



# Blood pressure screening during the May Measurement Month 2017 programme in Vietnam—South-East Asia and Australasia

Huynh Van Minh<sup>1\*</sup>, Nguyen Lan Viet<sup>2</sup>, Cao Thuc Sinh<sup>3</sup>, Phan Nam Hung<sup>4</sup>,  
Nguyen Thi Mong Ngoc<sup>5</sup>, Ngo Van Hung<sup>6</sup>, Tran Kim Son<sup>7</sup>, Nguyen Ta Dong<sup>8</sup>,  
Doan Chi Thang<sup>8</sup>, Hoang Anh Tien<sup>9</sup>, Hoang Cong Tuan<sup>9</sup>, Thomas Beane<sup>10</sup>,  
Xin Xia<sup>10</sup>, Neil R. Poulter<sup>10</sup>, and Markus P. Schlaich<sup>11</sup>

<sup>1</sup>Department of Cardiology, Hue University Hospital, Hue University, 6 Ngo Quyen Street, No 41 Nguyen Hue road, 53000 Hue city, Vietnam;

<sup>2</sup>Department of Cardiology, Vietnam Heart Institute, No 1 Ton that Tung, 10000 Hanoi, Vietnam;

<sup>3</sup>Department of Cardiology, Vinh Medical School, No 161 Nguyen Phong Sac, 46000 Vinh, Vietnam;

<sup>4</sup>Department of Cardiology, Quinhon Hospital, No 106 Nguyen Hue, 82000 QuiNhon, Vietnam;

<sup>5</sup>Department of Administration, PhuYen Health Service, No 4 To Huu, 62000 TuyHoa, Vietnam;

<sup>6</sup>Department of Cardiology, Daklak Hospital, No 2 Mai Hac De, 63000 Ban MeThuot, Vietnam;

<sup>7</sup>Department of Cardiology, Cantho Medical and Pharmacy University, No 179 Nguyen Van Cu, 90000 Can Tho, Vietnam;

<sup>8</sup>Department of Cardiology, Hue Central Hospital, No 16 Le Loi, 53000 Hue, Vietnam;

<sup>9</sup>Department of Cardiology, Hue University of Medicine and Pharmacy, Hue University, No 6 Ngo Quyen, 53000 Hue, Vietnam;

<sup>10</sup>Imperial Clinical Trials Unit, Imperial College London, Stadium House, 68 Wood Lane, London W12 7RH, UK; and

<sup>11</sup>Department of Clinical Research, Dobney Hypertension Centre, School of Medicine, Royal Perth Hospital Unit, University of Western Australia, Level 3, MRF Building, Rear 50 Murray St, Perth, WA 6000 MDBP M570, Australia

Elevated blood pressure (BP) is a growing burden worldwide, leading to over 10 million deaths each year. May Measurement Month (MMM) is a global initiative aimed at raising awareness of high BP and to act as a temporary solution to the lack of screening programmes worldwide. Our aim was to screen for hypertension (HTN) and cardiovascular risk factors in people aged  $\geq 18$  years in the community, thereby define the proportion of subjects with elevated BP and assess the awareness and the effectiveness of its treatment. An opportunistic cross-sectional survey of volunteers aged  $\geq 18$  years was carried out in May 2017. Blood pressure measurement, the definition of HTN and statistical analysis followed the standard MMM protocol. From May 2017 to June 2017, through 10 cities/provinces in Vietnam, 10 993 individuals with mean age  $49.1 \pm 16.2$  years were screened during MMM17. After multiple imputation, 3154 (28.7%) had HTN. Of individuals not receiving antihypertensive medication, 1509 (16.1%) were hypertensive. Of individuals receiving antihypertensive medication, 620 (37.7%) had uncontrolled BP. Raised BP was also associated with additional risk factors including smoking, alcohol, overweight-obesity, and diabetes. May Measurement Month 17 was the largest BP screening campaign ever undertaken in Vietnam. Undiagnosed and uncontrolled HTN in Vietnam remains a substantial health problem. Local campaigns applying standardized methods such as MMM17, will be highly useful to screen for the significant number of individuals with raised BP and increase the awareness of HTN.

