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Exploring the Potential of Community Health Workers in Type-2 Diabetes and Hypertension Management in Cambodia

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Abstract: To assess the community health workers' (CHWs) knowledge, attitude, and practices (KAP) in type-2 diabetes (T2D) and hypertension (HTN) management. We thus also sought to assess the potential health system barriers for incorporating CHWs in T2D and HTN management. Mixed-method study comprised (1) a survey among 153 active CHWs to assess their KAP of T2D and HTN, and (2) semi-structured interviews with key informants to understand challenges of the health system and proposed solutions in incorporating CHWs in T2D and HTN management. The majority of CHWs correctly answered general knowledge questions on NCDs, risk factors, and prevention; however, only one-quarter correctly answered questions on smoking, family history, or tobacco use as risk factors. Most respondents appeared to have positive attitudes and have been practicing some activities related to T2D and HTN. Both financial and non-financial resource constraints were cited as challenges of the health system; therefore, re-structuring the role definition of CHWs and task of responsibilities, and assessment the need and workload have been proposed as ways forwards to effectively incorporate CHWs in T2D and HTN care. CHWs in Cambodia have shown their potential in T2D and HTN management; however, a well-designed strategy including technical training, clearly defined roles and responsibilities, and strong supporting structure are important to maximize their potential in the health system.

Keywords: community health workers; non-communicable diseases; knowledge; attitude; practice; health system

Introduction

Cambodia has shown advanced progress in achieving the Millennium Development Goals (MDGs) for maternal and child health (MCH) and infectious diseases.[1] Yet, the burden of non-communicable diseases (NCDs) such as type-2 diabetes (T2D) and hypertension (HTN) has become a big concern in the country with the prevalence of T2D and HTN among adults aged 40–69 years in Cambodia being 3.3% and 23.5%, respectively in 2016.[2]

The Royal Government of Cambodia's strong political commitment towards achieving Universal Health Coverage (UHC) provides the Ministry of Health (MoH) with an opportunity to

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improve health service delivery.[3] To ensure service availability for T2D and HTN, the MoH and donor organisations have introduced a multitude of primary health care (PHC) interventions, including (1) the establishment of Non-Communicable Disease (NCD) clinics at the referral hospitals (RHs), (2) the introduction of the World Health Organization Package of Essential Non-Communicable Disease Interventions (WHO PEN) programme in health centres (HCs), and (3) the expansion and integration of MoPoTsyo's community-based Peer Educator Network.[4]

Ensuring universal access to T2D and HTN healthcare services through scale-up of health intervention packages is one of the stepping stones towards UHC for NCDs in Cambodia; however, it has been severely constrained by health system challenges such as weak governance, limited financial resources, and especially a lack of human resources.[5,6] Human resources are needed for T2D and HTN service delivery at the PHC and community levels since these NCDs require a comprehensive and cross-cutting approach to manage, for instance, life-long healthcare support, early case detection, psychosocial promotion, self-management, and medical support.[7]

To adequately address the growing need for T2D and HTN services in the context of a struggling PHC level with limited health human resources, community health workers (CHWs) have increasingly been recognised as a promising frontline healthcare workforce supporting the PHC system.[8,9] The Alma Ata Declaration of 1978 established CHWs as an essential element of the comprehensive PHC approach—"suitably trained socially and technically to work as a health team and respond to the community's expressed health needs".[10] Increasingly, CHWs are being seen as a prerequisite for the health system to achieve the goal of UHC[11] through various tasks performed in the health programmes. Previous studies from other low- and middle-income countries (LMICs) have demonstrated that CHW-based programmes are effective in HTN, diabetes control and reducing coronary heart disease risk,[12,13] help improve blood pressure,[14] and are beneficial in diabetes management.[15] A study in Pakistan showed that family-based home education delivered by CHWs achieved effective lowering of blood pressure levels in the population.[16] With insufficient numbers of trained health professionals at the PHC level, CHWs could thus also be a valuable extension of the professional healthcare team in NCDs health service in Cambodia and a crucial step in scaling up management of NCDs.

