

## Original Article



# Strengthening local health systems for hypertension prevention and control: the Communities for Healthy Hearts program in Ho Chi Minh City, Vietnam

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## ABSTRACT



**Background:** Hypertension leads to an estimate of 91,000 deaths yearly, accounting for 21% of total mortality in Vietnam. However, the national health system is under-resourced to meet the population's needs for hypertension prevention and care. The Communities for Healthy Hearts program (the Program) introduced an innovative health service delivery model to address hypertension in underserved communities in 4 districts of Ho Chi Minh City (HCMC). This study evaluated a 3-year implementation of this program (2016–2019) on the strengthening of local health system and its capacity to better prevent and manage hypertension.

**Methods:** A mixed approach of quantitative and qualitative studies was applied. The WHO's health systems building blocks framework was employed to assess impact of the Program on the local health system.

**Results:** Findings revealed that the Program developed a hypertension-ready system supported by enabling factors that are aligned with the WHO's building blocks. These were: increased availability of preventive and treatment services for hypertension; improved capacity of healthcare staff through trainings; effective communication materials, available technical guidelines; provision of stipends for collaborators; establishment of a collaborators network and blood pressure checkpoints with a strong collaboration among stakeholders. However, there was room for improvement and the Program provides a few lessons learned regarding planning in personnel changes and recruitment, efficacy of capacity building via training sessions, sustainability of financing, and completeness of patient information management.

**Conclusion:** Given national objectives in Vietnam to strengthen primary care and address the rising tide of NCDs, The Communities for Healthy Hearts program provided a promising approach to strengthen HCMC's health system and extend coverage of community-based approaches to improve prevention and control of hypertension. This model provides several approaches and lessons learned that can support health providers and policy makers in their efforts to strengthen national health programs in Vietnam to address NCDs.

**Keywords:** Hypertension; Governance; Service delivery; Financing; Health workforce; Health information system; Medical products; Vaccine and technology; Health systems strengthening

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No potential conflict of interest relevant to this article was reported. This paper is one of the 4 study series under the evaluation of Communities for Healthy Hearts program in Ho Chi Minh City, Viet Nam.

### Author Contributions

Conceptualization: Hoang VM; Data curation: Nguyen TV; Investigation: Tran TA, Nguyen TV, Hoang HH; Methodology: Hoang VM; Supervision: Tran TA, Hoang VM, Nguyen TV; Writing - original draft: Tran TA; Writing - review & editing: Hoang VM, Adler AJ, Shellaby JT, Bui VT, McGuire H, Le TTH, Nguyen TV, Hoang TA, Le MD, Nguyen TTD, Hoang HH, Bui PL, Khuong QL, Nguyen BN, Tran TN, Tran TP, Nguyen TNP, Do VV, Nguyen TV.

## INTRODUCTION

Hypertension is a key risk factor for cardiovascular and kidney diseases.<sup>1</sup> This condition, which is defined as having a systolic blood pressure (BP) reading of  $\geq 140$  mmHg and/or diastolic BP of  $\geq 90$  mmHg—both on 2 different days,<sup>2</sup> contributed to approximately 55% of all mortality related to cardiovascular disease (CVD) and in 7% of all disability-adjusted life years.<sup>3</sup> In 2015, the number of people with high BP reached 1.13 billion worldwide.<sup>4</sup> The number of adults with hypertension in 2025 was predicted to increase to a total of 1.56 billion.<sup>5,6</sup> Approximately one-third of the adult population has high BP in Southeast Asia, with nearly 1.5 million deaths occurring due to hypertension each year.<sup>7</sup>

It has been recommended that adequate control of hypertension in developing countries could be achievable by community based programmes and by upgrading primary healthcare systems.<sup>8</sup> Strengthening population-based approaches to reduce high-risk behaviors such as unhealthy diets, the harmful use of alcohol and physical inactivity, can help prevent hypertension. In most developed countries, approximately 50% of people with hypertension are aware of their condition.<sup>9</sup> However, health systems in most developing countries fail to detect and manage hypertension effectively.<sup>10,11</sup> Weaknesses in health systems to address hypertension exist at the national, regional, district, community, and household levels.

A national survey (STEPS) on risk factors for noncommunicable diseases (NCDs) in 2015 showed that the prevalence of hypertension was 18.9% in Vietnam, and was significantly higher in males (23.1%) than females (14.9%). Among those being detected with elevated BP, only 43.1% reported having been diagnosed, and only 13.6% reported their hypertension currently being managed at a health facility.<sup>12</sup>

In 2015, Vietnam approved a national strategy (2015–2025) on the prevention and control of NCDs, aiming to limit the proportion of adults with hypertension to be less than 30%. Meanwhile, there are more than 11,105 commune health stations (CHS) nationwide, each CHS normally has a full team that consists of a doctor/assistant doctor, nurse, midwife, traditional practitioner and pharmacist, who are responsible for all health programs and manage the health of population ranging from 5,000 to 10,000 habitants.<sup>13</sup> This national health system has been under resourced to meet the population's needs for hypertension prevention and management, particularly at the community level.

As a result, the Communities for Healthy Hearts program introduced an innovative health care delivery model that was designed to improve the prevention and management of hypertension in underserved communities. The program was launched in 4 districts of Ho Chi Minh City (HCMC) over a 3-year period (2016–2019), and was a partnership between the Novartis Foundation, Program for Appropriate Technology in Health (PATH) and HCMC's Provincial Health Department (PHD) and Preventive Medicine Center (PMC). The 5 objectives of the Communities for Healthy Hearts program were: 1) increase awareness of hypertension and demand for screening and treatment among adults through behavior change communication (BCC); 2) increase the availability of hypertension screening and referral services; 3) increase the availability of hypertension services, which reflect the full continuum of patient-centered care in public and private health facilities; 4) reduce loss to follow-up by strengthening referral systems, increasing contact with patients, and empowering patients; and 5) enable country-level decision-makers to use the project evidence to sustain and scale up hypertension services through information management.

