

May Measurement Month 2017: Blood pressure screening results from Zambia—Sub-Saharan Africa

Fastone Mathew Goma^{1*}, Beatrice Mwewa², Greenford K. Tembo³, Musonda Kachamba⁴, Charity Syatalimi⁵, Chabota Simweemba¹, Lexina Chilufya¹, Wilbroad Mutale¹, Thomas Beaney⁶, Xin Xia⁶, and Neil R. Poulter⁶

¹Centre for Primary Care Research, University of Zambia School of Medicine, PO Box 50110, Lusaka, Zambia;

²Mufulira School of Nursing & Midwifery, Mufulira, Zambia;

³Kalulushi College of Nursing, Kalulushi, Zambia;

⁴Faculty of Nursing, Rusangu University, Monze, Zambia;

⁵Centre for Primary Care Research, PO Box 50110, Lusaka, Zambia; and

⁶Imperial Clinical Trials Unit, Imperial College London, Stadium House, 68 Wood Lane, London W12 7RH, UK

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. Prevalence of hypertension is reported to reach 34% in some areas of Zambia but public awareness is reportedly low. A majority of individuals do not know that they have high BP and others do not take any medication. 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. Measurement sites were set-up at shopping malls, markets, sports facilities, churches, higher institutions of learning, and urban clinics. A total of 9607 individuals were screened during MMM17. After multiple imputation, 2438 (25.9%) had hypertension. Of individuals not receiving anti-hypertensive medication, 1706 (19.6%) were hypertensive. Of individuals receiving anti-hypertensive medication, 438 (62%) had uncontrolled BP. The MMM for 2017 was the largest BP screening campaign undertaken in Zambia. The campaign identified 2438 individuals with hypertension who were given heart health advice and/or referred to the local clinic for treatment. These results suggest that a large BP screening campaign based on convenience sampling could be a useful and reasonably inexpensive tool to help raise awareness in the general population and thereby help address the burden of disease caused by hypertension.

Background

Hypertension has been recognized as a leading cause of morbidity and mortality in Zambia for a long time. However, the proportion of people aware of having raised blood pressure (BP) remains low. Therefore, May Measurement Month (MMM),¹ an initiative of the International Society of Hypertension (ISH), was very

welcome. There has been a paucity of studies documenting prevalence of hypertension in Zambia and none of them have combined data collection with information sharing to raise awareness, modify lifestyle, and/or improve compliance to hypertension medication.

The STEPS Survey 2017² is the first comprehensive study to produce country-level, house-hold survey data on prevalence of hypertension and related risk factors for non-communicable diseases in Zambia. In that survey of 4302 respondents, the national prevalence of hypertension was 19.1% (20.5% in men and 17.6% in women) and rose with age to 50.5% (38.6% in males and 59.4% in females) in the 60-

*Corresponding author. Tel: +26097772301, Fax: +260211251074, Email: gomafm@unza.zm

69 years age group. Two-thirds (62.2%) of the men and one-third (34.9%) of the women had never ever been screened for hypertension, while 80.0% (91.0% men and 77.3% women) of the respondents with hypertension were not on medication. Only 6.7% (11.4% men and 2.5% women) of all the respondents had controlled BP. These findings were not surprising as the country has reported a rise in complications of hypertension such as heart failure and strokes.³

The MMM survey, with 9607 respondents, is therefore the largest BP survey that has been conducted in Zambia and addressed the important questions in advocacy for prevention and control of hypertension and its devastating cardiovascular disease complications.

Through MMM17, there was interest to increase the level of public awareness of BP measurements as a tool for combatting the devastating effects of hypertension. Through this simple campaign, individuals would be made aware of the importance of BP measurements, risk factors for cardiovascular disease, value of compliance to medication, and access to health information. The data obtained is important for use in advocacy with policy makers and in engagement with the public to increase self-efficacy.⁴

Methods

The study was designed after the protocol developed by the ISH and as detailed in Beaney *et al.*¹ Volunteers were trained to measure BP in a cascade manner via video recordings on the MMM website. Screening sites were set-up at shopping malls, institutions of learning, churches, recreational grounds, and clinics. Limited mass media campaigns were conducted through television and radio broadcasts. Every occasion was taken to urge the community members to get their BP measured.

Following a brief information interaction, consenting adults (>18) were requested to provide a limited amount of information. Due to internet access limitations, the data were entered on paper forms and later transferred to spreadsheets. Three BP readings from the non-dominant arm were made using the OMRON MIT5 automated BP machines, separated by 1- to 3-min intervals. Health information was provided to all whose BP was raised including hospital referral. Hypertension was defined as SBP ≥ 140 mmHg or DBP ≥ 90 mmHg or on medication for hypertension. The data manager at the Centre for Primary Care Research (CPCR) did preliminary cleaning of the data before transferring it to the MMM project team where the data were analysed following the global approach.¹

The major cost of this exercise was in BP machines. One hundred OMRON MIT5 automated BP machines were donated by OMRON through the ISH. The local logistics including transportation of data collection tools and volunteers were locally funded.

The initial public campaign for BP measurements was included in the MoH public health messages which were broadcast on the national media (Television and Radio). The National Coordinator appeared on the Zambian National Broadcasting Corporation and Revelation TV, and participated in several radio programmes where

hypertension, stroke, and NCDs were being discussed. The screening went on for close to 24 days.

The MMM17 Zambia study was co-ordinated from the Centre for Primary Care Research of the University of Zambia School of Medicine with collaborative alliances with the Zambian Ministry of Health and the Zambia Heart and Stroke Foundation (ZAHESFO). An intensified screening programme was conducted on World Hypertension Day (17 May).

