

May measurement month 2017: Latin America

Eduardo C.D. Barbosa^a, Agustin Ramirez^b, Thomas Beaney^c, Elsa Kobeissi^c, Patricio Lopez-Jaramillo^d, Rafael Hernández-Hernández^e, Bruna Eibel^f, Fernando Lanas^g, Ernesto Penaherrera^h, Marcos Marinⁱ, José Boggia^j, Jose Ortellado^j, Enrique Gomez^j, Enrique Sánchez^k, Alfonso Bryce^k, Osiris Valdez^l, Holly Beistline^m, Chukwuemeka Nwokochoⁿ, Kenneth Connell^o, Ana Barrientos^o, Fernando Wyss^p, John Kenerson^a, and Neil R. Poulter^c

Objectives: To raise awareness of blood pressure, measured by number of countries involved, number of people screened, and number of people who have untreated or inadequately treated hypertension.

Methods: An opportunistic cross-sectional survey of volunteers aged at least 18 years was carried out in May 2017. Blood pressure measurement, the definition of hypertension and statistical analysis followed the standard May measurement month protocol. Eighteen countries in Latin America and the Caribbean participated in the campaign, providing us with a wide sample for characterization.

Results: During May measurement month 2017 in Latin America and the Caribbean, 105 246 individuals were screened. Participants who had cardiovascular disease, 2245 (2.3%) had a prior myocardial infarction, and 1711 (1.6%) a previous stroke, additionally 6760 (6.4%) individuals were diabetic, 7014 (6.7%) current smokers and 9262 (8.8%) reported alcohol intake once or more per week. Mean SBP was 122.7 mmHg and DBP was 75.6 mmHg. After imputation, 42 328 participants (40.4%) were found to be hypertensive.

Conclusion: The high numbers of participants detected with hypertension and the relatively large proportion of participants on antihypertensive treatment but with uncontrolled hypertension reinforces the importance of this annual event in our continent, to raise awareness of the prevention of cardiovascular events.

Keywords: blood pressure, hypertension, risk factors

Abbreviations: BP, blood pressure; MMM, May measurement month

BACKGROUND

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 programs worldwide [1]. Measurement of BP is a cheap, simple, and noninvasive technique to detect hypertension and, assuming effective therapy is supplied, if

effectively managed can be highly cost efficient, protection against death and disability [2,3] which otherwise usually arises from myocardial infarction (MI), cerebrovascular disease, and renal failure [1]. In Brazil, hypertensive heart disease is responsible for 14% of all cardiovascular deaths [4]. In addition to this, most people with hypertension are not treated, which is largely due to the low levels of awareness and screening for high BP [5–7]. There are no previous studies in Latin America with BP awareness data for this number of people and countries involved. To address this significant public health epidemic, 18 countries in Latin America and the Caribbean joined the MMM initiative, to raise awareness of high BP. In this article, we report the findings from across the region.

METHODS

An opportunistic cross-sectional survey of volunteers aged at least 18 years was carried out in May 2017. BP measurement, the definition of hypertension and statistical analysis followed the standard MMM protocol [1].

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^aDepartment Hypertension, Brazilian Society Cardiology, FUNCOR, Liga de Hipertensão de Porto Alegre, Porto Alegre, Brazil, ^bArterial Hypertension and Metabolic Unit, University Hospital, Fundación Favaloro, Caba, Argentina, ^cImperial College London, London, UK, ^dFundación Oftalmológica de Santander (FOSCAL) Medical School, UDES, Bucaramanga, Colombia, ^eClinical Pharmacology Unit, Hypertension and Cardiovascular RiskFactorsClinic, Universidad Centro Occidental Lisandro Alvarado, Barquisimeto, Venezuela, ^fPost Graduate Program Institute of Cardiology RGS, Porto Alegre, Brazil, ^gUniversidad de La Frontera, Temuco, Chile, ^hDel Servicio de Cardiología Hospital Luis Vernaza, Guayaquil, Ecuador, ⁱArgentinian Society of Hypertension, Buenos Aires, Argentina, ^jCentro de Nefrología, Hospital Manuel Quintela, Universidad de la Republica, Montevideo, Uruguay, ^kHospital Vivian Pellas, Managua, Managua, Nicaragua, ^lDpto de Cardiología Hospital Central Romana, La Romana, Dominican Republic, ^mOperation Blessing International, Virginia Beach, Virginia, USA, ⁿDepartment of Basic Medical Sciences, University of The West Indies, Mona Campus, Jamaica, ^oThe University of the West Indies – Cave Hill Campus, Wanstead, Barbados and ^pTechnology and Cardiovascular Service of Guatemala – Cardiosolutions, Guatemala City, Guatemala