The Communities for Healthy Hearts created a model that aimed to promote a better understanding of hypertension within the community and greater access to hypertension services. To do so, the program developed an integrated system that engaged public health services at the commune, district and provincial level, and in the private sector. Having community collaborators provide screenings and the monitoring of BP is an example of both task-shifting and team based care as they link the person screened to the health facility and continue to engage with the CHS health workers to provide comprehensive hypertension screening, diagnosis, follow-up and case management.

The program promoted BCC campaigns in the community to raise awareness on hypertension and its risk factors, leveraged nontraditional partners to increase access to BP screenings, strengthened the healthcare providers' capacity in hypertension diagnosis, treatment, and management, standardized services and patient flows, and developed digital health and mobile health (mHealth) tools for patient information management. The Communities for Healthy Hearts program mobilized non-health sector personnel as community volunteers to support program activities, e.g. communication and health consultation to deliver the right health messages, increase the demand for as well as the access to early detection, and create the link to health facilities for diagnosis and treatment to better manage patients in the community. The establishment of a community volunteer network was an outstanding and non-traditional innovation brought by the Communities for Healthy Hearts program.

Using current scientific knowledge, available evidence and a review of experiences on the prevention and control of NCDs, the World Health Organization (WHO)'s global action plan for the prevention and control of NCDs 2013–2020 proposes a menu of policy options for Member States, international partners and the Secretariat, under 6 interconnected and mutually reinforcing objectives including health systems and universal health coverage (i.e., to strengthen and orient health systems to address the prevention and control of NCDs and the underlying social determinants through people-centered primary healthcare and universal health coverage). Applying people-centered primary healthcare and universal health coverage approaches, the Communities for Healthy Hearts program tried to bring high quality hypertension services closer to home by demonstrating an integrated community based model that aimed to increase awareness of hypertension and improve the availability and quality of hypertension services.

In this regard, the objective of this study was to evaluate a 3-year implementation of the Communities for Healthy Hearts program on how it strengthened the local health system capacity for optimal hypertension prevention and management.

## **METHODS**

### **Study design**

We used mixed methods including quantitative and qualitative methods in the present study. The purpose of this concurrent mixed method study is to better understand how the Communities for Healthy Hearts program strengthened the local health system in prevention and control of hypertension by converging both quantitative and qualitative data. The quantitative study, a health facility survey, was used to measure local health system's overall performance regarding hypertension prevention and control. At the same time, local health

system's enabling factors and bottlenecks for optimal hypertension prevention and control were explored using qualitative semi-structured interviews with key informants.

### Conceptual framework

The WHO's Monitoring the Building Blocks of Health Systems framework<sup>14</sup> was employed in this study. The framework conceptualizes a health system as consisting of 6 building blocks, namely 1) service delivery; 2) health workforce; 3) health information system; 4) medical products, vaccines and technologies; 5) health financing; and 6) leadership/governance. It also emphasizes the process elements for health system strengthening (access, coverage, quality, and safety), and the overall goals of a health system (improved health, responsiveness, social and financial risk protection, and improved efficiency) (Fig. 1).

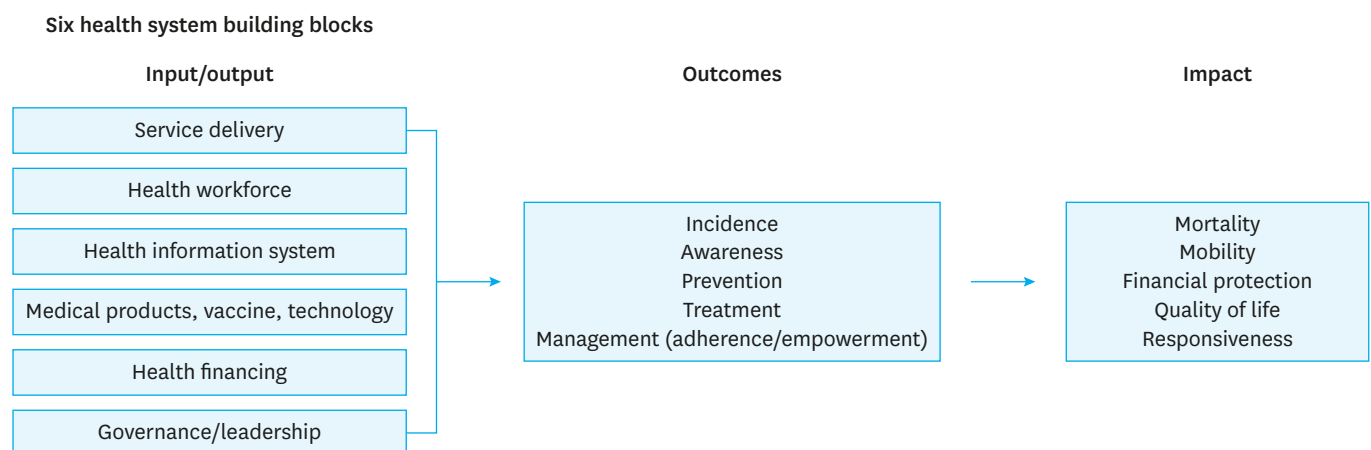
The building blocks approach is a useful instrument because it can be used to identify health system constraints, and point out which investments are needed and where. The building blocks is also used as a framework to advocate for health systems strengthening and to provide guidance to governments on investing in health systems strengthening to facilitate the scale-up of interventions.<sup>15</sup>

In the present study, these building blocks were specifically defined as: 1) service delivery: provision and quality of communication, screening, referrals, diagnosis, treatment, follow-up and patient management; 2) health workforce: qualified staff, job satisfaction, motivation; 3) health information system: refers to a system that integrates data collection, processing, reporting, and use of the information necessary for improving health service effectiveness and efficiency; 4) medical equipment and technologies: medical equipment, up-to-date and appropriate guidelines and protocols; 5) health financing: the required financial resources to ensure sustainability; availability and timing of funds release; and 6) leadership/governance: leadership roles of the HCMC PHD and PMC; roles and responsibilities of multi-sectoral coordination mechanisms, coalitions, and partnerships.

### Quantitative study for health facilities

#### Study subjects and sample size

District hospitals (n = 4) and all CHSs (n = 55) of all 4 districts were studied (this is out of a total of 79 public and private facilities included in the program).