\*Corresponding author. Tel: +84 914 062226, Fax: +84 234 3826269, Email: hvminhdr@yahoo.com

## Introduction

Arterial hypertension (HTN) remains a global burden not only for developed countries but also for developing countries.<sup>1</sup> Vietnam in the Asia Pacific region is located in the major regions with high HTN prevalence.<sup>2</sup> In the last years, the National HTN Program in Vietnam has been conducted in many provinces of Vietnam.<sup>3-5</sup> The prevalence of HTN in Vietnam was estimated to be 25.1%, including those who were unaware of their HTN. Annually HTN causes 91 600 deaths (20.8% of total deaths) and 7.2% of Disability adjusted life years lost, mainly through increased stroke and cardiovascular disease.<sup>6</sup> The May Measurement Month (MMM) programme 2017 was a unique global initiative organized by the International Society of Hypertension (ISH) to increase the awareness about the risks associated with HTN by measuring the blood pressure (BP) of the general population.<sup>7</sup> Since then, the MMM programme was enthusiastically responded to by Vietnam National Heart Association/Vietnam Society of Hypertension (VNHA/VSH) by launching and deploying it across the whole country. The goal of the MMM 2017 programme was to screen at least 10 000 people over the age of 18 years across the country to inform participants of the risks associated with HTN as well as to inform governmental organizations in order to further strengthen the existing HTN prevention programme.

## Methods

We selected 10 cities and provinces of the three regions of Vietnam: the North (Hanoi, Vinh, Thanh Hoa), the Central and Highlands (Hue, DaNang, QuiNhon, TuyHoa, Daklak), and the South (Ho Chi Minh City, Cantho). The co-ordinators are members of the VNHA/VSH executive committee and/or the directors of the local health departments. Volunteers were members of the Red Cross, the VNHA/VSH, among others, as well as medical students. There was an average of 50 persons per site. The sites of the screening were very varied, and included medical facilities, theatres, supermarkets, factories, schools, train stations, bus stations. Adults  $\geq 18$  years who had not had their BP tested for the previous year were selected. Screening time was from May 2017 to June 2017. Patients voluntarily participated. The screening protocol was approved by the VNHA/VSH and the Ministry of Health in terms of ethics. Blood pressure machines were semi-automatic OMRON HEM-7121. The BP method was based on the ISH protocol for MMM<sup>7</sup> noting especially that the time between BP measurements is 1 min with three measurements taken, allowing the average BP of the last two measurements to be calculated. Hypertension was defined as SBP  $\geq 140$  mmHg and/or DBP  $\geq 90$  mmHg or on antihypertensive treatment.

The body mass index (BMI) was classified according to Asian standards.<sup>5</sup> The survey questionnaire of the ISH for the MMM programme was used. Data collected by Excel 2013; processed and analysed using Stata version 14.2 by the MMM team.

**Table 1** Participant characteristics

Gender	Female 6770 (61.6%)	Male 4217 (38.4%)	Unknown 6 (0.1%)
Age (years)	Mean $\pm$ SD 49.1 $\pm$ 16.2		
Ethnicity	Kinh 8.225 (91.1%)	Other 1088 (9.9%)	
On antihypertensives medication	No 9338 (84.9%)	Yes 1645 (15.0%)	Unknown 10 (0.1%)
Diabetes	No 9736 (88.6%)	Yes 599 (5.5%)	Unknown 658 (6.0%)
Current smoker	No 9468 (86.1%)	Yes 1514 (13.8%)	Unknown 11 (0.1%)
Alcohol intake	Rarely 10 245 (93.2%)	$\geq$ Once 735 (6.7%) per week 13 (0.1%)	
BMI (kg/m <sup>2</sup> )	Mean $\pm$ SD 22.1 $\pm$ 3.0		
Total participants	10 993		100.0%

## Results

About 10 993 individuals were screened during MMM17. The majority of those screened were women (61.6%), and the mean age of both sexes was 49.1  $\pm$  16.2 years. Of these, 15.0% of patients were on medication for HTN. Of other recorded information, 5.5% of participants had diabetes, 13.8% smoked, 13.8% had alcohol and an average BMI of 22.1  $\pm$  3. *Table 1* shows the characteristics of the participants.