Correspondence to Eduardo C.D. Barbosa, Department Hypertension, Brazilian Society Cardiology, FUNCOR, Liga de Hipertensão de Porto Alegre, Costa Avenue, 30 – SL 408 – Menino Deus – Porto Alegre 90110-270, RS, Brazil. Tel: +55 51 3230-2790; e-mail: edubarbosa@terra.com.br

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Blood pressure measurements

BP could preferably be measured by an automated electronic device, but could also be measured by a conventional sphygmomanometer using a stethoscope. If a sphygmomanometer was used, the first and fifth Korotkoff sounds (the appearance and disappearance of sounds) corresponded to the SBP and DBP. BP should be measured on the upper arm. The circumference of the arm (at the mid arm level) was measured to ensure that the correct size of arm cuff was used. For arms with circumference less than 32 cm – regular cuff; arms with circumference 32–42 cm – large cuff; arms with circumference more than 42 cm – extra-large cuff; and arms with circumference less than 20 cm use pediatric cuff. The cuff was placed at the heart level. The patient's arm that was used for the measurement was rested comfortably on a table. BP was measured on one arm only, preferably left, and the arm used was recorded. The participant was seated with their backs supported and with their legs resting on the ground and in the uncrossed position for 5 min. Participants should not have smoked immediately before or during the measurement. Three BP readings were taken and recorded, with 1 min between readings. For each BP reading, the automated BP devices also provided data on heart rate (HR), and this information was captured. If the auscultatory method/sphygmomanometer was used, the HR was established during the 1 min after each BP reading, and also recorded.

Sample definition

Eighteen countries in Latin America and the Caribbean participated in the campaign, providing us with a wide sample for characterization. The majority of screening sites, in most of the countries, were at hospitals, pharmacies, and clinics. Each participant had their BP measured three times with the mean of the second and third readings used in analysis. Measurements were most commonly made using an automatic Omron device, on the right ($n = 25\,079$; 23.8%) or left arm ($n = 47\,367$; 45.0%), in the sitting position; in 32 800 (31.2%) of people screened the arm measured was not recorded. Where three readings were not available for an individual, multiple imputation was used to impute the mean of the second and third. The approach followed that used in the global analyses, based on the available readings, along with age and sex (along with an interaction term) and region [1].

The primary objective was to raise awareness of BP, measured by number of countries involved, number of people screened, and number of people who have untreated or inadequately treated hypertension. Hypertension was defined as SBP at least 140 mmHg or DBP at least 90 mmHg or those on antihypertensive medication. Ethical approval was granted separately in each country, and the recruiting mechanisms included public health messages and endorsements. Data were collected via Excel spreadsheets and regional data were analyzed centrally by the MMM project team [1].