**Fig. 1.** Conceptual framework for health system strengthening regarding hypertension prevention and control under the Communities for Healthy Hearts program in Ho Chi Minh City, Vietnam.

### *Variables and research tool*

WHO developed a service availability and readiness assessment (SARA) questionnaire specifically for NCDs in 2013.<sup>16</sup> SARA is a health facility assessment tool designed to assess and monitor the service availability and readiness of the health sector and to generate evidence to support the planning and management of a health system. The questionnaire used for this study was modified to align with the Communities for Healthy Hearts's program focus, which is hypertension. The modified version of SARA consists of 6 sessions. As per the 6 health system building blocks, the variables are: 1) service delivery (screening, diagnosis, treatment and management of hypertension, health promotion activities, and information on referral situation); 2) health workforce (number of health staff by categories, who are in charge for hypertension diagnosis and treatment, and capacity building for health workforce (quality, training); 3) health information system (data collection, storage, reporting, patient management); 4) medical equipment and technologies (availability and usage conditions of equipment/medicine, availability and appropriateness of guidelines related to hypertension diagnosis, treatment and management); 5) health financing (allowance, payment mechanism for health services related to hypertension); and 6) leadership/governance (oversight, collaboration, partnership, transparency and accountability).

### *Data collection*

Data collection for post-intervention (of this study): data collection forms (SARA) were sent to 4 district hospitals and 55 CHSs of the districts implementing the Communities for Healthy Hearts program activities in July, 2019. CHSs staff were instructed in how to fill in the data collection form. Completeness and consistencies of all the collected forms were checked. For data of pre-intervention phase, we used data from 2015 and 2016 and this survey was conducted by the Hanoi University of Public Health (HUPH) in May 2016.

### *Data management and analysis*

A pre-intervention and post-intervention comparison approach was applied for the quantitative study to assess the changes in hypertension service provision brought about by the Communities for Healthy Hearts program. In practice, the baseline survey was conducted in May, 2016. However, some SARA questions asked health facilities for activities conducted in 2015 (one full before the intervention began in 2016), such as questions on capacity building of health staff and communication activities of CHSs. Therefore, 2016 and 2015 (where applicable) were interchangeably used for describing the pre-intervention period of this program. Endline data was collected in July, 2019. The questionnaire was developed by the research team of HUPH. The questionnaires, including clear instructions on how to fill it out, were sent to district hospitals and CHSs for data collection. On the day, we conducted the semi-structured interviews, received the questionnaires and cross-checked with health staff for clarification if necessary. Descriptive analysis (percentages of variables of interest were calculated for district and commune level health facilities) was applied for the 2 periods (2015/2016 and 2019), thereby detecting achievements of the Program over 2 periods. In addition, Epidata 3.1 and SPSS 20.0 were used for data entry and statistical analyses, respectively.

## **Qualitative study (semi-structured interviews with key informants)**

### *Study sample size and sampling*

Stakeholders were purposively selected for interviews. They were managers and health providers from public and private health facilities at both the district and commune levels. The selected interviewees were the ones who participated in the program and clearly understood the program. Finally, a total of 33 key informants were interviewed. These respondents were from

the HCMC PHD (n = 1), HCMC PMC (n = 1), district PMCs (n = 5), district health bureau (n = 5); public district hospital (n = 4); private clinics (n = 8); and CHSs (n = 9).

#### *Research content and tools*

Questions for semi-structured interviews were broadly categorized into 6 topics as per the 6 health system building blocks of the conceptual framework. For each health system building block, these were the main questions: What interventions from the Communities for Health Hearts program have been implemented since 2016?; How did these corresponding activities/interventions change since starting the program?; What factors contributed to the successful or unsuccessful provision of these activities/interventions for hypertensive patients at this facility?; How did you assess these interventions?; What were the recommendation for better improvement of the healthcare services for hypertensive patients? These questions were supplemented with any relevant sub questions pending the answers received.

#### *Data collection*

Data was collected by trained researchers from the HUPH. Two researchers conducted semi-structured interviews. We tried to get as many answers as possible to the questions in the questionnaires and it took at least one hour for each interview. The interviews were recorded with agreement from the interviewees.

#### *Data analysis*

Collected qualitative data was transcribed by interviewers who were also researchers of the HUPH. Transcripts of semi-structured interviews as well as field notes were imported into NVivo for coding. Coding process was then done by 2 research team members. Any discrepancy raised during this process was discussed and interviewees were called back for further clarification if necessary. Systematic and content analysis techniques were applied to analyze the qualitative data as mentioned above. Based on the conceptual framework of WHO's health system building blocks and its desirable attributes as abovementioned, transcripts were coded into corresponding themes. For instance, with the Leadership/Governance building block, we coded separate themes such as coordination mechanisms, coalitions, partnerships, participation, transparency and accountability (if any). Then we categorized those contents into facilitating factors and bottlenecks when examining building block. Other building blocks were done similarly. Transcripts were then translated by the researchers themselves. For a better quality of English, they were then edited and cross-checked with people proficient in English.

#### *Document review*

Reports of HCMC's PMC—the national implementing agency of this program—were reviewed, collected and used for describing achievements and results of the program. These achievements were reflected in the results section of this article.

#### *Ethical clearance*

The study was reviewed and received ethical clearance from the Institutional Review Board of HUPH in Vietnam (# 318/2019/YTCC-HD3 dated 30/05/2019). All individual participants included in the study gave informed consent.

## RESULTS

The effectiveness of the Communities for Healthy Hearts program was assessed through the building blocks of 1) service delivery, 2) health workforce, 3) health information system, 4) medical equipment and technologies, 5) health financing, and 6) leadership/governance. **Table 1** overviews the enabling factors and bottlenecks for each health system building block, which will be explained in detail in the following section.

### Service delivery

Over the last 4 years, the Communities for Healthy Hearts program was shown to strengthen the healthcare provision for hypertension prevention, screening, diagnosis and treatment in all 4 districts and the sixteen wards enrolled in the program in HCMC. The established network of community collaborators and checkpoints (pharmacists, community centers, homes...) increased the provision of high-quality screenings for hypertension, provided heart-healthy lifestyle counseling for community members, and established a direct referral service to health facilities, and collected data about potential hypertension cases and confirmed hypertension cases for monthly reports to CHSs.

