

May Measurement Month 2021: results of 31 national blood pressure screening programmes

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Background

Raised blood pressure (BP) remains the biggest risk factor contributing to the global burden of disease and mortality, leading to 10.8 million deaths every year.¹ In May 2017, the International Society of Hypertension (ISH) introduced the May Measurement Month (MMM) campaign, the first in a series of annual BP screening programmes with the aim of raising awareness of the importance of raised BP.

After the success of MMM 2017² which included over 1.2 million screenees from 80 countries, MMM expanded in 2018³ and 2019⁴ to include over 1.5 million screenees every year. However, in 2020, the MMM campaign was deferred due to the COVID-19 pandemic, and fewer people were screened in 2021.⁵

This supplement presents data from 31 individual countries that contributed to the global 2021 dataset. Countries were included on the basis that they had screened at least 1000 adults as part of the MMM 2021 campaign.

May Measurement Month 2021 summary

The methods and results of MMM 2021 were published in full elsewhere.⁵ As with the three previous MMM campaigns, 2021 was a cross-sectional opportunistic survey of the BPs of adults aged ≥ 18 years who wished to take part, but, in recognition of the variable impact of COVID-19 around the world, screening took place at any time between May and November 2021.

Three BP and pulse rate measurements were taken from participants at 1 minute intervals after being seated for at least 5 minutes. The mean of the second and third BP readings was used in analyses. An anonymized questionnaire was also completed, including data on demographics, medical history, lifestyle, and body weight.

Screening sites were established in a range of locations, including healthcare settings, public spaces, workplaces, and COVID-19 vaccination centres. The campaign was promoted centrally by MMM, the ISH, and the World Hypertension League through newsletters and social media. Campaigns were also promoted locally through television, radio, social media, and celebrity endorsements.

We screened 651 008 participants from 54 countries, of whom, after data cleaning, data from 642 057 participants were included in the analysis.⁵ Of these 642 057 participants, 225 882 (35.2%) were classified as having hypertension (systolic BP ≥ 140 mmHg and/or diastolic ≥ 90 mmHg—based on the mean of the second and third of three sitting BPs) or being on BP-lowering medication. Of those with hypertension, 128 238 (56.8%) were aware of having hypertension and 113 580 (50.3%) were on antihypertensive medication. Of those on antihypertensive medication, 61 231 (53.9%) had controlled BP ($<140/90$ mmHg), and of all hypertensives, 27.1% had controlled BP. Of all participants not taking antihypertensive medication, 112 302 (21.3%) had hypertension. In total, 164 651 (25.6%) of those screened had uncontrolled hypertension (untreated or inadequately treated).

These rates of awareness, treatment, and control were lower than those reported in MMM surveys carried out before the COVID-19 pandemic. Nevertheless, a history

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of having tested positive for COVID-19 or being vaccinated for COVID-19 was associated with trivial effects on BP levels.⁵

From global to national data in May Measurement Month 2021

In many countries participating in MMM surveys, the data collected on BP are often the largest and most recent estimates of the size of the BP problem and of the hypertension management cascade. As such, reports of the national MMM data represent an important record of BP-related statistics in those countries, although being based on non-representative samples. In addition, in all those countries where at least 1000 adults are screened, contemporary BP-related analyses are of sufficient size to allow internally valid investigations, despite being based on opportunistic convenience sampling. While all countries follow the same protocol, some of the details of the sampling method vary from year to year in each country and across countries in the same year. Consequently, comparisons of data across countries in any 1 year and in any one country over time should be made with caution.

Challenges for May Measurement Month 2021

The challenges for the 2021 campaign that prevailed in 2017 to 2019 remained but faded into insignificance alongside those experienced in 2021 due to the problems caused by the COVID-19 pandemic. In recognition of the variably large effect of the pandemic around the world, the screening period for MMM was extended to any time between May and November in those countries where the local MMM organizers considered it safe to do so. However, only 54 countries were able to take part in MMM 2021, compared with 92 countries in MMM 2019, and the numbers screened fell to 651 008 in 2021 from 1 508 130 in 2019.

Methodological issues

May Measurement Month uses a single standardized protocol that is used across all participating sites. Nevertheless, as with any survey data, non-response is an issue that impacts on the comparability between sites. The MMM21 questionnaire included 30 questions, of which 6 were mandatory across all sites, with the remaining 24 questions optional. Given the time constraints of completing the full questionnaire, some countries opted to implement shortened versions of the questionnaire, while participants may also have declined to answer certain questions, or data collection would have been terminated early. Because of this, results presented for some of the countries in this supplement may not be available for all countries. For example, Mexico did not collect information on the use of antihypertensive medication, and therefore, percentages on treatment could not be calculated (see [Table 1](#)). Additionally, India adapted the eligibility criteria to screen only those without pre-existing hypertension, and therefore, by definition, none of the study samples included participants on antihypertensive medication.