In Cambodia, CHW programmes are a part of the broader national "Community Participation Policy for Health".[17] In this policy, CHWs refer to "Village Health Support Group" (VHSG) members and are volunteers of HCs.[18] In Cambodia, apart from VHSGs, CHWs are known by many different names due to their engagement in specific health interventions implemented at the PHC level by various Vertical Health Programmes—such as HIV/AIDs, infectious disease (Tuberculosis or Malaria) and MCH[19–21]—in which they have extra roles. However, so far, CHWs' engagement in T2D and HTN healthcare services is limited in the country.

As Cambodia's strategic action plan to address the NCD epidemic in a sustainable manner is to have both facility-based and community-based interventions,[22] it is crucial to assess the competences of CHWs to contribute to NCD management in order to assess their potential in national efforts to scale-up interventions to address the growing burden of T2D and HTN. Although some other countries such as Uganda[23] and South Africa[24,25] have studied CHWs' knowledge on NCDs, this evidence is lacking in Cambodia. As a response to this knowledge gap, our study sought to provide an overview of CHWs' knowledge, attitude, and practices in T2D and HTN management. In addition, it is also necessary to assess whether the health system is ready and willing to incorporate CHWs as a central tool in its care for T2D and HTN. We thus also sought to assess the potential health system barriers for incorporating CHWs in T2D and HTN management.

Methods

Study Design and Data Collection

The study was conducted in six operational districts (ODs) spread across different provinces in Cambodia: OD Sotr Nikum (Siem Reap), OD Daunkeo (Takeo), OD Samrong (Oddormeanchey), OD Kong Pisei (Kampong Speu), OD Pearaing (Prey Veng), and OD Sen Monorom (Mundulkiri). These ODs were purposively selected reflecting the different T2D and HTN health system interventions at

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the PHC level—the selection details of the first five ODs are well-described in previous publications.[4,26] However, OD Sen Monorom was additionally selected to give extra value to the study due to the existing Malaria Vertical Programme. The research design of this study comprised (1) a cross-sectional survey with CHWs and (2) semi-structured interviews with key informants.

The cross-sectional survey was conducted using a multi-stage cluster sampling where six ODs were purposively selected. Then, 75 villages were randomly selected, and exhaustive sampling was used to invite all available CHWs from selected villages to participate in the survey since the number of active CHWs per village varied due to different reasons. As a result, 153 CHWs participated in the study among the 160 invited (96% of response rate). A structured questionnaire was used in the local language (Khmer) includes questions on: (a) socio-demographic characteristics, (b) characteristics of CHWs, and (c) the knowledge, attitude, and practices (KAP) section in T2D and HTN management (Supplementary file 1).

a. Socio-demographic variables included age, gender, marital status, level of education, main occupation, and annual income.
b. Characteristics of CHWs included number of titles for their roles in providing community work, duration (years) of working as a CHW, duration (hours) per month spent on CHW work, and number of households under their supervision.
c. The KAP section for CHWs on T2D and HTN included seven questions on general NCDs, five questions on risk factors of T2D, five questions on prevention of T2D, five questions on risk factors of HTN, five questions on prevention of HTN, four questions on attitude, and two questions on practice.

The questionnaire development was guided by an extensive review of the relevant literature, government guidelines[22,27] and previous publications,[28,29] and consultation with health system and NCDs experts of the study team. This questionnaire was contextualised to overcome biases by different education and literacy. To ensure validity, the questionnaire was pre-tested among CHWs at the study settings to ensure local acceptability and clarity. All respondents could respond "Yes" to any question they thought true and "No" to any question they thought false. The knowledge score was calculated by assigning one point to each correct answer. The same scoring method was applied to questions on attitudes and practices. The interview of the survey is done by well-trained data collectors in local language.

Semi-structured interviews with key informants (KI) were conducted to understand their in-depth perspectives on the potential roles of CHWs in health program including T2D and HTN management, the challenges of the health system and their proposed solutions in incorporating CHWs in T2D and HTN management. There was a total of 11 KIs where five were the policymakers (two departments of the MoH, and three from the Vertical Health Programmes (HIV/AIDS, Malaria and Tuberculosis)) and six were implementers (representatives from ODs). The interviews were conducted by two researchers (SV asked the question and NSL/HVN took notes) in the local language and in the KIs' respective offices, and notes were taken as an interview record note in local language. These notes were translated into English by research assistants who were familiar with qualitative methods. The study was conducted from December 2019 to April 2020.