Specifically, the Communities for Healthy Hearts program expanded access to BP screening and referral points through private partnerships and social enterprise initiatives. The program engaged Pharmacy chains, Galant Clinic (a private clinic) and Glink (a social enterprise) in HCMC. By offering training and technical guidance, as well as ongoing support to these entities, the program was able to raise awareness and provide BP measurements at 28 non-traditional locations e.g. wet markets, hair saloons/barber shops, public parks by Glink; 20 community based organizations by Galant clinics; and 120 stores by Pharmacy (according to HCMC's PMC). 121,273 people aged 40 years and older were screened for elevated BP by the Communities for Healthy Hearts network. It was equal to 58% of people aged 40 years and older in the sixteen project wards. 16,455 individuals with elevated BP were

**Table 1.** Enabling factors and bottlenecks by health system building blocks—the Communities for Healthy Hearts program in Ho Chi Minh City, Vietnam

Health system inputs	Health system output
<p><b>Health workforce (Table 4)</b></p> <ul style="list-style-type: none"> <li>Enabling factors: improved capacity of the health staff and community collaborators/checkpoints via training courses</li> <li>Bottlenecks: the frequency of training sessions could affect the capacity of community collaborators in the long-term</li> </ul>	
<p><b>Health information system</b></p> <ul style="list-style-type: none"> <li>Enabling factors: the eHypertension.Tracker as a digital solution to better track and measure progress of NCD management; regular SMS reminders system</li> <li>Bottlenecks: time-consuming for data entry to the software</li> </ul>	
<p><b>Medical equipment and guidelines (Table 5)</b></p> <ul style="list-style-type: none"> <li>Enabling factors: available and useful guidelines; sufficient digital BP monitors for CHSs</li> </ul>	<p><b>Service delivery (Tables 2 and 3)</b></p> <ul style="list-style-type: none"> <li>Availability of communication and media activities</li> <li>Expanded access to BP screening and referral points through private partnerships and social enterprise initiatives</li> <li>Availability of hypertension diagnosis and treatment services provided by district hospitals and CHSs</li> </ul>
<p><b>Health financing</b></p> <ul style="list-style-type: none"> <li>Enabling factors: financial incentives to reward delivery of services by collaborators/checkpoint operators</li> <li>Bottlenecks: sustainable sources of funding not yet identified, ongoing discussion</li> </ul>	
<p><b>Leadership/governance</b></p> <ul style="list-style-type: none"> <li>Enabling factors: strong support among the program's partners and stakeholders</li> <li>Bottlenecks: time-consuming mechanism for the recruitment and management of personnel</li> </ul>	

NCD = noncommunicable disease; BP = blood pressure; CHS = commune health station.

managed by the CHSs by July, 2019. Before the project, 46.9% people with hypertension knew their status. After the Communities for Healthy Hearts intervention, this number increased to 63.6%. With regards to communication and media activities, the program reached 1,120,150 people with 31,801 likes/follows on social media, published 34 articles in the health information portal of HCMC's PMC that were accessed by 5,000 people, and also had 113,600 people get information on the program via newspapers (according to HCMC's PMC).

#### *Hypertension prevention*

**Table 2** presents results of the quantitative study on health education activities implemented at the district hospitals and CHSs, by type of content and activity. By 2019, “meetings of health clubs” (implemented by 67% of district hospitals) and “household visits” (also by 67% of district hospitals) were the most popular forms of health education at the district level. Meanwhile, at the CHSs, “loudspeakers” (used by 89.1% of CHSs) was the most frequent type of health education implemented.

Regarding available preventive services for hypertension, health promotion related content/topics on the prevention of hypertension and CVDs were fully implemented by district hospitals (100%). As a result of the Communities for Healthy Hearts program, there was also an increasing proportion of CHSs that provided these contents/topics during their health education sessions by 2019, with awareness on proper lifestyle and diets to prevent hypertension being raised by all CHSs.

In addition, there were also an increasing proportion of CHSs that provided contents/topics of risk factors for CVDs; how to measure BP as well as contents/topics of different stages of hypertension and cause of hypertension during their health education sessions by 2019.

Results of the qualitative study revealed that the effectiveness of health education activities provided by the Communities for Healthy Hearts program was recognized by the representatives of health management centers at district and city levels.

“Many hypertensive patients were provided with hypertension-related information, such as how to prevent hypertension and be referred to higher-level health facilities

**Table 2.** Types and content of communication/health promotion activities being implemented at district hospitals and CHSs of the Communities for Healthy Hearts program sites, 2015 and 2019

Communication/health promotion activities	2015		2019	
	District hospital	CHSs	District hospital	CHSs
<b>Type of communication/health promotion activities</b>				
Loudspeakers	4 (100)	44 (80.0)	0 (0)	49 (89.1)
Community meetings	4 (100)	39 (70.9)	1 (33)	36 (65.5)
Meetings of health clubs	2 (50)	9 (16.4)	2 (67)	4 (7.3)
Organizing of culture and sport events	4 (100)	4 (7.3)	0 (0)	3 (5.5)
Household visits	4 (100)	30 (54.5)	2 (67)	23 (41.8)
<b>Contents/topics on the prevention of hypertension and CVD</b>				
The danger of hypertension	4 (100)	48 (88.9)	3 (100)	42 (76.4)
Different stages of hypertension	4 (100)	22 (40.7)	3 (100)	25 (45.5)
Cause of hypertension	4 (100)	42 (77.8)	3 (100)	45 (81.8)
Early signs for detecting hypertension	4 (100)	48 (88.9)	3 (100)	48 (87.3)
Risk factors of CVDs	4 (100)	39 (72.2)	3 (100)	48 (87.3)
How to measure blood pressure	4 (100)	28 (51.9)	3 (100)	41 (74.5)
Complications of hypertension	4 (100)	48 (88.9)	3 (100)	46 (83.6)
Proper lifestyle and diet to prevent hypertension	4 (100)	50 (92.6)	3 (100)	55 (100.0)

Values are presented as number (%).