RESULTS

During MMM 2017 in Latin America and the Caribbean, 105 246 individuals from Argentina (30.7%), Colombia

(21.1%), Venezuela (20.6%), Brazil (6.9%), Ecuador (6.6%), Chile (4.5%), Uruguay (2.3%), Paraguay (1.1%), Mexico (1.1%), Nicaragua (0.9%), Peru (0.9%), Dominican Republic (0.9%), El Salvador (0.6%), Jamaica (0.5%), Barbados (0.4%), Honduras (0.4%), Guatemala (0.2%), Haiti (0.1%) were screened. Different ethnicities were included: 18 882 White (17.9%), 4956 Black (4.7%), 4713 South Asian (4.5%), 250 East Asian (0.2%), 26 Arabic (0.0%), 203 Hispanic (0.2%), 38 331 mixed (36.4%), 5146 other (4.9%), 32 739 unknown (31.1%). The difference in the percentage of participation of the countries involved is related to the campaign engagement and the total number of the population of each country. There were 62 863 (59.7%) females and 922 of them were pregnant (1.5%). The mean age of the total sample was 48.6 years. Participants who had cardiovascular disease, 2245 (2.3%) had a prior MI, and 1711 (1.6%) a previous stroke, additionally 6760 (6.4%) individuals were diabetic, 7014 (6.7%) current smokers and 9262 (8.8%) reported alcohol intake once or more per week.

Mean SBP was 122.7 mmHg and DBP was 75.6 mmHg. After imputation, 42 328 participants (40.4%) were found to be hypertensive. Before imputation, 36 490 (54.6%) adults were classified as hypertensive and after imputation, 42 328 (40.4%) were classified as hypertensive. After imputation, of those not on antihypertensive treatment, 10 677 (14.6%) were found to have hypertension, while of those on antihypertensive treatment, 12 142 (38.5%) had treated but uncontrolled BP. The change in BP with age and sex (Fig. 1) shows that males had higher SBP and DBP until the age of 80 and 85 years, respectively. SBP continued to increase in both sexes across all ages but among women, the slope was higher than among males. By contrast, DBP tend to decrease in both sexes after 55 years.

The difference in mean BP according to individual characteristics from linear regression models adjusted variably as appropriate for age, sex, and antihypertensive medication is shown in Fig. 2. As shown, SBP and DBP was higher in participants on treatment for hypertension, those with diabetes, current smokers and those patients declaring alcohol intake compared with those without these characteristics, while SBP and DBP was lower in pregnant than in nonpregnant women. No difference between SBP and DBP was observed between patients with and without a previous MI; however, in those participants with previous stroke, SBP was slightly higher.

The differences in BP according to BMI from linear regression models, adjusted for age, sex, and antihypertensive medication, with underweight as the reference category is shown in Fig. 3. SBP and DBP showed a strong graded increase across the four categories of weight (from underweight to obese).

Finally, Fig. 4 shows the differences in BP according to the day of the week, from linear regression models adjusted for age, sex, and antihypertensive medication, using Mondays as a reference. Data were collected mainly on Wednesday (15.3%), and least on Sunday (3.4%). SBP and DBP were lower on Sunday and Saturday, compared with Monday, while no differences were found on Friday. The highest SBP was found on Tuesday while the highest DBP was found on Thursday.

