

May Measurement Month 2017: an analysis of the blood pressure screening campaign results in Indonesia—South-East Asia and Australasia

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Elevated blood pressure (BP) is a growing burden worldwide, leading to over 10 million deaths each year. Our previous primary health surveys in 2013 and 2018 show that 25.8% to 34.1% of adults have raised BP, which is associated with cardiovascular, cerebrovascular, and renovascular morbidity and mortality. 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. An opportunistic cross-sectional survey of volunteers aged ≥ 18 was carried out in May 2017. Blood pressure measurement, the definition of hypertension and statistical analysis followed the standard MMM protocol. We recruited 292 sites in all 34 provinces in Indonesia, and screened in public areas and offices as well as health centres. A total of 69 307 individuals were screened. After multiple imputation, 23 892 (34.5%) had hypertension. Of individuals not receiving antihypertensive medication, 20.0% were hypertensive. Among individuals receiving antihypertensive medication, 7885 (62.8%) had uncontrolled BP. MMM17 was the largest standardized screening campaign for BP measurement in our country. The proportion of individuals identified with hypertension and the percentage of those with uncontrolled BP on medication provide evidence of the substantial challenges in managing hypertension in the community. These results suggest that opportunistic screening can identify significant numbers of individuals with raised BP.

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Introduction

Hypertension has been the most substantial risk factor for cardiovascular disease and stroke. In Indonesia, the previous primary health surveys in 2013 and 2018 continually show that 25.8% to 34.1% of adults have raised blood pressure (BP).¹ It has been consistently reported that higher BP is associated with a higher risk for all-cause mortality, cardiovascular morbidity and mortality, and end-stage renal disease.²⁻⁴

In the era of universal health coverage (UHC) in our country, it is essential to focus on health promotion and prevention, including screening programmes for non-communicable disease in the community. Blood pressure measurement is a cheap, simple, and a non-invasive technique to screen for elevated BP. Assuming effective medication is provided, this could lead to a highly cost-effective primary prevention approach to reduce the associated morbidity and mortality.^{5,6} Unfortunately, regular BP measurement is not widely available, and therefore, the awareness of hypertension is still low.⁷ Targeting this state of affairs was the primary purpose of our involvement in the global MMM17 programme, an initiative of the International Society of Hypertension,⁸ which we hope to be an effective method for raising awareness for high BP as one of the critical cardiovascular risk factors.

Methods

The Indonesia MMM17 cross-sectional survey—as part of global MMM initiative—was conducted and funded by the Indonesian Society of Hypertension (InaSH), which includes the Indonesian Heart Association (PERKI), Indonesian Neurological Association (PERDOSSI), and Indonesian Nephrology Association (PERNEFRI); with close collaboration with the Ministry of Health and the Indonesian Heart Foundation (YJI). The ethical clearance was obtained from Universitas Padjajaran Bandung. We recruited 292 sites in all 34 provinces of Indonesia, with 715 volunteers registered in our database. For volunteers, information of protocols and directions were given by e-mail communication.

Being a cross-sectional survey with a convenience sampling technique,⁸ the way for recruiting participants varied depending on local wisdom/tradition and relevant circumstances. We had screened in the crowds of the local Sunday markets, during car-free day events, religious events, in public shopping malls, university campuses, government and private business offices, at pharmaceutical company workplaces, airports, train stations, and others. In at least the five major cities, the local organizers conducted mass ‘Zumba dances’ with consecutive screening of thousands of individuals.

The BP measurement method, definition criteria for hypertension and controlled BP was performed as guided by the MMM protocol.⁸ Approximately 45% of measurements were obtained using digital BP devices, and others by manual BP devices. Data collection was done by sending hard copies to the InaSH secretariat or by spreadsheets. Data were cleaned locally by our team and further analysed centrally by MMM analysts.

Results

During May 2017, 69 307 individuals were screened, of whom 64 520 individuals completed three BP readings. More women than men were screened, with a mean age of 42.8 years. About 18.1% of participants were taking antihypertensive medications, 4999 participants (7.2%) reported having diabetes, 4043 (5.8%) reported a history of myocardial infarction (MI), 1937 (2.8%) had a history of stroke, and 11 458 (16.5%) reported to be an active smoker. The mean body mass index was 23.8 kg/m² (Supplementary material online, *Table S1*).

From 64 520 participants with three BP readings, BP's fell by 2.4/1.4 mmHg between the first and third readings. The mean of the first and third readings was significantly lower than the first reading (Supplementary material online, *Table S2*).

After imputation, out of the 69 291 individuals for whom the mean of readings-two and three were available and who were on antihypertensive medication, 23 892 (34.5%) were hypertensive. After excluding participants on antihypertensive medication, 11 335 (20.0%) of 56 734 participants were found to have hypertension. Among the 12 552 of those already on medication and with a mean BP available, 7885 (62.8%) still had uncontrolled BP (*Table 1*).

We observed that individuals receiving antihypertensive medications had significantly higher systolic and diastolic BP. In contrast, after adjusting for age, sex, and antihypertensive treatment, systolic and diastolic BPs were significantly lower in those with diabetes, previous history of stroke, and MI (Supplementary material online, *Figure S1*).

Discussion

In Indonesia, MMM17 was the largest standardized national screening campaign for BP measurement. After being invited by the International Society of Hypertension (ISH), we collected more than 69 000 BP readings from all 34 provinces of the Indonesian archipelago. The mean age of the participants (42.1 years) is lower compared with those in Europe (52.2 years) and East Asia (55.0 years) but close to worldwide data (44.9 years). The proportion of participants who were already taking antihypertensive treatment (18.1%) was lower compared with the global figure.⁸

The differences of three BP readings in our participants were comparable to global data, and provided substantial evidence to support our future national recommendation for three BP readings as a standard protocol. To our surprise and acknowledging the limitations of the MMM17 survey, the proportion of participants with hypertension was 34.5%, which is comparable to the prevalence of hypertension observed in the recent government's primary health survey 2018 (with structured block random sampling of 300 000 households over 34 provinces in Indonesia), which was 34.1%.¹ This result encouraged us to continue the MMM campaign in 2018. Data of 62.8% of individuals on medication who have not achieved target BP is comparable to global data, and indeed reflects the significant challenges for managing hypertension in the community.⁹

Table 1 Number and proportion of participants with hypertension, of those not on treatment and of those on treatment

HTN	Percentage	Denominator	HTN, No treatment	Percentage	Denominator	HTN on meds, uncontrolled BP	Percentage	Denominator
23 892	34.5	69 291	11 335	20.0	56 734	7885	62.8	12 552

In contrast to global data, we observed that individuals with diabetes, previous history of MI, and stroke had significantly lower BP when compared with mean BP.⁸ Interestingly, those on antihypertensive medication showed significantly higher BP, particularly systolic BP (Supplementary material online, *Figure S1*). Certainly, this big data provides a robust support for the importance of systolic BP variability in predicting the risk of future cardiovascular mortality. This finding suggested a possible better awareness of BP in individuals who had already suffered from hypertension and its complications. Therefore, it may reflect an adequate secondary prevention programme. However, the MMM17 data clearly demonstrate the substantial challenges for an effective primary prevention campaign.

Beyond the study limitation that has been described in the global MMM publication,⁸ the initial MMM17 Indonesia campaign was an effective screening method and might provide reliable evidence to support advocacy for public health policymaking.

Supplementary material

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

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