CVD = cardiovascular disease; CHS = commune health station.



for early treatment in order to prevent hypertension-related complications. The number of hypertensive patients has been increasingly detected over the last few years thanks to patient referrals”

—(Representative of district health center #3)

“People were frequently offered free BP measures. Besides, hypertension-related information was sufficiently and frequently provided via communication channels. With this project, Facebook was very powerful”

—(Representative of HCMC's PMC, #1)

#### *Hypertension screening*

Results of the quantitative study show that the proportion of CHSs offering hypertension screening services increased from 43% in 2015 to 80% in 2019. In addition, qualitative data also shows that the program was viewed favorably by local people thanks to this increased offering.

“Local people could be offered routine BP screening. BP could be measured at checkpoints and at home, thus, many people with hypertension have been detected early and referred to health facilities for timely treatment”

—(Representative of HCMC's PMC, #1)

“All residential quarters had community collaborators and BP checkpoint operators, people with hypertension had been actively detected”

—(Representative of CHS, #1)

#### *Hypertension diagnosis and treatment*

**Table 3** presents results of the quantitative study on the availability of hypertension diagnosis and treatment services provided by district hospitals and CHSs that were part of the Communities for Healthy Hearts program. All district hospitals could provide diagnosis and treatment services for people with hypertension. Overall, the proportion of CHSs assessing CVD risk and providing hypertension related services increased from 61.1% to 100% in 2019 (**Table 3**), especially for services such as measuring the patients' BP in accordance with the standard guidelines, detecting the risk factors for developing CVD, determining the stage of hypertension, and appropriate treatment regimens and referrals based on clinical guidelines. Services such as determining the treatment strategy corresponding to the stages of hypertension, selecting the appropriate medications for hypertension treatment, and modifying the treatment regimen when needed, were still performed most often in district hospitals rather than in CHSs. This finding should be considered by policy makers on how CHSs can be more empowered to manage patients with hypertension in respect to their treatment regimen (especially between stages 1 and 2).

#### **Health workforce**

Since the onset of the program in 2016, the Communities for Healthy Hearts program organized 30 training sessions and developed 4 rounds of technical assistance for 67 health staff, 132 community collaborators and 558 BP checkpoints, on BP measurement techniques, the community-based hypertension management model, communication skills, and lifestyle modification counseling. Additionally, there were 14 training sessions on hypertension diagnosis and treatment guidelines for 330 doctors and nurses from the 79 health facilities in the program's network in order to refresh and standardize hypertension diagnosis, treatment and management practices in health facilities in accordance with the latest guidelines from the Ministry of Health (in 2017 and 2018) (according to HCMC's PMC).

**Table 3.** Availability of diagnosis and treatment services for hypertensive patients

Diagnosis and treatment services	2016		2019	
	District hospital	CHS	District hospital	CHS
Activities related to diagnosis of hypertensive patients				
Measure patients' BP in accordance with the standard guidelines	4 (100)	55 (100.0)	3 (100)	55 (100.0)
Detect risk factors for developing CVDs				
History of stroke or diabetes or dyslipidemia	4 (100)	52 (94.5)	3 (100)	55 (100.0)
Overweight/obesity or abdominal obesity	4 (100)	50 (90.9)	3 (100)	55 (100.0)
Smoking	4 (100)	52 (94.5)	3 (100)	51 (92.7)
Alcohol abuse	4 (100)	52 (94.5)	3 (100)	55 (100.0)
Little physical activity	4 (100)	51 (92.7)	3 (100)	55 (100.0)
Family history of premature CVD (men < 55 years and women < 65 years old)	4 (100)	51 (92.7)	3 (100)	55 (100.0)
High salt, little vegetables/fruit, or high animal fat diets	4 (100)	55 (100.0)	3 (100)	54 (98.2)
Determine the stage of hypertension (5 stages according to national regulation: normal BP, pre-hypertension, hypertension level 1, hypertension level 2, hypertension level 3)	4 (100)	37 (67.3)	3 (100)	52 (94.5)
Determine the treatment strategy corresponding to the stages of hypertension	4 (100)	33 (61.1)	3 (100)	35 (63.6)
Activities related to treatment of hypertension patients				
Lifestyle modification counseling	4 (100)	51 (92.7)	3 (100)	50 (90.9)
Identify treatment target (BP target)	4 (100)	44 (80.0)	3 (100)	48 (87.3)
Select starting medications for hypertension treatment	4 (100)	41 (74.5)	3 (100)	40 (72.7)
Modify treatment regime when needed (BP doesn't meet the target)	4 (100)	38 (69.1)	3 (100)	36 (65.5)

Values are presented as number (%).

BP = blood pressure; CVD = cardiovascular disease; CHS = commune health station.

**Table 4** presents the results of the quantitative study on the trainings that took place in CHSs. By 2019, 100% of the CHSs' health staff had received training sessions on hypertension. There were several CHSs whose health staff were trained in more than one session. Most of these staff received training on the diagnosis and treatment of hypertension (94.5% and 89.1% of all CHSs, respectively), identifying hypertension complications (89.1%), managing hypertensive patients (96.4%), as well as collecting, storing and reporting data (80.0%).

Results of the qualitative study showed an improved capacity of the health staff in CHSs with regards to counselling skills, systematic screenings, accurate diagnosis, and the appropriate treatment and management of hypertension.

“(The) content of training sessions were very specific and useful; (the) health staff (now) measure BP correctly”  
—(Representative of district hospital, #3)

**Table 4.** Number and contents of training for health staff on hypertension at CHS in 2015 and 2019

Training on hypertension	2015	2019
No. of trainings		
No training session	5 (9.1)	0 (0.0)
One training session	31 (56.4)	13 (23.6)
More than 1 training session	19 (34.5)	42 (76.4)
Content of trainings		
Diagnosis of hypertension	48 (92.3)	52 (94.5)
Treatment of hypertension	46 (88.5)	49 (89.1)
Identify hypertension complications	40 (76.9)	49 (89.1)
Treatment of hypertension complications	35 (67.3)	37 (67.3)
Management of hypertensive patients	37 (71.2)	53 (96.4)
Data collection, storage, reporting	17 (30.9)	44 (80.0)
Other	4 (7.7)	1 (1.8)

Values are presented as number (%).