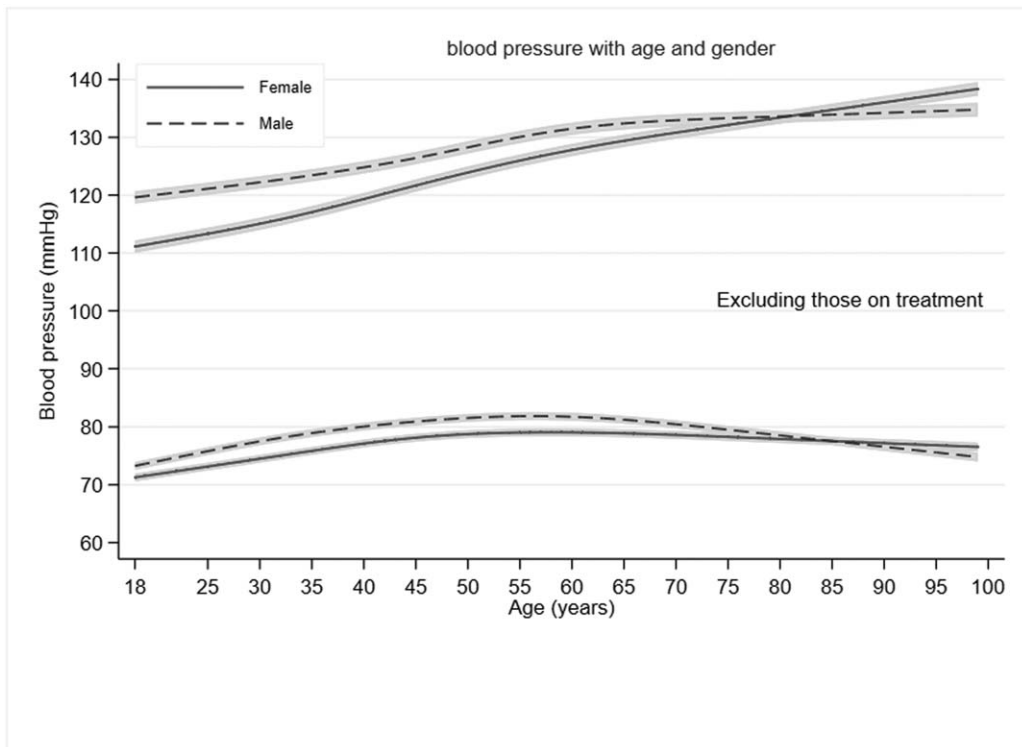


FIGURE 1 Blood pressure with age and sex.