After imputation, and standardizing for age and gender, mean BP values were 120.2/75.6 mmHg, and in those on antihypertensive treatment was 130.2/81.1 mmHg (*Table 2*).

After imputation, of 10 989 individuals with a mean BP available, the percentage of participants with HTN was 28.7% ( $n = 3154$ ). Of 9344 individuals not on treatment, 1509 (16.1%) had HTN. Of 1643 individuals on antihypertensive treatment and with an available BP reading, 37.7% had an uncontrolled BP.

Supplementary material online, *Figure S1* shows the association of BP with other individual factors. Patients on antihypertensive medication, current smokers, and regular alcohol drinkers had significantly higher systolic BP (SBP) and diastolic BP (DBP). Patients with diabetes had significantly higher SBP, but not DBP. Supplementary material online, *Figure S2* shows the association with BMI. Significant linear increases were seen in SBP and DBP in moving from underweight to obese BMI categories.

## Discussion

The percentage of screened subjects with elevated BP was higher compared to previous surveys in Vietnam including those reported by Son *et al.* (25.1%)<sup>3</sup> and Ha *et al.* (23%),<sup>8</sup> but somewhat lower than in the report by Hoang *et al.* (33.8%)<sup>9</sup> and Nguyen *et al.* (32%).<sup>6</sup> For other Asian countries, in our region the proportion of HTN was estimated to

**Table 2** Crude and age/sex-standardized blood pressure measurements after imputation, using WHO world standard population

	Crude BP	Age- and sex-standardized BP	Age- and sex-standardized BP excluding those on treatment	Age- and sex-standardized BP in those on treatment
SBP (mmHg)	121.2	120.2	119.4	130.2
DBP (mmHg)	75.8	75.6	75.1	81.1
Denominator	8982	10 969	9327	1642

be between 15 and 35%. In general, lower-income countries in the region have lower rates<sup>2,10</sup> which may explain some of the differences within the region and over time. In Vietnam, the increased rate of obesity and diabetes mellitus in recent years are also likely to track with raised HTN rates.<sup>1,6</sup> It appears as if the efforts made through National Programmes and the health sector in Vietnam, may have resulted in better management of HTN as indicated by a smaller proportion of subjects (16.1%) not being treated for their HTN compared to previous studies.<sup>3,5,8</sup> Studies in previous years in Vietnam indicate that about only one-third of cases of HTN were controlled, but the results of MMM show that 62.3% of those on treatment were controlled.<sup>9</sup> While awareness may have increased, there may be other factors which explain this.

In 1993, among 25–64 Vietnamese years old, overweight-obesity to be 2.3%, in 2015 the incidence of overweight-obesity was up to 15%, and diabetes mellitus was reported to be 4.1% and dyslipidaemia 32%.<sup>6</sup> Another study conducted in Ho Chi Minh City showed that the obesity rate reached 23%, diabetes 5.9%, and lipid disorders 56.2%.<sup>9</sup> This matched our MMM 2017 screening results with regards to the associations of BP with obese or non-obese patients. Do *et al.*<sup>5</sup> showed, across her study in 2005, that BMI was a cardiovascular risk factor independent of HTN. The prevalence of overweight-obesity was 22.49% higher in the HTN group, compared to the control group. Compared to our national study in 2012,<sup>3</sup> the rate of overweight-obesity was significantly higher in the present study. Obesity is not only causally linked to HTN but also to diabetes. The number of subjects with diabetes mellitus; however, was relatively small, possibly due to lack of appropriate tests and tools for examining the patients' blood glucose in our study. In line with previous investigations weight gain, inactivity, alcohol consumption, smoking, salt intake, and diabetes mellitus emerged as determinants of HTN.<sup>10</sup>

In conclusion, the MMM 2017 programme was a large awareness campaign across the globe including the health system in Vietnam. From our findings, we conclude that there is an ongoing need for cardiovascular health screening and counselling in the community to improve detection and management of elevated BP as a high-risk non-communicable disease.