The University of Zambia (UNZA) Biomedical Research Ethical Committee (UNZABREC) reviewed the survey protocol. Informed consent was obtained from each of the participants. All anonymized data forms were kept in secure cabinets at the Centre for Primary Care Research and were only viewed by approved study personnel.

Results

Data were collected from 33 sites in Lusaka Province (9), Eastern province (5), Copperbelt province (17), and Southern Province (2) by about 160 volunteers mostly health professions students. A total of 9607 individuals, 5575 (58.0%) women and 4026 (41.9%) men, participated in this survey (Table 1). Of these, 99.4% were of black ethnicity. Mean age was 36 years. Of these, 732 (7.6%) were on anti-hypertensive medication, 195 (2.0%) were known diabetics, 138 (1.4%) reported having had myocardial infarction, and 89 (0.9%) had had a stroke, 697 (7.3%) were current smokers and 943 (9.8%) reported taking alcohol once or more per week. The mean BMI was 25.0 (5.0) kg/m². Blood pressure measurements were taken in the left arm in 95.7% of cases and most of the measurements were taken on Wednesdays.

The mean age and sex standardized BP (excluding those on treatment for HTN) was 125.6/79.7 mmHg and increased with age (see Supplementary material online, *Figure S1*). Of the 2438 (25.9%) participants who were hypertensive, 1706 (70.0%) were not currently receiving treatment. This represented 19.6% of all of those not receiving treatment. Of the 706 participants receiving treatment with an imputed BP reading, 438 (62.0%) still had elevated BP, meaning BP was controlled in only 38% of them.

Of the 6437 participants who had all three BP readings, there was a consistent average decrease in BP between 1st and 2nd reading of 2.9/1.9 mmHg and 2nd and 3rd readings of 1.8/1.0 mmHg.

There was a statistically significant change in BP with BMI. While in healthy individuals it was recorded as averaging 3.0/0.7 mmHg higher compared with the underweight group, it was greatly exaggerated in the overweight (8.2/4.3 mmHg) and obese (10.1/5.9 mmHg; see Supplementary material online, *Figure S2*).

Higher BP was also noted in those on anti-hypertensive medication, those with diabetes or previous stroke, and amongst those reporting regular alcohol use or smoking tobacco (see Supplementary material online, *Figure S3*).

Discussion

Comparatively, MMM17 is the largest synchronized, standardized national screening campaign of any

cardiovascular factor ever done in Zambia. The proportion of participants found to be hypertensive (25.9%) falls within what is expected in Zambia where prevalence s of 25.8% and 30.3% have been reported from Kaoma and Kasama respectively,⁵ and 34.8% for Lusaka.⁶ MMM17 had a larger representation from urban centres of Lusaka and Copperbelt provinces. The large proportion of individuals who did not know that they had hypertension, or had uncontrolled hypertension on medication, signifies the purpose of such screening campaigns. The inclusion of the information sharing on healthy diets and lifestyle modification was novel and much appreciated by the participants. MMM17 demonstrated that a large BP screening campaign based on convenience sampling could be a useful and reasonably inexpensive tool to help raise awareness in the general population and thereby help address the burden of disease caused by hypertension. MMM has been a novel approach to raising awareness among policy makers who celebrated its inclusion on the National Health Week programme and supported its data collection processes. There were also alliances built with other health professions and training institutions in the country that will be strengthened as MMM becomes an annual event.

Supplementary material

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

Acknowledgements

Our gratitude to Mrs Brenda Chitindi of Zambia Heart and Stroke Foundation for facilitating data collection in rural districts of eastern Zambia, medical Students from the

University of Zambia and Copperbelt University, Dr Clementina Lwutula at University of Zambia Clinic, and all the nursing students and community volunteers who made this massive exercise successful.

Conflict of interest: none declared.

References

1. Beaney T, Schutte AE, Tomaszewski M, Ariti C, Burrell LM, Castillo RR, Charchar FJ, Damasceno A, Kruger R, Lackland DT, Nilsson PM, Prabhakaran D, Ramirez AJ, Schlaich MP, Wang J, Weber MA, Poulter NR; on behalf of the MMM Investigators. May Measurement Month 2017: an analysis of blood pressure screening results worldwide. *Lancet Glob Health* 2018;**6**:736-743.
2. Ministry of Health. Zambia STEPwise survey of non-communicable diseases risk factors. Zambia Report for 2017; 2017.
3. Ministry of Health. *The 2012 Annual Health Statistical Bulletin*. Lusaka, Zambia: Directorate of Policy and Planning, Monitoring and Evaluation Unit, Ministry of Health; 2014.
4. Chow CK, Teo KK, Rangarajan S, Islam S, Gupta R, Avezum A, Bahonar A, Chifamba J, Dagenais G, Diaz R, Kazmi K, Lanus 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**: 959-968.
5. Mulenga D, Siziya S, Rudatsikira E, Mukonka VM, Babaniyi O, Songolo P, Muula AS. District specific correlates for hypertension in Kaoma and Kasama rural districts of Zambia. *Rural Remote Health* 2013;**13**: 2345.
6. Goma FM, Nzala SH, Babaniyi O, Songolo P, Zyaambo C, Rudatsikira E, Siziya S, Muula AS. Prevalence of hypertension and its correlates in Lusaka urban district of Zambia: a population based survey. *Int Arch Med* 2011;**4**:34.