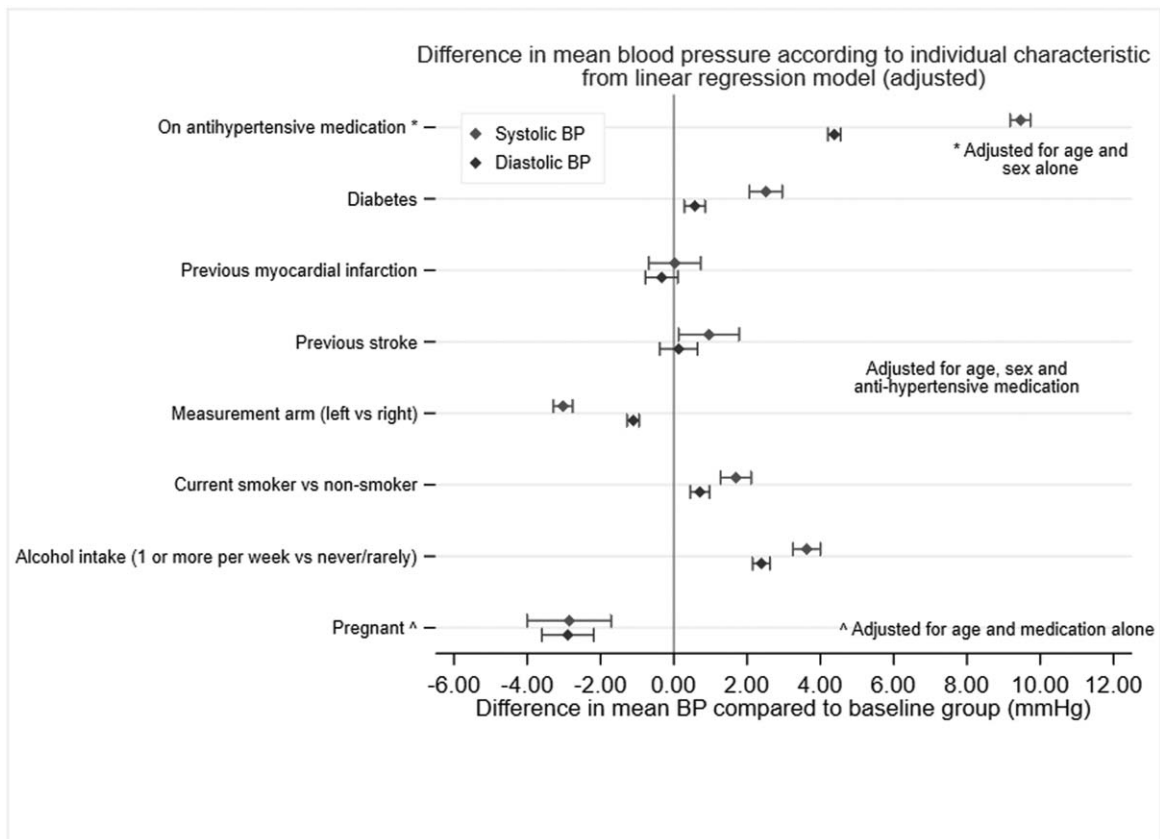


FIGURE 2 Difference in mean blood pressure according to individual characteristic from linear regression model (adjusted).

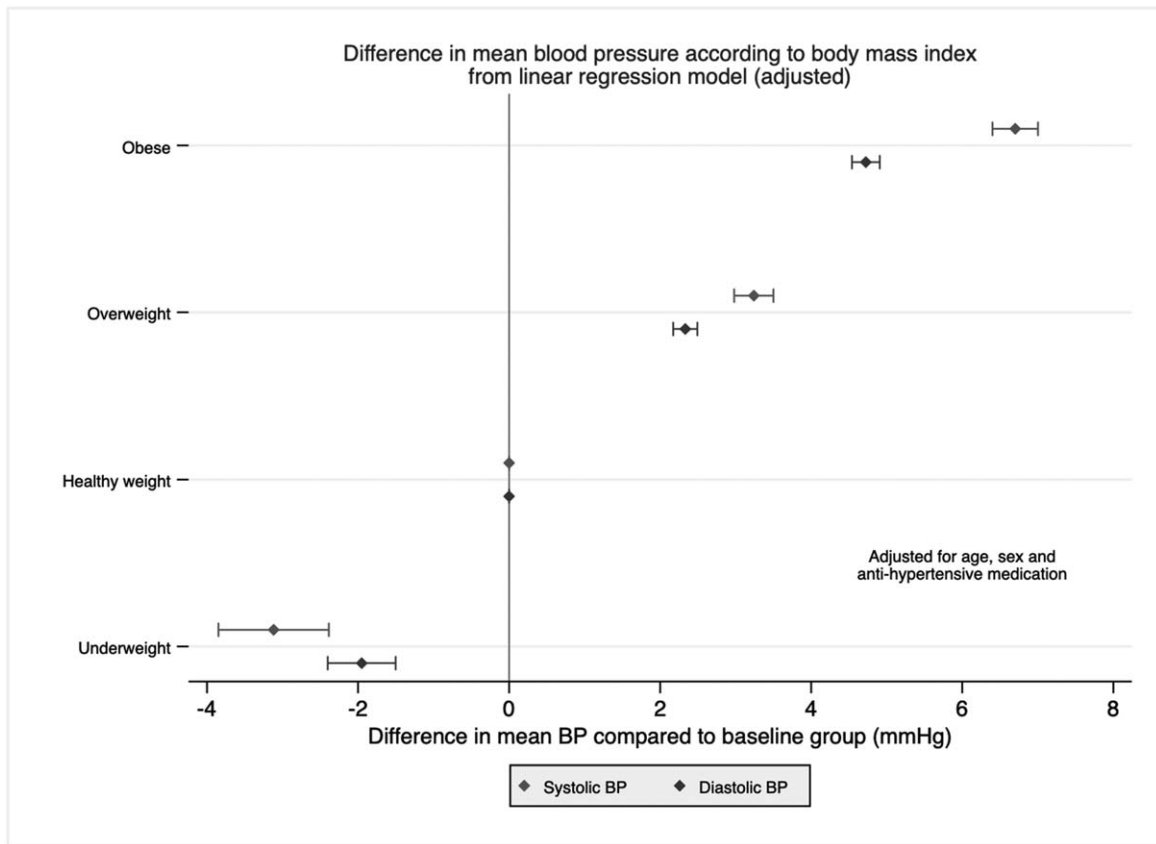


FIGURE 3 Difference in mean blood pressure according to BMI from linear regression model (adjusted).

