

# May Measurement Month 2018: an analysis of blood pressure screening from Kenya

Elijah N. Ogola<sup>1\*</sup>, Anders Barasa<sup>2</sup>, Yubrine M. Gachemba<sup>3</sup>, Felix Barasa<sup>4</sup>, Bernard M. Gitura<sup>5</sup>, Wafula Nalwa<sup>6</sup>, Anne Wairagu<sup>7</sup>, Thomas Beaney<sup>8,9</sup>, Anca Chis Ster<sup>9</sup>, and Neil R. Poulter<sup>9</sup>

<sup>1</sup>Department of Clinical Medicine and Therapeutics, University of Nairobi, Ngong Road, Nairobi 00202, Kenya;

<sup>2</sup>Department of Medicine, Aga Khan University, 808 Muthaiga Heights, Nairobi 00100, Kenya;

<sup>3</sup>Department of Medicine, Egerton University, PO Box 536, Nakuru 20115, Kenya;

<sup>4</sup>Department of Medicine, Moi Teaching and Referral Hospital, Nandi Road, Eldoret 30100, Kenya;

<sup>5</sup>Cardiology Unit, Kenyatta National Teaching and Referral Hospital, Ngong Road, Nairobi 00202, Kenya;

<sup>6</sup>School of Medicine, City Campus, Maseno University, Private Bag 40100, Kisumu, Kenya;

<sup>7</sup>Gatundu Level 5 Hospital, PO Box 84, Gatundu 01030, Kenya;

<sup>8</sup>Department of Primary Care and Public Health, Imperial College London, St Dunstan's Road, London W6 8RP, UK; and

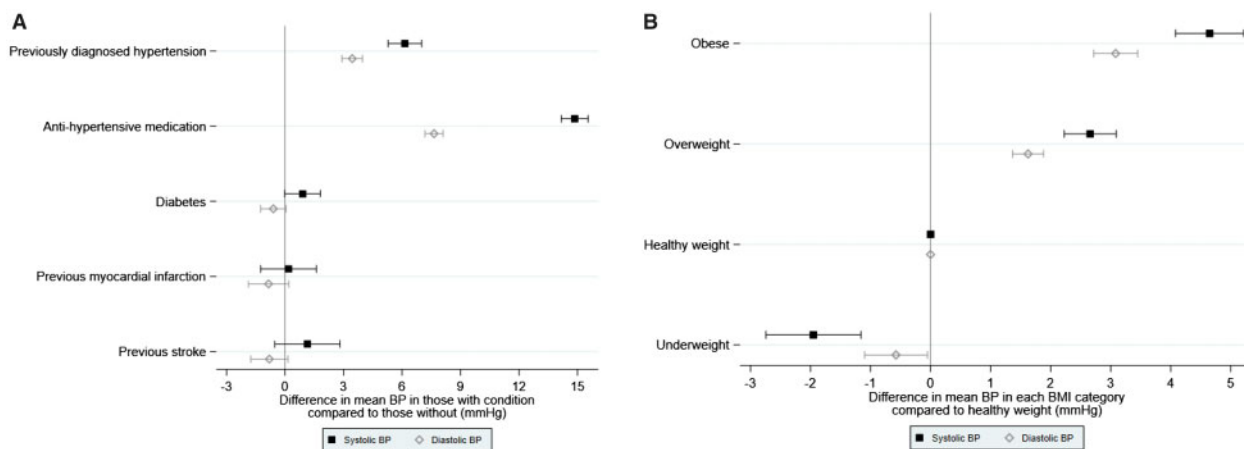
<sup>9</sup>Imperial Clinical Trials Unit, Imperial College London, Stadium House, 68 Wood Lane, London W12 7RH, UK

## KEYWORDS

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Hypertension (HTN) is highly prevalent and the leading cardiovascular risk factor for death globally. A large proportion of individuals with high blood pressure (BP) are unaware leading to under treatment and poor control. To address this, the International Society of Hypertension (ISH) initiated a global mass screening campaign, the May Measurement Month 2017 (MMM17), in which Kenya participated. Following the success of the campaign, its successor MMM18 was launched. Here, we present the Kenyan results for MMM18. Opportunistic screening of consenting adults was done in various sites across Kenya in May 2018, by volunteers trained using ISH material, under the co-ordination of the Kenya Cardiac Society. Blood pressure, pulse rate, weight, and height were measured by standard methods. Definitions of HTN and statistical methods all adhered to the standard MMM protocol. We screened 49 548 subjects, mean age 39.95 (15.3) years. In total, 49.4% had never had a BP measurement taken. After multiple imputation, 17.1% were hypertensive and of those who were hypertensive, 30.7% were aware, 26.6% were on antihypertensive treatment, and 13.0% had controlled BP. Alcohol use, excess weight, and treatment for HTN were associated with higher BP. The Kenyan MMM18 sites successfully screened more than three times the number screened in 2017, hence improving public awareness. Less than half the population had ever had a BP check. Less than a third of the hypertensives were aware with correspondingly poor treatment and control rates. Opportunistic mass screening is useful in raising public awareness.