Data Analyses

Survey data were managed and analysed using STATA version 14 (StataCorp. 2015. Stata Statistical Software: Release 14. College Station, TX) and included generation of frequencies and percentages using descriptive statistics.

All of the semi-structured interviews were read by the first author (SVC) to immerse herself in the data. An inductive approach is used to allow themes to be identified and studied in detail by using NVivo software (NVivo qualitative data analysis software; QSR International Pty Ltd.). Discussions were carried out with the research team to have a final development of themes that were in line with the study objectives.

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Results

Socio-Demographic Characteristics of CHWs

Based on the illustration in Table 1, the mean age of participants was 49 years (SD=14). Among all participants, 51.0% were females, 79.1% were currently married, 43.8% had at least completed primary education, 39.2% were farmers, and 48.4% was 4–17 million riels (USD 1000–4250).

The CHWs had spent on average 8.6 years (SD=6.5) as a CHW. In our study, 44.5% of respondents were performing only one role, 30.5% two roles, and 24.8% three roles linked to community health-related work.

The current functions included (1) being a formal VHSGs who is involved in community outreach activity of the HCs, (2) observing whether tuberculosis patients take their medicines as Community Direct Observation Therapy Watchers, and other functions such as (3) diagnosing and treating malaria as Village Malaria Workers (VMWs) or Mobile Malaria Workers (MMWs), (4) peer educator for T2D and HTN, (5) Red Cross volunteers, (6) working for non-government organisations' social protection programmes, and (7) distributing contraceptive pills as Community-Based Distributors.

Table 1. Socio-demographic Characteristics of Study Participants (N=153).

Socio-Demographic (N=153)	Mean ± SD (range) or N (%)
Age Range (years)	49±14 (17–81)
Age Group	
≤39 years old	41 (26.8%)
≥40 years old	112 (73.2%)
Gender	
Male	75 (49.0%)
Female	78 (51.0%)
Marital Status	
Currently married	121 (79.1%)
Single	7 (4.6%)
Divorced or widowed	25 (16.3%)
Level of Education	
No education or less than primary	53 (34.6%)
At least complete primary school	67 (43.8%)
Complete secondary or higher	33 (21.6%)
Main Occupation	
None/stay at home	10 (6.5%)
Farmer	60 (39.2%)
Vendor	23 (15.0%)
Chief/vice-chief/member of commune council	52 (34.0%)
Other	8 (5.2%)
Annual Personal Income	
less than 1 million riels (< USD 250)	10 (6.5%)
1 to 4 million riels (USD 250–1000)	58 (37.9%)

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4 to 17 million riels (USD 1000–4250)	74 (48.4%)
more than 17 million riels (> USD 4250)	11 (7.2%)
Number of roles performed (community health-related work)	
Only one role	68 (44.5%)
Two roles	47 (30.7%)
Three roles	38 (24.8%)
Main function of the CHW in the health programme	
Health Centre-Village Health Support Group	121 (79.1%)
Tuberculosis Vertical Programme (Community Direct Observation Therapy Watchers)	23 (15.0%)
Other (Village Malaria Worker or Mobile Malaria Workers, Peer Educator for T2D and HTN, Coordinator for social protection, Community-based Distributor for Contraceptive Pill)	9 (5.9%)
Average no. of years as a CHW	8.6±6.5 (0–31)
Average CHW work hours (per month)	17±17 (2–96)
Average no. of households under supervision	148±97 (17–492)

Knowledge, Attitude, and Practice

Based on the illustration in Table 2, most respondents answered about six out of seven NCD-related knowledge items correctly (M=6.3, SD=0.8). The majority of CHWs (90.2%) agreed that NCDs cannot directly spread between people, 96.7% agreed that NCDs can be prevented with a healthy diet, 91.5% agreed that diabetes is an NCD, 94.8% did not agree that regular exercise will put you at risk of diabetes, 93.5% agreed that HTN is an NCD, and 94.8% agreed that reducing salt intake may reduce the risk of high blood pressure. The highest prevalence of misunderstanding was seen in item 7 (related to smoking) of NCD-related knowledge, where 74.5% incorrectly believed the statement was true.