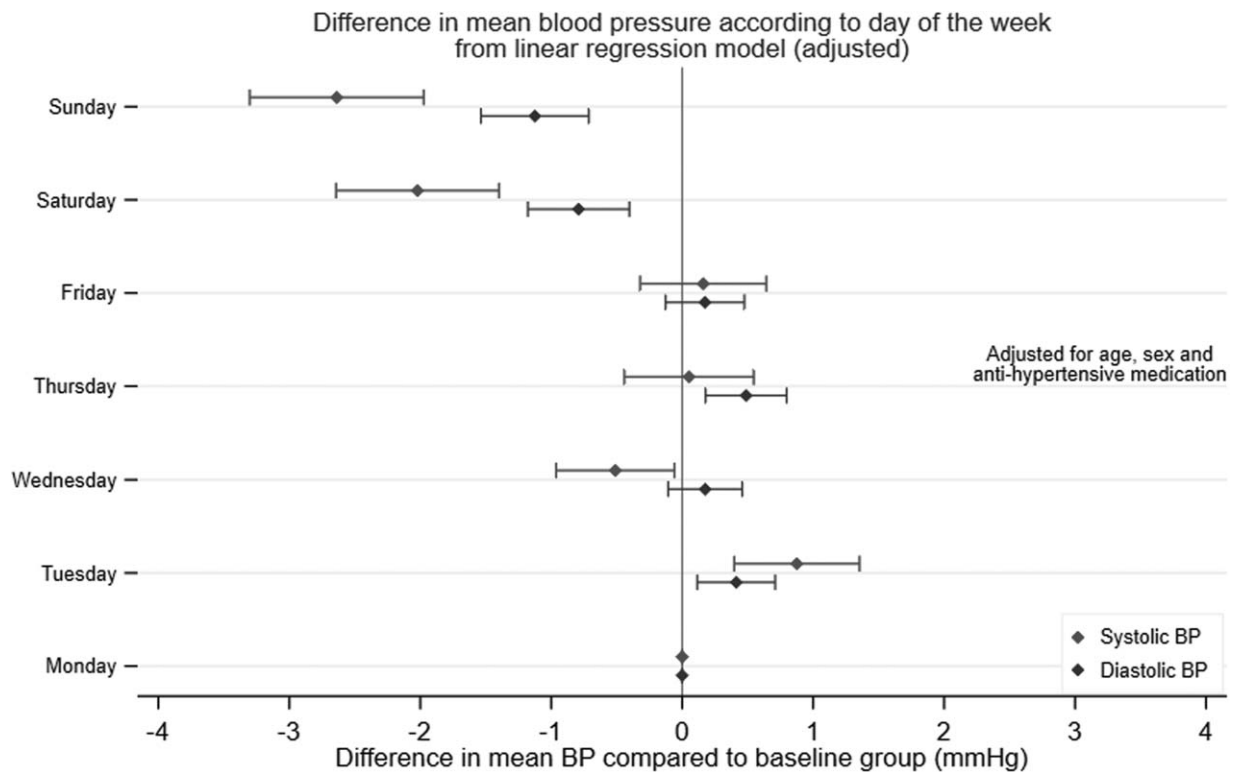


FIGURE 4 Difference in mean blood pressure according to day of the week from linear regression model (adjusted).

DISCUSSION

MMM 2017 in Latin America is the largest regional, international, and standardized screening campaign of a cardiovascular risk factor ever to be done. While systematic BP screening programs are lacking, particularly in Latin America and the Caribbean region, this inexpensive annual screening campaign could help offset the enormous health burden attributed to increased BP [1]. The MMM results will provide a paradigm change in the Latin American and Caribbean lifestyle, with more awareness about high BP and its associated risks.