CHS = commune health station.

“Our knowledge on hypertension prevention has improved (greatly). We (now) know how to measure BP and identify (different) levels of hypertension”

—(Representative of community collaborator, #1)

However, some respondents suggested that the frequency of training sessions could affect the capacity of community collaborators in the long-term. The continuation and integration of refresher trainings should be considered as a recommendation for the HCMC authorities and other programs that will work with CHSs on the management of hypertension.

“At the initial stage (of the program), many training sessions were organized for us. However, 6 months later, (the) frequency of training sessions decreased, (and) we were afraid that the knowledge of community collaborators would be eroded”

—(Representative of CHS, #2)

### Health information system

PATH, the Novartis Foundation, and the HCMC PMC developed the eHypertension.Tracker—the first digital patient tracker for managing a NCD in Vietnam. The eHypertension.Tracker is an online, searchable database. It contains data on BP checks and results, referrals, diagnosis, and treatment for each individual client. The public primary health care centers, district hospitals, private clinics, and NCD program managers within local government can all access the system. The tracker automatically generates lists of clients who have been diagnosed with hypertension and require ongoing care. Health care workers can also search the database for specific clients. Client notes from follow-up appointments, including BP measurements, treatment adherence, lifestyle changes, and any complications are logged and tracked over time. For health workers, the tracker provides a library of information on hypertension, technical guidelines, and communication materials to help them provide high quality, people-centered care. Clients also receive support from the system by opting-in to receive regular SMS reminders – prompting them to get BP checks, make healthy lifestyle choices, and follow up.

The eHypertension.Tracker was highly appreciated by the health staff for its usefulness and timely contribution as a digital solution to better track and measure progress.

“The eHypertension.Tracker software had sufficient information, thus, it could help health staff manage their hypertensive patients”

—(Representative of HCMC's PMC, #1)

However, some respondents did express concern about the speed of processing data in the eHypertension.Tracker and that it could be time-consuming for data entry (due to the many tabs). Like all new digital solutions, there is a need to improve the functionalities and uptake of this type of solution, and a need to evaluate further how best to improve this platform as it represents a much needed solution for the management of chronic patients in Vietnam.

“Presently, at my clinic, I have my colleague who admitted patients, or had patient visits, and wrote down information of the patients for the clinic. She would not have time to enter the data (of the patients) into the eHypertension.Tracker as requested by the Community for Healthy Hearts program. Because, when she (and me also) opened the eHypertension.Tracker, the computer runs pending all the time. Right after finishing data entry for one patient, it was pending for quite too long.”

—(Representative of private clinic, #1)

**Table 5.** Availability and applicability of guidelines on hypertension diagnosis and treatment at the CHS in 2016 and 2019

Guidelines on hypertension diagnosis and treatment	2016	2019
Guidelines on hypertension diagnosis and treatment are available at this CHS	46 (83.6)	50 (90.9)
Guidelines on hypertension diagnosis and treatment are applicable for this CHS	41 (74.5)	48 (87.3)

Values are presented as number (%).  
CHS = commune health station.

### Medical equipment and guidelines

In order to follow up and manage hypertension cases, the Communities for Healthy Hearts program developed guidelines for the referral, diagnosis, and treatment of potential hypertensive individuals in the community. These guidelines were developed with and approved by the HCMC Department of Health, and were applied into practice in all 4 program districts. In addition to the guidelines and package of trainings (as per **Table 5**), the program provided sufficient digital BP monitors for CHSs, community collaborators and checkpoint operators.

**Table 5** shows results of the quantitative study on the availability and applicability of the guidelines on hypertension diagnosis and treatment among the program's CHSs. In both cases, the program contributed an increase in the availability and applicability of the guidelines. The standardized and consistent use of guidelines is a critical factor for improved outcomes in the management of hypertensive patients.

In the results of the qualitative study, the health staff found that the digital BP monitors provided by the program were easy and convenient to use.

“They provided us with Omron machine (digital BP monitor), it was of good quality and was also (well) maintained. Easy in operation and high quality”

—(Representative of CHS, #3)

### Health financing

The community collaborators/volunteers were proactive community members in social work and often did not have monthly salaries. The stipend that Communities for Healthy Hearts program provided to them based on the performance was about VND 200,000 per month or higher if they did other related work (based on provided reports).

“The collaborators were provided with BP monitors and VND200,000 (approximately US\$10) per month as stipend. Additionally, VND 100,000 (approximately US\$ 5) per month was paid to one who (had) written the reports”

—(Representative of CHS, #4)

The program supported several activities and co-shared costs with districts/health authorities. However, the question of sustainability for policy makers (how best to engage collaborators and provide appropriate incentives) remains an ongoing discussion.

“On the side of CHS, I think that the program's intervention activities were very good for the local people. If we did not have such program, it is like we were blind people. Hypertensive patients did not come to us. We did not go finding them (patients) cause we did not have funds for doing these activities. Thanks to this program, we could manage our patients”

—(Representative of CHS, #5)

“To keep volunteers working was difficult. However, I hope that with request from the HCMC Department of Health, the HCMC People's Committee can pay this expense (stipend for collaborators). Then, I think it would be sustainable. For instance, they (HCMC People's Committee) could pay US\$ 10 per month for each collaborator so that activities could be continuous. Each year, (if) funds for organizing 1, 2 annual meetings were also available, then, everything would be fine. We must have fixed amount of money for community collaborators. It must be at least US\$ 10 like the Communities for Healthy Hearts program paid. If we had this source of fund for the community collaborator, it would ensure the continued activities in the community (sustainability)”  
—(Representative of district health center, #2)

### Leadership/governance

The program established an integrated system bridging community-based health services from CHSs to the district level, to health authorities at the provincial level, and with private health facilities. The program engaged a total of 79 public and private health facilities, including 55 CHSs, 16 private clinics, 4 district hospitals, and 4 district health centers. An essential component and innovation introduced by the program was the establishment of a network of community collaborators and BP checkpoints to extend the reach of the health system in order to support public and private health facilities in prevention activities and the management of hypertensive patients. By the end of May 2019, this network consisted of 132 collaborators and 558 BP checkpoints.

