questions refer to question 1–14.

Table 6. CHVs' self-assessment of confidence in knowledge pre- and post-programme

Statement	Pre-programme	Post-programme
	Total (N = 30)	Total (N = 27)
I am confident that I have enough knowledge on NCDs and their risk factors		
Not at all confident	0	0
Not confident	3 (10.0)	0
Not sure	6 (20.0)	0
Confident	16 (53.3)	15 (55.6)
Very confident	5 (16.7)	12 (44.4)

gramme. All CHVs (100%) reported being either very confident or confident about having enough NCD and risk factor knowledge compared to 70% before the programme (Table 6).

After capacity-building completion all CHVs (100%) reported that they had made some degree of practical changes to their dietary and physical activity practices such as reducing sugar consumption, increasing water intake, and engaging in regular exercise (Table 7), with 41.6% making changes in both lifestyle aspects.

"Before joining the training, and even until the April workshop, I hadn't really eaten many vegetables. I usually cook for my family, but sometimes when you cook you just make do with whatever is in the kitchen. What I learned from the workshop about eating in balance made me more

conscious about what I'm cooking. For example, when I cook omelettes now, I add vegetables inside it. I also add vegetables in my turmeric fried beef (daging masak kunyit). I make sure I buy more vegetables now also. Actually, eating healthy is quite doable if you do it in small steps. I think my family and I are quite changed now." (CHV, woman, PA Sri Kota)

Despite the strong preference for in-person workshops, virtual workshops also achieved impact. For example, following a virtual workshop on creating digital content intended to support the CHV role as social influencers, posts in the MYJomSihat Facebook group related to exercise and physical activity increased, image and post quality improved, and more CHVs engaged with Facebook. Total en-

Table 7. CHVs' self-reports of behaviour change post-programme

Statement	Response	
Have you made any changes in your practices since your involvement in the capacity-building programme?	Yes(100%) No	100% 0%
What kinds of changes did you make?	Dietary practices Physical activity Both	38.0% 20.8% 41.6%
How frequently do you practice these changes?	Every day At least once a week At least once a month Rarely	41.6% 50.0% 8.3% 4.2%

gement, measured by comments and reactions, doubled in the month from 1871 to 3697 following this workshop.

DISCUSSION

The BHP MYS capacity-building programme increased CHV NCD health literacy, developed CHV social influencing capacities, and produced some initial evidence of this translating into CHVs' lifestyle behaviours. The programme reached CHVs of varying demographics, and a large proportion sustained involvement until the programme ended. Positive change was reported across the entire cohort in NCD prevention knowledge and confidence and personal behaviour changes in diet and physical activity, although the behaviour changes were self-reported and may have differed in degree and duration/ sustainability.

Previous CHV NCD-related programmes have primarily focused on clinical or disease knowledge delivery.^{14–16} The BHP MYS CHV capacity-building curriculum differed in its focus on health promotion, emphasising the CHV's role in encouraging, informing, and supporting the community to take achievable actions to reduce NCD risks and achieve better health. It also differed from the theory-based pedagogic approach that dominated past CHV NCD training,¹⁷ instead of working with CHVs to consider practical and personal changes based on community context and lived experience, using game-based learning strategies. The evaluation findings suggest that the BHP MYS capacity-building programme increased CHV capacities to undertake NCD-related health promotion within their respective communities and to reduce their NCD risk.

BHP MYS operated a hybrid model of facilitated workshops and check-ins alongside the e-learning modules completed individually online. The evaluation found that CHVs were most satisfied with group workshops mainly due to the sense of community and level of engagement with others. This suggests a successful cohort model, as it included a "strong emphasis on the group experience, the ability for students to rely on peer support mechanisms as well as the facilitating and building of peer relationships directly within the learning environment".¹⁸ This aligns with previous studies that report that cohort-based learning can facilitate greater ownership and a sense of community.^{18,19} The BHP MYS capacity-building design also emphasised active learning approaches, such as roleplay and simulations.²⁰ The evaluation findings indicate that these played

an important role in making training engaging and attractive for CHVs, and helped build CHV skills and confidence to perform their roles.²¹ This is similar to the findings from medical education settings suggesting that learners tend to be more engaged and retain more information in real-life settings.^{12,22}

The BHP MYS' blended in-person - digital approach proved particularly valuable in the circumstances of the COVID-19 pandemic. The programme's digital aspect provided a new, positive dimension regarding the potential for social networking for health promotion among CHVs and out in the community. CHVs started to undertake a social influencer role by sharing information and their dietary and physical activity practices online with their social networks and demonstrated increased knowledge, skill, and confidence in this over time. This is aligned with previous research,²³ suggesting that influencer posts can impact food choices and that influencers appearing in physically ideal conditions were deemed more credible. However, there were a number of CHVs whose satisfaction with e-learning was lower than for facilitated group and one-to-one sessions. This indicated that CHVs preferred interaction in synchronous learning sessions. The findings also indicated the high-value CHVs placed upon ongoing support from the BHP MYS team for their capacity-building. However, it should be noted that the hybrid in-person and virtual approach was supported intensive owing to a lack of familiarity with technology and the cultural component of consistent relationship building to ensure sustained CHV engagement.

