May Measurement Month 2017–19: an analysis of blood pressure screening results from Niger

Ali I. Touré1*, Oumarou Y. Ismael1, Kimba souley1, Ali S. Bonkano1, Dodo Boubacar1, Moustapha Ousseini1, Dari Mossi1, Garba I. Issoufou1, Moussa Souna1, Ousseina Bonkano1, Abdoul Majid1, Halima Douma1, Wei Wang2, Thomas Beaney2,3, and Neil R. Poulter2

1Lamorde National Teaching Hospital, Hospital Center University De Niamey, Hospital Lamordé, G33J+GQ5, Niamey, Niger; 2Imperial Clinical Trials Unit, Imperial College London, Stadium House, 68 Wood Lane, London W12 7RH, UK; and 3Department of Primary Care and Public Health, Imperial College London, St Dunstan’s Road, London W6 8RP, UK

The aim of this study was to screen for cardiovascular risk factors with particular focus on high blood pressure (BP) in Niger and thereby to raise awareness among the population of Niger about raised BP and the associated risk to health. The city of Niamey served as our study location during the month of May in 2017, 2018, and 2019. We screened volunteer adults aged ≥18 years, who completed a pre-established questionnaire and had three sitting BP measurements taken. Hypertension was defined as a systolic BP ≥140 mmHg or diastolic BP ≥90 mmHg (based on the mean of the second and third BP readings) or being on antihypertensive medication. We screened 2297 adults of which 42.9% were women and 57.1% men. Of the 2297 screened, 33.2% were found to be hypertensive of whom only 26 (3.4%) were recorded as being on treatment. Approximately 30% of those screened were found to be obese or overweight. High BP is a real public health danger, and this study finds alarming figures that highlight the need for improved policies for screening and management of hypertension. Raising awareness and improving detection of hypertension remain essential to reduce the burden of cardiovascular disease.

*Corresponding author. Tel: +227 99171717, Email: pr_toure@yahoo.fr

© The Author(s) 2022. Published by Oxford University Press on behalf of the European Society of Cardiology. This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial License (https://creativecommons.org/licenses/by-nc/4.0/), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact journals.permissions@oup.com
An analysis of blood pressure screening results from Niger

Measurement. Three BP readings were taken and the mean of the second and third readings was used in analysis. Hypertension was defined as systolic BP $\geq 140$ mmHg or diastolic BP $\geq 90$ mmHg or on treatment for hypertension. Where one or more BP readings were missing, multiple imputation was used to estimate the missing values, based on global data as described previously.$^2,^3,^4$

There were some differences in variables collected by questionnaire across years. For example, data on awareness and screening site type were collected in 2018 and 2019 only.

Results

The number of participants in 2017 was 477, in 2018 was 1122, and in 2019 was 698. The mean age was $43.5 \pm 15.5$ years, 57.0% were men and 42.9% were women. 78.5% of participants were of Black ethnic background. The majority of the screening occurred in hospitals or clinics (47.8%), followed by 32.0% in indoor public areas and 16.8% in outdoor public areas. The mean BP was $132.7/82.9$ mmHg among screenees with the second and third BP readings available. After imputation and standardization for age and sex, the mean BP was $129.0/80.7$ mmHg. The use of antihypertensive medication was not recorded in 2017 and was missing for 55.3% of participants in 2018 and 89.3% of participants in 2019. Of the 557 participants across 2018-19 for whom antihypertensive medication use was recorded, only 26 (4.5%) were reported taking antihypertensive medication. Of all 2297 participants, 763 (33.2%) had hypertension after imputation of missing BP readings (Table 1), of whom 3.4% were recorded as being on antihypertensive medication. The association between age and sex with systolic BP in people who were not taking antihypertensive medication showed a linear increase. For diastolic BP, a less pronounced relationship was shown. After 50 years of age, the systolic and diastolic BPs were slightly higher in men than in women (Figure 1).

Discussion

The percentage of participants with hypertension in MMM 2017-19 in Niger was 33.2%, and with only 3.4% of hypertensive people recorded as being on treatment. The prevalence of hypertensive patients found in our survey is similar to that found in the 2007 WHO STEPS Survey, which was 36.3%, although STEPS only included adults aged 15-64 years.$^1$

Limitations of the study include a large percentage of missing data on antihypertensive medication use, which was not collected in 2017 and unrecorded for most participants in 2018 and 2019 and is likely to lead to an underreporting of the true prevalence of hypertension, which may explain some of the differences with the STEPS survey. Furthermore, participants were screened opportunistically, and there may be selection bias in the samples, which were not designed to be nationally representative. Despite this, the results show that opportunistic screening can detect large numbers of people with undiagnosed

![Figure 1](image-url) Change in blood pressure with age and sex excluding participants on antihypertensive medication.

| Table 1 Total participants and percentage with hypertension and on medication |
|-----------------------|--------------------------|--------------------------|
| Total participants    | Number (%) with hypertension | Number (%) of hypertensives on medication |
|-----------------------|--------------------------|--------------------------|
| 2297                  | 763 (33.2%)              | 26 (3.4%)               |


hypertension. Although outcomes of those screened were not captured, participants with hypertension were directed to local healthcare facilities for further assessment and provided with lifestyle and dietary advice to reduce their BP.

The MMM campaign in Niger highlights a large number of people with hypertension can be screened opportunistically. In the absence of systematic and population-based screening, the MMM campaign should be continued annually in order to raise awareness of raised BP and its complications among the population.

**Funding**

None declared.

**Conflict of interest:** None declared.

**Data availability**

The data underlying this article will be shared upon reasonable request to the corresponding author.

**References**

1. World Health Organization. STEPS 2007: Niger, 2007. https://extranet.who.int/ncdsmicrodata/index.php/catalog/736/related-materials.

2. 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; MMM Investigators. May Measurement Month 2017: an analysis of blood pressure screening results worldwide. Lancet Global Health 2018;6:e736–e743.

3. Beaney T, Burrell LM, Castillo RR, Charchar FJ, Cro S, Damasceno A, Kruger R, Nilsson PM, Prabhakaran D, Ramirez AJ, Schlaich MP, Schutte AE, Tomaszewski M, Touyz R, Wang JG, Weber MA, Poulter NR; MMM Investigators. May Measurement Month 2018: a pragmatic global screening campaign to raise awareness of blood pressure by the International Society of Hypertension. Eur Heart J 2019;40:2006–2017.

4. Beaney T, Schutte AE, Stergiou GS, Borghi C, Burger D, Charchar F, Cro S, Diaz A, Damasceno A, Espeche W, Jose AP, Khan N, Kokubo Y, Maheshwari A, Marin MJ, More A, Neupane D, Nilsson P, Patil M, Prabhakaran D, Ramirez A, Rodriguez P, Schlaich M, Steckelings UM, Tomaszewski M, Unger T, Wainford R, Wang J, Williams B, Poulter NR; MMM Investigators*. May Measurement Month 2019: the Global Blood Pressure Screening Campaign of the International Society of Hypertension. Hypertension 2020;76:333–334.