Results of the qualitative study reveal that there was strong support among the program's partners and stakeholders including local authorities, health facilities at different levels and leaders from community-level authorities.

“The program has a good collaboration from sectors and stakeholders, therefore, leaders of those units, sectors, organizations were very supportive of the program. (The) President of the ward was the leading person. They were very supportive, and we did not meet with any difficulty. A network of community collaborators actively participated in hypertension screening activities”  
—(Representative of district health bureau, #1)

Results from the qualitative study revealed that the mechanism for the recruitment and management of personnel in the program required several steps and was a time-consuming process.

“From the perspective of government management, personnel recruitment/change took a lot of time and delayed the Communities for Healthy Hearts program activities”  
—(Representative of district health center, #2)

## DISCUSSION

The results from this study show that the Communities for Healthy Hearts program was effective in strengthening the local health systems within the districts that participated in the program (Table 6).

Service delivery: health education campaigns, BCC, increased screening activities, and the improvement of hypertension diagnosis, treatment, follow-up and patient management

**Table 6.** Summary box: the Communities for Healthy Hearts program—key components of the interventions

Developed innovative community-based hypertension management model: <ul style="list-style-type: none"> <li>• Developed network of collaborators and checkpoints</li> <li>• Connected private and public health facilities on community-based hypertension management model</li> <li>• Training and technical assistance for collaborators, checkpoints on BP measurement techniques, community-based hypertension management model and communication skills, counseling on behavior change, and the management and prevention of hypertension</li> </ul>
Improved capacity of facility-level health workers: training sessions on diagnosis and treatment guidelines; communication skills
Developed referral, treatment guidelines and training materials for health workers, collaborators, checkpoints on hypertension screening, diagnosis, treatment, counseling and communication
Provided BP monitors for all CHSs and collaborators/checkpoints
Developed and implemented the eHypertension.Tracker software and mHealth care program as digital health solutions to improve the monitoring and empowerment of hypertensive patients
Communication: <ul style="list-style-type: none"> <li>• Developed, printed and distributed communication materials (leaflets, BP diary, billboard, video clip on proper BP measurement)</li> <li>• Communication events, seminars and direct communication campaigns to households</li> <li>• Training sessions on healthy lifestyle and BCC for patients and community members</li> </ul>
Hypertension screening, referrals by collaborators/checkpoints, the network was tasked to: <ul style="list-style-type: none"> <li>• Carry out active BP measurement and screening for hypertension for people aged 40 and over in the community</li> <li>• Record information of those who have BP measurement</li> <li>• Refer people suspected of having hypertension to health facilities to diagnosis and treatment</li> <li>• Report data on screening and referral to CHSs monthly</li> </ul>
Periodic meetings among stakeholders were implemented to monitor, supervise and support project activities

BP = blood pressure; mHealth = mobile health; CHS = commune health station.

contributed to the improvement of hypertension prevention and control in HCMC. Notably, hypertension awareness among those diagnosed with hypertension increased. The results show that before the program 46.9% people with hypertension knew their status in 2016, and after the program this number increased to 63.6% in 2019. This result was higher than 48.4% according to findings of a study with a nationally representative sample of the general population aged 25 years and over conducted in 2012<sup>17</sup> and higher than 43.1% according to findings of National Survey on the Risk Factors of Non-Communicable Diseases (STEPS) of Vietnam in 2015 (the latest figure available).<sup>12</sup>

Health workforce: 30 training sessions were held and designed for each specific participant in the Communities for Healthy Hearts network over the years. The package of trainings strengthened the capacity and professional knowledge of primary healthcare workers, community collaborators and checkpoint operators to respond to the needs of those at risk for or living with hypertension. Training sessions for health staff on patient counselling about lifestyle modification were organized by the Communities for Healthy Hearts program. A recent study undertaken in Malaysia described barriers along the patient pathway, where inadequately trained health staff were unable to counsel patients effectively on lifestyle modification,<sup>18</sup> and highlighted that this is a common issue in settings across the region. Our findings suggest that refresher-training sessions for primary health workers and community collaborators should be regularly organized. In another context, regarding optimal hypertension treatment management, Vietnam and Ghana encountered common challenges related to task-sharing bottlenecks (described as the process of enabling lay or low level healthcare personnel to fulfil a wider clinical role; existing policy precluded lower-cadre services providers such as nurses from prescribing or dispensing antihypertensives).<sup>19</sup> In Ghana, a challenge faced by the Community Hypertension Improvement Project (ComHIP) was reportedly the shortage of trained health staff who could prescribe hypertension medication (linked to the challenge that many doctors remain reluctant to postings in rural areas where more health care professionals are needed).<sup>19</sup> However, this was not the case in Vietnam. Our findings indicate that interviewees did not express concerns about the insufficiency of trained health staff for the management of NCDs. This greater

debate in HCMC surrounded the challenge of empowering CHS with all aspects of NCD management, instead of it falling under the purview of district hospitals, and whether CHSs are underutilized by just focusing on prevention and communication aspects.<sup>20</sup> We believe that the decentralization to CHSs would most likely help in the long run given the prevalence of hypertension in Vietnam and the consequent burden on the system if all patients are to be managed effectively.<sup>21,22</sup>

Health information system: the eHypertension.Tracker software, in association with household visits by health staff, supported the specific objective of reducing loss to follow-up by strengthening referral systems, increasing patient contact, and empowering patients. This approach of patient management has been proven to be effective. A recent study undertaken in the United States echoed our findings, whereby the utilization of a virtual health intervention using connected devices proved to improve patient activation (engagement in their disease process<sup>23</sup>). Provincial PMCs and all related stakeholders could use the eHypertension.Tracker to monitor progress by easily accessing the number of people who are screened, referred, diagnosed, and on treatment and exporting associated reports on the control and management of hypertension. The introduction of such a platform aligns with several global recommendations on the improvement of monitoring systems for hypertension management, such as the WHO HEARTS technical package.<sup>24</sup>