The proportion of the participants with hypertension, treated and controlled (BP < 140/90 mmHg) is in line with data recently published in a prospective cohort [8], showing that SBP has been increasing over the years. This is certainly due to the risk factors we are constantly exposed to: stress, poor diet, sedentary lifestyle, smoking, and others [3,9]. The data from smokers and reported alcohol intake were noteworthy because they had low rates; we highlight that the question was unique, and there was no detail on the aspects of smoking and alcohol intake.

Variation in SBP by day of the week, presented lowest pressures on Saturday and Sunday, and highest BP on weekdays. This presumably relates levels of one or more environmental factors that exert a pressor effect on weekdays [9]. We have no data on active workers, nonworkers, students, and retirees in the sample, which could interfere with this result. The proportion of participants with hypertension (including those on treatment) in Latin America and the Caribbean has increased in recent years. Our data, which show 42 328 participants (40.4%) with hypertension, cannot be considered as a prevalence value when compared with those obtained in *Latin America as the Cardiovascular Risk Factor Multiple Evaluation in Latin America (CARMELA)* study [10,11], a multicenter observational representative study including 11 550 individuals from seven large cities which showed a prevalence of 18% (range between 9 and 29%, in an age group of 25–64 years). Moreover, in the PURE (Prospective Urban Rural Epidemiology) study [5,12], four countries from Latin America participated with 23 578 individuals in which ambulatory BP monitoring was used to evaluate hypertension prevalence. The values obtained were: 50.8% in Argentina, 52.6% in Brazil, 46.7% in Chile, and 37.5% in Colombia; generating a mean prevalence of around 46.9%. The MMM17 Latin America results, a study to assess hypertension awareness, cannot be compared with the results of CARMELA and PURE because they are epidemiological studies of hypertensive patients. The data collected in MMM were from participants recruited opportunistically, and therefore not intended to be based on representative samples of the countries where screening took place; hence true prevalence cannot be reported.

In conclusion, MMM 2017 was the largest BP screening campaign undertaken in Latin America. The high numbers of participants detected with hypertension and the relatively large proportion of participants on antihypertensive treatment but with uncontrolled hypertension reinforces the importance of this annual event in our continent, to raise awareness of the prevention of cardiovascular events.

These results suggest that opportunistic screening can identify significant numbers of individuals with raised BP and the campaign should continue to run annually as a vital contribution to raising the awareness of hypertension.

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Collaborators

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Barbados: Raphael Greenidge.

Brasil: Weimar S. Barroso, Andréa A Brandão, Audes D. M. Feitosa, Roberto Dischinger Miranda, Marco A. Mota-Gomes.

Chile: María S. García, Melanie Paccot.

Colombia: Johanna Otero, Paul A. Camacho, Sandra Rueda-Quijano, Luz María Gómez-Peña, Juan Felipe Gómez-Cuellar, Juan José Rey, Gregorio Sánchez, Claudia Narváez, José Luis Accini, Gustavo Aroca, Edgar Arcos, Iván Hernández, Henry García, Maritza Pérez, Clara Rocío Galvis, Dora Inés Molina, Carlos Mejía, María Eugenia Casanova, Luis García, Miguel Urina-Triana.

Ecuador: Estefani Jarrin, Maria Isabel Ramirez, Ruben Peñaherrera, Cecilia Mora, Yan Duarte, Oscar del Brutto, Elisa Avila, Estefani Jarrin, Jose Ruales, Juan Vintimilla, Fabricio Arteaga.

El Salvador: Evelyn Castellanos, Vilma de Romero.

Haiti: Emmanuela Delsoin.

Honduras: Nancy J. E. Torres, Brigitte Paiger.

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Conflicts of interest

There are no conflicts of interest.

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