On average, about three out of five T2D risk-factor knowledge items were answered correctly (M=3.4, SD=0.9). The majority of CHWs agreed that lack of exercise (86.9%) is risk factor of T2D, while fruit and vegetable intake (88.9%) and walking exercise (96.1%) are not risk factors of T2D. A minority of participating CHWs correctly agreed that a family history of T2D (23.5%), and tobacco use (48.4%) are risk factors of T2D.

On average, the participating CHWs scored 4.6 out of 5 on the T2D prevention knowledge items (M=4.6, SD=0.7). The CHWs acknowledged that ways of preventing T2D include regular exercise (96.7%), not having too much oily food (89.5%), vegetables consumption (92.2%), not drinking sweet beverages (92.8%), and doing physical activities (94.1%).

Similarly, around four out of five HTN risk-factor knowledge items were answered correctly (M=4.5, SD=0.6). The CHWs acknowledged that risk factors of HTN include eating salty foods (96.7%), lack of exercise (95.4%), tobacco use (70.6%), while walking exercise (96.7%), and fruit and vegetable intake (93.5%) are not a risk factor of HTN.

Lastly, approximately four of five HTN prevention knowledge items were answered correctly (M=4.6, SD=0.8). The CHWs acknowledged that ways of preventing HTN include exercising (96.7%), vegetables consumption (94.1%) and doing physical activities (96.1%). They agreed that having too much of oily food (86.3%) and eating salty food (94.1%) are not ways of preventing HTN.

Most respondents had a positive attitude on the importance of receiving on-time treatment for T2D patients (98.7%), the importance of lifelong treatment for T2D (84.9%), the importance for people over 40 years old to receive HTN screening regularly (99.3%), and the importance of taking medicine regularly for HTN patients (99.3%). Since they have encountered some patients living with T2D and

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HTN in their villages, CHWs tended to be very positive on the statement on the disease management including screening and treatment. Moreover, some CHWs have been informed about the T2D and HTN service availability at the HC which allowed them to be able to inform and encourage villagers to have their blood pressure and blood glucose screened.

Regarding practices, 83.0% CHWs had ever advised people over 40 years old to have blood glucose screening and 85.6% had ever advised those over 40 years old to undergo blood pressure screening.

Table 2. Response to knowledge, attitude and practice items.

#	Knowledge, Attitude and Practice items	Correct (%)
	NCD-related knowledge	
1	Do you think non-communicable disease is one that cannot be directly spread between people?	90.2
2	Do you think non-communicable disease can be prevented by having healthy diet?	96.7
3	Do you think of diabetes as a non-communicable disease?	91.5
4	Do you think doing regular exercise will put you at risk of having diabetes?	94.8
5	Do you think hypertension is a non-communicable disease?	93.5
6	Do you think reducing salt intake may reduce risk of having high blood pressure?	94.8
7	Smoking is not a risk factor for non-communicable diseases	74.5
	Type-2 Diabetes Risk factor	
1	Family history of T2D is a risk factor of having T2D	23.5
2	Fruit and vegetable intakes are not risk factors of T2D	88.9
3	Lack of exercise is a risk factor of T2D	86.9
4	Tobacco use is risk factor of T2D	48.4
5	Walking exercise is not a risk factor of T2D	96.1
	Type-2 Diabetes Prevention	
1	Do exercise regularly can prevent you from having T2D	96.7
2	Having too much of oily food cannot prevent you from having T2D	89.5
3	Vegetable consumption can prevent you from having T2D	92.2
4	Sweet beverages cannot prevent you from having T2D	92.8
5	Physical activities can prevent you from having T2D	94.1
	HTN risk factor	
1	Salty food is a risk factor of having HTN	96.7
2	Fruit and vegetable intakes are not risk factors of HTN	93.5
3	Lack of exercise is a risk factor of HTN	95.4
4	Tobacco use is risk factor of HTN	70.6
5	Walking exercise is not risk factor of HTN	96.7