Beside regular communication channels, the Communities for Healthy Hearts program used SMSs and a Facebook channel to improve the coverage and access to BCC messages. This approach was similar to ComHIP in Ghana that applied an mHealth solution to support a community-based approach to hypertension prevention and control.<sup>20</sup> As policy makers and implementing partners consider systems for improved patient management, both the ComHIP and Communities for Healthy Hearts models serve as useful examples on how to design and implement a digital solution that can improve case management and follow up of patients with chronic diseases. Efficacy of the SMS service from the Communities for Healthy Hearts program in clinical outcomes (i.e., change in mean systolic BP) was not proven yet. However, findings from other clinical studies conducted mostly in developed countries show that SMS text messages were effective in motivating positive self-reported behavior change toward healthier lifestyles among hypertensive patients<sup>25</sup>; improved medication adherence compared with no text messaging<sup>26</sup>; improved adherence to clinic visits and support for treatment of raised BP.<sup>27</sup> In addition, SMS-text message interventions appear to work best in a low-resource operational setting.<sup>28</sup> Our findings suggest that while the eHypertension.Tracker enabled the tracking of a large cohort of patients across districts, some respondents were concerned about the slow-speed processing of data that they encountered and the time-consuming activity of data entry (many tabs). Because of these technical difficulties, some private clinics did not enter data into the system, which resulted in diminishing the effectiveness of this solution for the program. There remains a strong case for digital solutions to improve patient case management and to enable community actors to play a larger role in the management of patients. For example, randomized or observational studies suggest that the synergy between BP telemonitoring and pharmacist case management of hypertensive patients may facilitate high BP screening and detection.<sup>29</sup> Despite some technical challenges, the eHypertension.Tracker holds promise and should be continuously upgraded for its ease of use, and the integration of feedback on how to make it a friendlier interface. In this regard, a systematic review of hypertension by Goldstein<sup>30</sup> pointed out that developing the system is only the first step, and that interrelationships of the technical design with the clinical and organizational context would play a major role in successful deployment

of a system. In this sense, the introduction of the eHypertension.tracker provided a lesson learned for Vietnam and possibly a solid platform to improve information management systems for NCDs at the national level.

**Medical equipment and guidelines:** Our findings indicate that the provision of digital BP monitors to a network of community collaborators and checkpoint operators was very effective as it facilitated community access to essential equipment for hypertension screening and diagnosis. The provision of BP monitors to community actors was also demonstrated as an essential technology and tool for implementing CVD interventions in primary care recommended by the WHO.<sup>20</sup> Our findings suggested that the digital BP monitors should be handed over to and managed by the local authorities of program wards/communes. The monitors, then, would be used by community collaborator/checkpoint one by one rather than given to them after 2 years of operation as currently practiced. We would encourage that this model of equipping community agents with the necessary equipment and training to screen BP needs to be widely applied and implemented in other settings in Vietnam.

For hypertension guidelines, the Communities for Healthy Hearts program provided guidelines to all participating project districts. Such guidelines are crucially important in facilities where most services are provided by non-medical doctor clinicians (assistant medical officers or clinical officers), nurses and assistants,<sup>31</sup> as standardized guidelines remain an issue in many settings. A study conducted in Tanzania in 2013 showed that guidelines were inadequate at many health facilities, particularly at lower level facilities. Guidelines for hypertension were observed in only 3 health facilities and only 13% of facilities possessed guidelines for the management of hypertension and diabetes.<sup>31</sup>

**Health financing:** the program invested financial resources to respond to the requirements of equipment provision, training sessions organization, and allowances (about US\$ 10 per month or higher pending work delivered) for community collaborators. In our study, we limit our exploration to the local and national contexts and our analysis does not include other sources of health expenditures, which were not within the scope of our study.

**Leadership/governance:** the established network of community collaborators and checkpoints increased the provision of high-quality screenings for hypertension, provided heart-healthy lifestyle counseling for community members, and established a direct referral service to health facilities. This inclusion of community stakeholders was a service delivery innovation for hypertension prevention and created a valuable extension to HCMC's health system. A study in United Kingdom in 2001 reported that a similar involvement of pharmacists was associated with improved patient satisfaction, compliance with therapy and greater success in achieving 'target' BP, and their BP monitoring service was of value in improving the management of hypertension.<sup>32</sup> A similar study in the U.S reported that pharmacists and nurses were both effective in team-based care for hypertension. Team-based care was defined as adding new staff or changing the roles of existing staff to work with a primary care provider.<sup>33,34</sup> Community collaborators and checkpoints was a program innovation that no other NCD program had done in Vietnam to date. This network functioned well in NCD services provision and should be considered by the Ministry of Health as an important chain in the primary health care approach. Our findings suggest that the challenges incurred regarding personnel changes in the Communities for Healthy Hearts program should be considered as a policy level challenge. In order to ensure sufficient human resources for the network of collaborators, and collaborators to work effectively, it is



necessary to improve the mechanism of personnel recruitment/changes in the direction of reducing the waiting time for approval.

Implication of the study: Most disease programme or service-specific strategies are unlikely by themselves to bring about improvements across the health system. Additionally, only gains can be made unless the broader health system is strengthened at the same time as interventions are being introduced on a large scale. For the efficient scaling up of hypertension interventions in other regions of Vietnam, this study has provided some examples where there is room for improvement in regards to the local health system building blocks. These lessons learned not only apply to Vietnam, but also for any other country seeking to improve and innovate their strategies for optimal hypertension management.

Evaluation and interviews took place before the Communities for Healthy Hearts dissemination workshop with health authorities in November 2019, where the program saw significant commitment from local authorities and which has led to the national scale up of this program to be supported by the organizations PATH and Access Accelerated.

In summary, the Communities for Healthy Hearts program was effective in strengthening the health system of districts in HCMC to improve the prevention and management of hypertension. This program provides multiple lessons learned for the management of hypertension in Vietnam and can help inform policy makers as they aim to scale up their efforts nationally to address the rising tide of NCDs. However, in order to sustain such a model and continue efforts to strengthen the local health system of HCMC, improvements need to be made for the optimal prevention and control of hypertension in Vietnam, namely: improved process for personnel recruitment/changes, improved training sessions, sustainable financial resources, and improved patient information management tools.

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