



# May Measurement Month 2022: an analysis of blood pressure screening results from Brazil

Bruna Eibel<sup>1</sup>, Weimar Kunz Sebba Barroso<sup>2</sup>, Thomas Beaney <sup>3,4</sup>,  
Gabriele Kerr<sup>3,4</sup>, Neil R. Poulter<sup>3,4</sup>, Lucélia Batista Neves Cunha Guimarães<sup>5</sup>,  
Elizabeth E.S. Cestario<sup>6</sup>, Abraham B. Epelman<sup>7</sup>, Luis Aparecido Bortolotto<sup>8</sup>,  
and Eduardo Costa Duarte Barbosa <sup>9,10\*</sup>

<sup>1</sup>Institute of Cardiology, University Foundation of Cardiology, Porto Alegre, Brazil; <sup>2</sup>Federal University of Goiás - Hypertension Unit, Medicine School, Goiania, Brazil; <sup>3</sup>Imperial Clinical Trials Unit, Imperial College London, Stadium House, 68 Wood Lane, London W12 7RH, UK; <sup>4</sup>School of Public Health, Imperial College London, 90 Wood Lane, London W12 0BZ, UK; <sup>5</sup>Faculdades Integradas do Extremo Sul Da Bahia - Medicine School, Rod, Br 367, Km 14, Eunápolis/Porto Seguro, Eunápolis, Brazil; <sup>6</sup>Cardiology League Coordinator, University Center of Votuporanga, Votuporanga, Brazil; <sup>7</sup>Medical Affairs Department, Servier Brazil Laboratories, Estrada dos Bandeirantes 4211, Rio de Janeiro, RJ 22775-113, Brazil; <sup>8</sup>Brazilian Society of Hypertension, Instituto do Coração (InCor), São Paulo, SP, Brazil; <sup>9</sup>Department of Hypertension and Cariometabolism, São Francisco Hospital, Santa Casa de Misericórdia de Porto Alegre, Porto Alegre 90050-170, Brazil; and <sup>10</sup>Department of Medicine, Feevale University, Ers 239 2755, Novo Hamburgo, RS 93525-075, Brazil

## KEYWORDS

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The May Measurement Month (MMM) campaign was carried out in Brazil in 2022 with the aim of raising awareness of raised blood pressure (BP). Here, we report on the findings of the campaign. Adults aged  $\geq 18$  years were recruited opportunistically, including a population with representation from all Brazilian states and reflects some of the characteristics of hypertension in Brazil. Three seated BP readings were taken for each participant, along with completion of a questionnaire on demographics, lifestyle factors, and comorbidities. Hypertension was defined as a systolic BP  $\geq 140$  mmHg and/or diastolic BP  $\geq 90$  mmHg or on antihypertensive medication use. Controlled BP was defined as being on antihypertensive medication with a BP  $< 140/90$  mmHg. Multiple imputation was used to estimate any missing BP readings. In total, 11 544 were screened, with a mean age of 53.4 years and 55.3% of whom were female. Of all participants, 6858 (59.4%) had hypertension, of whom 5548 (80.9%) were aware, and 5072 (74.0%) were on antihypertensive medication. Of those on antihypertensive medication, 2732 (53.9%) had controlled BP, and of all participants with hypertension, 39.8% had controlled BP. In total, 4126 (35.7%) were found to have either untreated or inadequately treated hypertension. The MMM campaign in Brazil identified high rates of hypertension among participants and about 60% of hypertensives were either untreated or inadequately treated, which are likely to be contributors to the major causes of death in the country.

## Introduction

Raised blood pressure (BP) is one of the largest contributors to the global burden of disease.<sup>1</sup> Cardiovascular disease

\*Corresponding author. Tel: +55513586-8800, Fax: +55513586-8800,  
Email: edubarbosa@terra.com.br

(CVD), including stroke and coronary heart disease, has been the leading cause of death for half a century in Brazil. Coronary heart disease, now the leading cause of CVD death, accounted for 31% of CVD mortality, cerebrovascular diseases for 30%, hypertensive heart disease for 14%, and other forms of heart disease (mainly congestive heart failure) for 18%.<sup>1</sup> May Measurement Month (MMM) was initiated in 2017 by the International Society of Hypertension and has since run annually, except for 2020 due to the COVID-19 pandemic.<sup>2</sup> In 2021, the MMM campaign continued, with the aim of continuing to raise awareness of the dangers of increased BP and in 2022, included 757 350 participants worldwide.<sup>3</sup> Brazil participated in MMM in all previous active years and verified a high percentage of newly diagnosed hypertension and uncontrolled hypertension.<sup>4</sup> In this paper, we report on the findings of the MMM22 campaign in Brazil.