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	HTN prevention	
1	Do exercise regularly can prevent you from having HTN	96.7
2	Having too much of oily food cannot prevent you from having HTN	86.3
3	Vegetable consumption can prevent you from having HTN	94.1
4	Eating salty food cannot prevent you from having HTN	94.1
5	Physical activities can prevent you from having HTN	96.1
	Attitudes	
1	If you ever heard about diabetes, do you think it is important for patients to receive on-time treatment?	98.7
2	If you ever heard about diabetes, do people with diabetes need lifelong treatment?	84.9
3	If you know something about high blood pressure/hypertension, do you think that it is important for people over 40 years old to have their blood pressure measured regularly?	99.3
4	If you know something about high blood pressure/hypertension, do people with high blood pressure/hypertension need to take medication regularly?	99.3
	Practices	
1	Have you ever advised people over 40 years old in this village to have their blood glucose checked (measured) at the health facility?	83.0
2	Have you ever advised people over 40 years old in this village to have their blood pressure measured?	85.6

Health System Barriers and Way forwards for Incorporating CHWs in T2D and HTN Management

Respondents reported on barriers of the health system related to the CHWs' involvement in NCDs management and on potential ways to address the reported barriers and the feasibility of implementation.

Health System Barriers

The major health system barriers reported were the need for both (1) financial and (2) non-financial support. Respondents recognised that another vertical disease control programmes also provide financial incentives (in the form of monthly payments, case-based incentives, transportation, or mobile phone top-up), and recognized this as an essential part of any community-based intervention. They also admit that the limited government structural support increased dependency on external donors' funding and hinders the sustainability of CHW's engagement.

> *"Financial incentive is important. What we learnt from the malaria vertical programme was that this program had a large funding and always succeed in achieving its indicators; however, the shortage of funding in 2016 made all the program activities down including the performance of VMWs. Why? Because there was no longer amount of money to support the VMWs in their work, so they stopped working too. Therefore, I still agreed that we need some money for them to work for us."* (Representative from implementer)

> *"Financial support is important even if CHWs are volunteer since they also have a family to support. CHWs are motivated to work if they can receive some financial incentive. To date, we can allocate some fund from our facility's funding revenue (user-fees) which is around 5000 to 10000 [riels; USD 1.15 to 2.5] only to compensate their transportation when they have to come to HC for a meeting. To*

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fully operate their performance in the community for any health care programme, I think financial support is essential." (Representative from implementer)

Since there are no national vertical health programmes supporting the CHWs for T2D and HTN management, public health facilities—especially HCs—have used their own financial revenues through user-fee to only support transportation fee for CHWs to attend the meeting at the HCs. However, respondents stated that the current revenue from user-fees is low and limited to contribute as an incentive for CHW's work.

"For a sustainable financial support to CHWs, we cannot rely only on the revenues of user-fees of the HC since the amount is already low and it cannot be allocated much to support the CHWs' work. I think government grant or funding is the most sustainable funding stream and the health sector reform through Decentralization and De-concentration would be an opportunity to engage local authorities. This reform meant the local authorities must have accountability to the health service management in their regions meaning they need to consider local resource allocation for the health-related activities in the communities." (Representative from the policymaker)

Respondents raised that non-financial support such as training, supervision, and resource supply are also crucial components to ensure sustainability of the CHW program and an empowerment on their performance. System structural support was raised as a complementary to financial support, CHWs need proper training to be enrich skill and confident. Respondents suggested that CHWs must receive pre-service and refresher training along with sufficient resource supplies.