\*Corresponding author. Tel: +254 722737944, Email: elijah.ogola@uonbi.ac.ke



**Figure 1** (A and B) Determinants of blood pressure in the screened population. (A) Difference in mean blood pressure according to participants with comorbidities compared to those without from linear regression models adjusted for age, sex, and antihypertensive medication (antihypertensive medication adjusted for age and sex alone). (B) Difference in mean blood pressure compared to healthy weight from linear regression models, adjusted for age, sex, and antihypertensive medication.

## Introduction

Hypertension (HTN) is a leading cardiovascular risk factor and cause of death globally.<sup>1</sup> Sub-Saharan Africa (SSA) has the highest age-adjusted prevalence of HTN ranging from one-fourth to one-third of the adult population.<sup>2</sup> A recent meta-analysis showed HTN awareness, treatment, and control rates in SSA to be 27%, 18%, and 7%, respectively.<sup>3</sup> These results were replicated in the recent Kenya national survey.<sup>4</sup> May Measurement Month (MMM) is a global campaign launched in May 2017 to raise awareness by public screening to sensitize health authorities on the burden of HTN.<sup>5</sup> In MMM17, Kenya successfully screened 14 845 of whom 24.6% were hypertensive with less than half on treatment, and only 45.5% on treatment were controlled.<sup>6</sup> The programme was repeated globally in 2018 (MMM18).<sup>7</sup> We here present the country data for Kenya for the MMM18.

## Methodology

Opportunistic screening was co-ordinated by the Kenya Cardiac Society (KCS) on consenting adults in 50 sites across Kenya in May 2018. Sites were selected based on availability of volunteers (total  $n = 120$ ). Local physicians trained the field staff using materials supplied by the International Society of Hypertension. Ethics approvals were obtained from the ethics committees of the Kenyatta National Hospital and Moi Teaching and Referral Hospital. Screening was conducted in health institutions, shopping malls, open markets, places of worship, and airports. We used donated OMRON M3 (Omron Healthcare, Japan, Tokyo) digital devices to take blood pressure (BP) measurements. Three BP readings were measured, 1-min apart, with the subject quietly seated, with the average of the last two readings recorded. Hypertension was defined as a systolic BP (SBP)  $\geq 140$  mmHg and/or diastolic BP (DBP)  $\geq 90$  mmHg or on antihypertensive treatment. Pulse rate, weight, and height were also measured. Participants with elevated BP

received both oral and written information on appropriate lifestyle modification measures and were referred for further care. Data were entered directly into Excel spreadsheets, the MMM app, or on hard copy with later transcription. All data were cleaned locally before being loaded onto the MMM central database for analysis. Multiple imputation was used to estimate the mean of the second and third BP readings where either or both were missing, using the global data.<sup>7</sup>

## Results

The Kenyan sites screened 49 548 subjects. The mean age was 40.0 years (SD 15.3), 55.5% were female and 90.6% Black African. A total of 968 (2.0%) had a history of diabetes, 308 (0.6%) myocardial infarction, and 243 (0.5%) stroke. Among screenees, 1043 (2.1%) were current smokers and 1250 (2.5%) self-reported drinking alcohol at least once a week, 6049 (12.2%) were overweight and 3307 (6.7%) obese. Mean body mass index was 25.5 kg/m<sup>2</sup> (SD 4.8). After multiple imputation, 8469 (17.1%) were hypertensive of whom 30.7% were aware, and 26.6% were on treatment. Only 49.0% of treated participants were controlled, giving an overall control rate for all hypertensives of 13.0%. A total of 20 535 (41.4%) had never had a previous BP measurement.

Age- and sex-adjusted SBP and DBP were higher in people on antihypertensive treatment. When adjusted for age, sex, and antihypertensive treatment, alcohol intake was associated with increased SBP and DBP. Compared with healthy weight, both overweight and obese subjects had higher SBP and DBP whereas underweight subjects had lower BPs (*Figure 1A and B*). Left-arm measurement was associated with lower DBP, but not SBP. However, history of stroke, myocardial infarction, and current smoking status were not associated with different levels of either SBP or DBP.

## Discussion

Following the success of MMM17,<sup>5,6</sup> we participated in the MMM18 global programme.<sup>7</sup> The lessons learnt from 2017 enabled us to improve the screening rate to almost 50 000. The proportion with HTN was 17.1%, which is lower than last year (24.6%).<sup>6</sup> Being a non-randomized sample, this most likely reflects differences in the populations screened. The awareness, treatment, and control rates remain poor, consistent with recent findings.<sup>4,6</sup> Only about half of the subjects have ever had a BP measurement, slightly lower than the 66% in the STEPs survey.<sup>4</sup> These data show that poor awareness and treatment rates are a significant barrier to population-level BP control. The low screening rates show that targeted screening programmes like MMM and Healthy Heart Africa can significantly contribute to raising awareness.<sup>8</sup> Consistent with established literature, alcohol intake and excess weight were associated with elevated BP. There was a trend for diabetes to be associated with SBP which did not reach statistical significance. Tackling these risk factors offers the potential for primary prevention.

In conclusion, nearly 50 000 adults were screened in Kenya during MMM18. Poor awareness, treatment, and control rates for HTN confirm the need for continuous programmes to create awareness followed by linkage to and retention in care.

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**Conflict of interest:** none declared.

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