

# May Measurement Month 2017-2019: an analysis of blood pressure screening results from Guatemala

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## KEYWORDS

Hypertension;  
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In 2018, the Ministry of Public Health and Social Assistance of Guatemala published the last update of the prevalence of noncommunicable diseases (NCDs), and as in other low-income countries, the prevalence of NCD morbidity and mortality had risen. The prevalence of hypertension in Guatemala has been reported in a range from 18.7 to 22.7% which could be underestimated, because the country does not have an adequate statistical surveillance system. May Measurement Month (MMM) 2017, 2018, and 2019 in Guatemala was an opportunistic survey, which followed the methodology previously published. Blood pressure (BP) measurements were carried out in various locations, mainly hospitals and clinics (48.9%) or pharmacies (34.2%) in Guatemala City. In all patients, three BP measurements were taken after 5 min of rest and sitting in the correct recommended position. The mean of the second and third BP measurements was used for the analyses. Multiple imputation was used to impute the missing readings, based on the global MMM data. After multiple imputation, of all 3265 participants, 43.4% had hypertension. Of all participants with hypertension, 74.7% were aware of their diagnosis, 69.2% were on antihypertensive medication, and 63.1% had controlled BP (<140/90 mmHg). Of all those with hypertension, 43.6% had controlled BP. MMM is the largest hypertension survey ever carried out globally. The MMM results from Guatemala reported here provide complementary and strong data on the impact of hypertension in the country and help to make hypertension visible as a priority health problem, which requires urgent solutions.

## Introduction

In 2018, the Ministry of Public Health and Social Assistance of Guatemala published the last update of the prevalence of noncommunicable diseases (NCDs), and as in other low-

income countries, the prevalence of NCD in morbidity and mortality had risen. A range of estimates of the prevalence of hypertension in Guatemala have been reported, from 18.7 to 22.7%. These figures could be underestimates because the country does not have an adequate statistical surveillance system.<sup>1,2</sup> In 2006, the Central American Diabetes Initiative (CAMDI), in conjunction with the Center for Disease Control and Prevention (CDC) and the Pan

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**Table 1** Total participants and percentages with hypertension, awareness, on medication and with controlled blood pressure

Total participants	Percentage (%) with hypertension	Percentage (%) of hypertensives aware	Percentage (%) of hypertensives on medication	Percentage (%) of those on medication with controlled BP	Percentage (%) of all hypertensives with controlled BP
3246	43.4	74.7	69.2	63.1	43.6

American Health Organization (PAHO), reported a 13% prevalence of high blood pressure (BP) in the city of Villa Nueva—the bedroom city of Guatemala. However, this reported prevalence of hypertension was probably unrealistic since many of its inhabitants were actually away from their workplaces at the time of the survey, and therefore the survey was not representative of the population residing in the community.<sup>3</sup> In our study carried out in the Guatemalan League of the Heart and San Juan de Dios General Hospital in 2008 (not published), we found a prevalence of 36% in a database including more than 115 000 patients, derived from the 22 Departments of Guatemala.

## Methods

May Measurement Month 2017, 2018, and 2019 in Guatemala was an opportunistic survey, which followed the methodology previously published.<sup>4,5,6</sup> BP measurements were carried out in various locations, mainly hospitals and clinics (48.9%), pharmacies (34.2%), or public areas (16.1%) in Guatemala City. Volunteer doctors performed physical measurements and medical students, or nurses trained in BP measurement also participated. Verbal authorization for the collection and use of the results received from the participants, without writing down personal identification data were obtained and when required advice on management information which had been translated into Spanish, was distributed to the participants. BP measurements were taken on the upper arm using validated semi-automatic measuring devices made by Omron and Microlife, following the BP measurement guidelines contained in the Latin America Society of Hypertension Guidelines for the Management of Arterial Hypertension.<sup>7,8</sup> Hypertension was defined as a systolic BP  $\geq 140$  mmHg or diastolic BP  $\geq 90$  mmHg or if the participant reported being on treatment for hypertension.<sup>4,7</sup> In all patients, three measurements were made after 5 min of rest and sitting in the correct recommended position. The mean of the second and third BP measurements were used for the analyses. For missing data, multiple imputations were used to impute the missing reading, based on the global MMM data.<sup>4,5,6</sup> Data were collected during 2017, 2018, and 2019 mainly via the Excel document or on the app provided and were analysed centrally by the MMM project management team. No funds were required for the present investigation, and all the medical and support staff donated their time in the sessions carried out.

## Results

The total number of participants screened in Guatemala was 3246, 59.6% of whom were female, and 98.8% of whom were recorded as ‘other’ ethnic backgrounds.

The mean age (SD) was 46.1 (17.0) years, and mean body mass index was 16.6 kg/m<sup>2</sup>, 13.2% had self-reported diabetes, 3.8% had suffered a myocardial infarction in the past, 2.3% a stroke, 9.0% declared that they were smokers, 3.4% drank alcohol at least once or more a week, 4.9% were on aspirin, and 4.4% were taking statins. Of all women, 4.0% reported being pregnant, and 8.2% had suffered hypertension in a previous pregnancy.

After multiple imputation, of all 3265 participants, 1408 (43.4%) had hypertension. Of all 1408 participants with hypertension, 974 (69.2%) were on antihypertensive medication, of whom 63.1% had controlled BP (<140/90 mmHg). Of all 1408 hypertensives, 43.6% had controlled BP. Of all 1290 participants with hypertension in 2018 and 2019, where data on awareness were collected, 964 participants (74.7%) were aware of their diagnosis. Of the treated patients from whom information was received, 68.1% were treated with monotherapy, 24.6% with double therapy, and 7.3% were on three or more drugs (Table 1).

## Discussion

Across three years of MMM campaigns, of all 3265 participants, over four in ten (43.4%) had hypertension. Of all participants with hypertension, one quarter was unaware of their diagnosis and seven in ten were on antihypertensive medication, but over half remained uncontrolled (56.4%).

These estimates are higher than those from the 2018 Hypertension in Guatemala study, which reported a prevalence that ranged between 18.7 and 22.7%. However, this may have been an underestimate because the country does not have an adequate statistical surveillance system.<sup>1,2</sup> In the MMM surveys, the mean BMI of the participants was unexpectedly low and may not reflect reality since the samples were not nationally representative. So this particular variable requires validation in future surveys of a nationally representative sample.

In 2006, the CAMDI in conjunction with the CDC and the PAHO, reported a 13% prevalence of hypertension in the city of Villa Nueva which is the bedroom city of Guatemala.<sup>3</sup> In a study carried out in the Guatemalan Heart League and San Juan de Dios General Hospital in 2008 (not published), we found a prevalence of 36% in a database including more than 115 000 patients arising from all over the country.

MMM is the largest hypertension survey ever carried out globally. The results from Guatemala provide additional complementary and strong data to the existing information on arterial hypertension in the country and

help to raise awareness and make hypertension visible as a priority health problem, which we still must solve. Convenience sampling in hospitals and clinics is likely to overestimate the true prevalence in the population. However, health systems are overburdened, and pragmatic solutions to a lack of screening are urgently needed, such as through the MMM campaigns.

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**Conflict of Interest:** None declared.

### Data availability

The author of this study makes the data obtained available for analysis and subsequent evaluation.

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