As stated earlier, the hybrid delivery approach emphasises in-person engagement rather than virtual. Given fluctuating national-level COVID-19 preventative measures, the programme moved to encompass more virtual modalities. A further indication of the benefit of blended approaches was the request from CHVs for traditionally formatted tools or 'job aids' to help them convey messages to or provide activities for their communities. Job aids are commonly used and valued by CHVs and may combine simple text and illustrations to convey critical messages,²⁴ and BHP MYS CHVs suggested that these would help them reach older community members with greater trust in printed materials. These were seen as complementary to the recognised value of digital engagement, which can be shared across various social media platforms. Therefore, a blended digital and analogue approach to materials would

be recommended to reach populations with limited digital literacy.

The BHP MYS capacity-building evaluation indicated a preference for face-to-face methods and high ratings also for virtual sessions and engagement. The virtual approach was essential to be able to continue implementation during the pandemic. However, feedback indicated that many CHVs also saw the benefits. This aligns with some previous research that suggests that stand-alone e-learning outcomes for health worker training may be less favourable compared to traditional (analogue) approaches,²² and also indicates that strong supervisory/advisory support for CHVs is crucial.²⁵ Thus, future programmes may consider adopting blended learning to maximise reach and efficiency.

Demographic characteristics influenced the extent of CHV engagement with capacity-building. The CHV profile reflects that seen in previous Malaysian research that found that most health volunteers were women aged over 45 years.²⁶ As in previous research, their motivation was better health and to become a community role model. To a certain extent, women in Malaysian households still shoulder the bulk of domestic tasks such as cooking and childcare.²⁷ Therefore, the content of various capacity-building modules was aligned to their social roles, thus sustaining participation. While it was possible for the training programme to reach younger adults more generally, CHVs with young families or work commitments found consistent commitment more challenging.²⁶ In addition, some younger CHVs who attended training once or dropped out later on perceived health promotion as only relevant for elderly people or chronic disease patients. A similar pattern is seen in research that shows a significant association between health screening participation and increasing age.^{26,28–30} Higher satisfaction with their health among younger CHVs in BHP MYS may also have contributed to the lower number and frequency of self-reported lifestyle changes.

The programme shows promising outcomes in building community capacity to address NCDs. However, CHVs highlighted the need to invest further time and effort to build relationships and trust with community members and leaders to achieve sustainable community engagement and NCD action. This should be included at the planning stage of future programmes to create the right conditions for successful initiatives such as the CHV capacity-building to sustain community benefits over the medium and long term.^{8,9,31}

LIMITATIONS

Due to the 9-month programme duration, we could not assess long-term maintenance of CHVs' changes in practice, there is some anecdotal indication of various CHVs continuing to practice healthy eating through their Facebook group posts. The study was not randomised and did not include a control group. Small sample sizes also did not allow for meaningful statistical tests. Nonetheless, the triangulation of data collected via multiple methods and the use of objective programme data, for example, pre-post knowl-

edge tests, provides a robust basis to support the evaluation findings. Health literacy and behaviour changes were assessed by self-report, which may be open to bias. Future research might consider additional methods of verifying self-reports, such as the use of activity trackers or interviews with family members. It should be noted that most CHVs in this cohort were Malay, and the programme content was developed primarily for a Malay-speaking audience. A small number of CHVs of other ethnicities participated, however, the uptake, acceptability, and impact of the programme with wider groups merit further research. Lastly, evaluation findings reflect the greater emphasis on digital methods resulting from the COVID-19 pandemic. It is possible that greater in-person engagement and less restricted circumstances may produce differing findings.

CONCLUSIONS

The BHP MYS programme achieved its objective of increasing the capacities of Community Health Volunteers to address NCDs in their own lives and communities – improving NCD health literacy and confidence, developing social influencing capacities, and encouraging NCD-related behaviour change efforts among CHVs. The programme was acceptable and perceived as beneficial among CHVs, and findings indicate the value of blended in-person and digital approaches and the need for ongoing support and guidance. Finding ways to build upon capacity-building, sustain involvement, and encourage applying knowledge and skills after programme completion, are key considerations for this cohort and any wider implementation with CHVs in Malaysia and elsewhere.

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ETHICS APPROVAL AND CONSENT TO PARTICIPATE

All procedures performed in studies involving human participants were in accordance with the ethical standards of Ministry of Health Medical Research Ethical Committee Research and was approved with approval number NMRR-20-1004-54787 (IIR). Participation in this research was entirely voluntary. All respondents were provided with information including a full explanation of study aims, procedures, risks, benefits, and protections for individual privacy. Written informed consent was obtained from every respondent.

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AUTHORSHIP CONTRIBUTIONS

All authors contributed to the conceptualisation of the research questions and manuscript writing. WFAF, NH, SCL, and AJM developed the manuscript outline and coordinated the manuscript development. WFAF, NH and SCL conducted the analyses and interpretation, designed the study and tools, and oversaw the study's implementation including data collection and management. FIM provided valuable inputs for revising the manuscript. All authors read and approved the final manuscript.

COMPETING INTERESTS

The authors completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available upon request from the corresponding author), and declare no conflicts of interest.

CORRESPONDENCE TO:

Wan Fariyah Ahmad Fahmy
RTI International Malaysia
Suite 5.2 & 5.3, Level 5, Nucleus Tower,
Jalan PJU 7/2, Mutiara Damansara,
47820 Petaling Jaya, Selangor, Malaysia.
Tel: +60122690929
Email: fariyah.fahmy@gmail.com

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SUPPLEMENTARY MATERIALS

Online Supplementary Document

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