"For our vertical disease programme, we were able to achieve all the indicators including community function. CHWs have been involved since the start of the program and were both financially and technically support including monthly incentive, and material supply. We also offered them a regular supervision to monitor and guide their performance. We provided them training and always conduct a regular monthly follow-up meeting for them to share work progress and challenges they encountered at the field. Our program believed that these supports are essential for us or another related health programme to achieve the outcome." (Representative from policymaker)

Ways Forwards to Involve CHW in the Scale-Up of NCD Management

The current employment system of CHWs in the country seems to be diverse and different from one region to another based on the availability of national vertical health programmes. The poorly organised system structure, and undefined roles and responsibilities of CHWs seem to be barriers to their performance for T2D and HTN in the PHC. Respondents raised a need for re-define the role of CHWs and task of responsibilities to help CHWs in receiving appropriate support for their roles which would increase their motivation and work performance leading to better implementation of health programmes.

"I think that what constrains CHWs in receiving the financial support was how they were defined in our national policy as "a volunteer". As have been defined and labelled as a volunteer for HC and the community, it limited their odds of receiving some incentive or recognition as an important part of the PHC. This definition that labelled them as "a volunteer" should be changed so that they can be incentivised through their performance. We cannot expect anyone to work for free." (Representative from policymaker)

Respondents also noted the need for an assessment of the workload and competences of CHWs to ensure an optimal performance. This should be done on a regular basis to deeply understand their performance, work challenges, and difficulties which would help in the successful scale-up of CHW interventions through appropriate task assignment, structural support, and re-adjusted interventions to fulfil their need and address their challenges.

While CHWs have long been funded through separate national vertical health programmes, respondents noted the need to rearrange the employment and financing system of CHWs in general. Scale-up of CHW interventions does not only entail the addition of new disease management

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interventions (like T2D and HTN) to their task, but also a rethinking of their competences, workload, and remuneration.

> *"I think it is feasible to use the existing VHSGs in NCDs management; however, we need to understand their workload. With our programme financially supported them, they still were programme-driven, and more concerned about their personal businesses which imposed as barriers to their performance. They tended to work on programmes which generate more funding for them."* (Representative from policymaker)

> *"Community-based intervention such as home-based care for people living with HIV/AIDs was a key activity in our vertical health programme. Due to the shortage of funding, we wished to integrate our community intervention as one community function with another vertical health programmes. Since integration could save more funding when it is decreased. This community functions should be managed by one separated department where the department are offering all the health care training to CHWs and manage the pool funding to support them in any health-related activities."* (Representative from policymaker)

Discussion

Our study provides evidence on the potential contribution of CHWs to a scale-up of T2D and HTN care in Cambodia by assessing their KAP as well as the health system barriers to and potential solutions for successful implementation. Our main findings relate to the knowledge of CHWs, and to major facilitators to CHW scale-up being support and financing structure.

Overall, the general knowledge among CHWs on T2D and HTN was good, albeit still limited on certain risk factors. The latter finding is consistent with studies in other low-income settings such as in Eastern Uganda.[29] This might be explained by the current training opportunities mainly consisting of occasional information sharing, workshops from the health centres and media advertisements on curative aspects with little attention to risk factors. Most CHWs were aware of the most common NCDs and the majority knew about prevention of T2D and HTN, reflecting their fundamental knowledge and the potential role of CHWs to engage in this program. The demonstrated positive attitudes and good practices with regards to T2D and HTN potentially resulted from the high prevalence of T2D and HTN in their communities as indicated in the study in Uganda.[29]

Major barriers to further implementation of CHW interventions related to training, support and financing. Capacity building was cited as an important step. To deepen and broaden their capacity in prevention and disease management, not only for T2D and HTN, but also related to the connection with other diseases, CHW trainings should cover more disease areas, including risk factors and preventive measures. A study in LMICs has also confirmed that the design of a targeted training curriculum was one of the key factors that could affect the effectiveness of a CHW training program.[30]