## Supplementary material

Supplementary material is available at *European Heart Journal - Supplements* online.

## Acknowledgements

The authors sincerely thank the Ministry of Health, VNHA, OMRON Company, SERVIER Company, the University of Medicine & Pharmacy, Health Services, Hospitals, Doctors, Volunteers in 10 screening sites, and Hue Cardiovascular Student Club; particularly they would like to thank the ISH leaders, MMM leaders, ISH secretary, and ISH statistic team.

**Conflict of interest:** none declared.

## References

- Vietnam Noncommunicable Disease Prevention and Control Programme 2002-2010. Catherine Harper, Consultant for the WHO (World Health Organisation), August 2011. Vietnam NCD Programme 2002-2010: Implementation review. Page ii-vii.
- Sarki AM, Nduka CU, Stranges S, Kandala NB, Uthman OA. Prevalence of hypertension in low- and middle-income countries a systematic review and meta-analysis. *Medicine* 2015;**94**:1-15.
- Son PT, Quang NN, Viet NL, Khai PG, Wall S, Weinehall L, Bonita R, Byass P. Prevalence, awareness, treatment and control of hypertension in Vietnam—results from a national survey. *J Hum Hypertens* 2012;**26**:268-280.
- Van Minh H. *Epidemiology of Cardiovascular Disease in Rural Vietnam*. UMEA University Medical Dissertations; 2006. New Series No. 1018-ISSN 0346-6612-ISBN 91-7246-049-9.
- Do HTP, Geleijnse JM, Le MB, Kok FJ, Feskens EJM. National prevalence and associated risk factors of hypertension and prehypertension among Vietnamese adults. *Am J Hypertens* 2015; **28**:89-97.
- Nguyen TT, Hoang MV. Non-communicable diseases, food and nutrition in Vietnam from 1975 to 2015: the burden and national response. *Asia Pac J Clin Nutr* 2018;**27**:19-28.
- Poulter NR, Schutte AE, Tomaszewski M, Lackland DT. May Measurement Month: a new joint global initiative by the ISH and the WHL to raise awareness of raised blood pressure. *J Hypertens* 2017;**35**:1126-1128.
- Ha DA, Goldberg RJ, Allison JJ, Chu TH, Nguyen HL. Prevalence, awareness, treatment, and control of high blood pressure: a population-based survey in ThaiNgyuen, Vietnam. *PLoS One* 2013;**8**: e66792.
- Hoang P. *Prevalence of Hypertension and Diabetes Among Adults in Ho Chi Minh City—a Community-Based Study in an Urban District*. Research Gate; 2017. Vol. 27, No 8-2017, PhamNgocThach University of Medicine, Vietnam. www.researchgate.net/publication/323004071.
- Chow CK, Teo KK, Rangarajan S, Islam S, Gupta R, Avezum A, Bahonar A, Chifamba J, Dagenais G, Diaz R, Kazmi K, Lanas F, Wei L, Lopez-Jaramillo P, Fanghong L, Ismail NH, Puoane T, Rosengren A, Szuba A, Temizhan A, Wielgosz A, Yusuf R, Yusufali A, McKee M, Liu L, Mony P, Yusuf S; PURE (Prospective Urban Rural Epidemiology) Study investigators. Prevalence, awareness, treatment and control of hypertension in rural and urban communities in high- middle- and low-income countries. *JAMA* 2013;**310**:1-10.