## Methods

MMM is a cross-sectional opportunistic survey of consenting adults aged 18 years or over. Screening sites were set up in hospitals and indexed clinics, in all the main regions of Brazil. All professionals involved were trained on how to take a BP measurement. The campaign was advertised via posters and internal and online communications. In accordance with the standard MMM protocol, participants ideally had three seated BP readings measured at 1-min intervals.<sup>3</sup> Validated automatic devices from Omron were used to measure BP. A questionnaire was also completed, collecting information on demographics, comorbidities, lifestyle risk factors and antihypertensive medication use. Hypertension was defined as a raised BP (a systolic BP  $\geq 140$  mmHg and/or diastolic BP  $\geq 90$  mmHg based on the mean of the second and third readings), or being on antihypertensive medication. Controlled BP was defined as being on medication with a BP  $< 140/90$  mmHg. Participants found to have raised BP were provided with diet and health lifestyle advice, as well as encouraged to increase their physical activity. Data were collected locally via paper forms and submitted to the central MMM team for cleaning and analysis. In cases where any BP reading was missing, to ensure comparability between participants, the average of the second and third readings was estimated by multiple imputation using chained equations, based on global data as described previously.<sup>3</sup> For comparison with other countries participating in MMM, results are also presented after age and sex standardization using the World Health Organization world standard population, and assuming an equal gender split.<sup>5</sup> Ethical approval was not required due to the nature of the campaign.

## Results

In total, 11 544 were screened during MMM22 in Brazil. The mean (SD) age was 53.4 (16.7) years, 6387 (55.3%) were female and 5872 (50.9%) were white. Of all participants, 128 (1.1%) reported never having had a BP measured before. Multiple imputation was used to estimate missing BP readings for 1023 (8.9%) participants missing data on the second and/or third BP reading. Of all participants, 6858 (59.4%) were found to have hypertension, of whom 5548 (80.9%) were aware, and 5072 (74.0%) were on antihypertensive medication (*Table 1*). Of those on antihypertensive medication, 2732 (53.9%) had controlled BP, and of all hypertensives, 39.8% had controlled BP. Of participants who were not taking antihypertensive medication, 1786 (27.6%) were found to have raised BP. In total, 4126 (35.7%) were found to have either untreated or inadequately treated hypertension. After age and sex standardization, 5298 (47.2%) were found to have hypertension, of whom 3711 (70.0%) were aware, 3303 (62.3%) were on antihypertensive medication and 1820 (34.4%) were controlled (*Table 1*). Percentages with hypertension increased with age, from 16.5% ( $n = 183$ ) of 18-29-year-olds to 84.5% ( $n = 1847$ ) of those aged 70 years or more.

## Discussion

The MMM22 programme identified a total of 4126 (35.7%) participants with untreated or inadequately treated hypertension, highlighting the scale of hypertension in Brazil. It is worth mentioning the small number of people (1.1%) who had never had their BP measured before; this is a very positive aspect and may be related to the various awareness-raising actions among the population.<sup>6</sup> Another notable aspect of this campaign was the higher awareness and treatment rates compared with several previous reports.<sup>6</sup>

The proportion of hypertensives, clearly increased with advancing age<sup>3,7</sup> being verified in 16.5% of participants aged 18-29 years, whereas in those aged 70 years or more, 84.5% were found to have hypertension. This is a consistent global finding and is likely due to the cumulative impact over time of a combination of factors such as poor diet and a sedentary lifestyle.

In MMM18, 24.2% of the individuals screened were found to have hypertension,<sup>2</sup> whereas 59.4% of individuals were detected with hypertension in the current campaign. We assume these MMM data differ

**Table 1** Total participants and numbers with hypertension, awareness, on medication and with controlled blood pressure, before and after age and sex standardization

|              | Total participants | Number (%) with hypertension | Number (%) of hypertensives aware | Number (%) of hypertensives on medication | Number (%) of those on medication with controlled BP | Number (%) of all hypertensives with controlled BP |
|--------------|--------------------|------------------------------|-----------------------------------|---|--|--|
| Actual       | 11 544             | 6858 (59.4)                  | 5548 (80.9)                       | 5072 (74.0)                               | 2732 (53.9)  | 2732 (39.8)  |
| Standardized | 11 236             | 5298 (47.2)                  | 3711 (70.0)                       | 3303 (62.3)                               | 1820 (55.1)  | 1820 (34.4)  |

Absolute and relative data.

from previous estimates of hypertension and awareness control in Brazil in part due to the impact of the COVID pandemic, in which people avoided elective medical appointments and took extreme care when leaving home, leading to temporary sedentarism and increased levels of post-traumatic stress.<sup>3</sup>

### Strengths and limitations

A strength of the MMM campaign is the use of a standardized protocol across countries, which aids comparability of findings. Participants in MMM were recruited opportunistically using convenience sampling and as a result, prevalence estimates should not be interpreted as estimates of national prevalence. Hypertension was defined based on three BP readings at a single visit for pragmatic reasons which is not the optimal method of diagnosis at the individual level recommended in guidelines. Consequently, the rate of hypertension detected is likely to represent an overestimate.

### Conclusions

MMM22 was the largest BP screening campaign undertaken after the COVID-19 pandemic in Brazil. The high percentage of newly diagnosed hypertension and the identification of uncontrolled hypertension despite pharmacologic treatment reinforce the importance of this annual event in Brazil to raise awareness, and to improve the prevention of major adverse cardiovascular events. These results suggest that opportunistic screening can identify a significant number of individuals with raised BP, both off and on treatment.

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### Data availability

Data are not publicly available but access can be requested with permission from the MMM Management Board, on request through the MMM website: maymeasure.org.

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