However, their performance is further affected by health system factors, more specifically resource constraints (financial barriers and non-financial barriers). Substantial government's financial investment is needed through an innovative funding mechanism to improve structural support. Previous studies have demonstrated that boosted tax revenue for NCDs could be a potential fund raising mechanism; for instance, a study from Tonga has shown that the NCD tax policy can be successfully employed as a strategy to support health goals for NCD services.[31] The Thai Health Promotion Foundation has also been able to generate an annual revenue of USD 120 million from a 2% surcharge of excise tax on tobacco and alcohol[32] which used to support evidence generation, a public campaign, and social mobilization to address NCDs risk factors. Evidently, village health volunteers in Thailand are a key part of PHC receiving 1,000 Thai baht (USD 32) per month.[33] In Cambodia, the government has issued sub-decree number 193 on December 4, 2019 on the assignment of health management and health service delivery to the capital and province administration,[34] which allows room for financial allocation of the budget of provincial administrators to operate health related-activities[35] The local governance must be more accountable to its population health through improved access to NCDs care at public health facilities

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by bringing services closer to the villagers and re-allocating local funds to NCD services including CHWs engagement in all health services of the HC. A result from a cost analysis showed that including a minimum wage for CHWs could increase a large gain in efficiency in the implementation of health interventions.[36]

Non-financial resources, such as continuous training, material support, or supervision from healthcare professionals were also cited to be essential elements for CHWs' engagement in T2D and HTN care. Previous studies have pointed out that the essential elements for an effective work environment for CHWs include supplies and equipment, supportive supervision, and respect from the community.[23,37] The inadequate supply could impact the community's trust on the role of CHWs as has also been demonstrated in previous studies concerning CHW programmes.[38,39]

The majority of the CHWs in our study had more than two roles including MCH or infectious diseases; therefore, over-burdening of CHWs is a clear concern as also indicated in other developing countries.[40] A previous study conducted in Cambodia has also outlined that CHWs had a number of roles and responsibilities as part of their volunteer work.[41] Therefore, the design of future community-based interventions should be planned rigorously to ensure adequate support to maximise CHWs' performance and to avoid over-burdening. This is in line with a review on the influence of the work environment on CHWs' productivity and effectiveness, which stated that a manageable workload of CHWs carried out in an organised manner, with a reasonable geographic distance to cover, the needed supplies and equipment, and a supportive supervisor, and respect and acceptance from the community and the health system are prerequisites for an effective community-based strategy.[37]

CHWs can function as crucial extensions of the health workforce, especially in the scale-up of T2D and HTN care because they can provide services to the community such as raising awareness and screening and they can contribute to increasing coverage, addressing the horizontal dimension of scale-up – as defined in the previous multi-country research study [42]. Their special role in providing self-management support to patients can also contribute to expand the existing package of interventions through vertical scale-up.

Limitations of the Study

Our study has some limitations especially related to its limited sample size which restricts the generalisability of study findings to other areas of the country. Yet, the strength of our study was the high response rate from the CHWs and that it involved both quantitative and qualitative data which enabled triangulation of findings. The findings are not only obtained from CHWs but also from respondents from the Vertical Health Programmes who have long-term experience in engaging CHWs in their respective programme.

Conclusion

Our study has shown the potential of CHWs in T2D and HTN management with their fundamental background, and this could be maximised through a well-designed community-based strategies that focus on their work characteristic, and support need in the health system. First strategy is to develop a technical support mechanism through a well-designed training curriculum that covers diverse topics to fill in their knowledge gaps, especially on risk factors. Second, their roles and responsibilities should be sharpened to their characteristics and clearly defined to avoid over-burdening their work. Last, health system should design an effective policy which provide a strong supporting structure for CHWs' performance including financial and non-financial support to alleviate their participation in the health program and sustain their commitment.

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Abbreviations

MDGs: Millennium Development Goals; MCH: Maternal and Child Health; NCD: Non-Communicable Disease; T2D: Type 2 Diabetes; HTN: Hypertension; UHC: Universal Health Coverage; MoH: Ministry of Health; PHC: Primary Health Care; RHs: Referral Hospitals; WHO PEN: World Health Organization Package of Essential Non-Communicable Disease Interventions; HCs: Health Centers; CHWs: Community Health Workers; LMICs: Low- and Middle-Income Countries; VHSGs: Village Health Support Groups; ODs: Operational Districts; KAP: Knowledge, Attitude and Practices; KI: Key Informant; VMW: Village Malaria Worker, MMW: Mobile Malaria Worker.

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