The impact of missing data on the comparability of results is the strongest for BP readings. Although the MMM protocol prescribed that ideally three BP readings should be measured, this was not possible in all cases, due to time and logistical constraints or participant preference. In previous iterations of the campaign, ~75% of participants had all three BP readings, but this improved in the MMM21 campaign, with 85.5% of participants having all three readings. Nevertheless, were we to compare individuals with one or two readings to those with three BP readings, it would lead to a large bias in the estimates of hypertension and BP control in those with missing readings, given the clear decline in average BP across subsequent repeated clinic-based BP readings, as shown in previous campaigns.²⁻⁴ For this reason, we used multiple imputation employing chained equations to give a best estimate of what the readings would have been had they been taken. Given the relatively small number of participants in each country, to ensure robustness, we did not rerun the imputations individually for each country but applied the imputations that we generated and described previously, based on the global data.⁵ To aid comparison, papers in this supplement give the headline estimates of proportions with hypertension and parameters of awareness, treatment, and control amongst them, using the imputed BP readings where these were missing.

Limitations of May Measurement Month 2021

The major limitation of this campaign was the greatly reduced number of participating screenees arising from only 54 countries. Nevertheless, MMM 2021 constituted the largest contemporary global evaluation of BP during the COVID-19 pandemic. In keeping with very reasonable requests from the MMM national leaders, to keep the questionnaire short, we were unable to collect more extensive information through the MMM questionnaire, and the collection of blood and urine samples was not feasible for logistic, financial, and acceptability reasons.

By virtue of the opportunistic convenience sampling used in MMM, the true national prevalence of hypertension in each country, region, and globally cannot be evaluated. However, the primary aim of MMM is not to evaluate the prevalence of hypertension, rather to promote awareness of the importance of BP and its measurement. Furthermore, importantly, analyses of associations shown between BP parameters and several variables remain internally valid. Because of the cross-sectional design, confirmation of the definitive diagnosis of hypertension and the follow-up of those detected as having raised BP are not possible.

Strengths and prospects for the May Measurement Month campaign

At a time when the care of chronic non-communicable disorders (NCDs) including hypertension was impaired due to competing interests caused by the COVID-19 pandemic, 165 000 adults with untreated or inadequately treated raised BP were identified in 54 countries by the MMM 2021 campaign. As such, it represents a unique database providing important information for each participating country and on the global control of hypertension.

Table 1 Summary results for the 31 countries included in this supplement: numbers screened in MMM21 (with comparison to MMM19) and parameters of hypertension awareness, treatment and control

Country	Total screened in MMM19 for comparison	Total screened in MMM21	Percentage of all participants with hypertension (%)	Percentage of hypertensives aware (%)	Percentage of hypertensives on medication (%)	Percentage of those on medication with controlled BP (%)	Percentage of all hypertensives controlled (%)
Albania	19 154	11 788	47.3	70.1	67.0	49.3	33.0
Argentina	94 523	26 070	54.4	79.8	76.9	55.3	42.5
Armenia	9818	5777	45.7	43.7	33.6	42.2	14.2
Australia	2877	1307	40.1	65.4	59.3	54.7	32.5
Bangladesh	24 941	28 355	39.5	78.8	65.6	66.8	43.8
Bulgaria	1596	3908	74.1	82.5	76.4	48.5	37.0
China	238 387	218 844	26.1	30.4	28.7	59.6	17.1
Democratic Republic of the Congo	29 857	20 913	14.0	35.8	28.0	50.4	14.1
Ecuador	15 885	1326	31.9	71.7	70.5	50.0	35.2
Georgia	13 267	4935	57.5	86.1	83.5	41.6	34.7
Ghana	7102	4832	29.5	11.9	8.6	24.2	2.1
Hungary	2766	1414	39.5	66.3	62.5	59.0	36.9
India	362 708	15 045	16.4	N/A	N/A	N/A	N/A
Kazakhstan	N/A	1763	31.5	41.8	34.0	46.6	15.8
Kenya	33 992	9738	28.2	45.9	42.0	50.3	21.1
Malawi	9723	7074	21.6	5.5	5.3	76.5	4.1
Mexico	39 700	77 547	19.3	48.0	N/A	N/A	N/A
Nepal	74 205	5161	21.1	37.1	27.6	56.7	15.6
Nigeria	3646	9361	34.1	53.3	48.2	36.4	17.6
Pakistan	6919	11 366	58.2	69.1	64.0	41.9	26.8
Paraguay	4301	3633	57.4	72.9	70.1	40.9	28.7
Philippines	89 941	59 655	44.9	53.9	48.4	43.5	21.1
Poland	7072	1699	30.9	60.6	51.4	59.6	30.6
Republic of the Congo	3157	2135	34.1	24.5	11.9	33.2	4.0
South Africa	4727	2294	30.8	48.6	43.5	49.6	21.5
Thailand	N/A	10 940	30.2	50.3	46.2	68.5	31.6
Uganda	N/A	1671	60.9	75.1	69.3	35.2	24.4
UK and Ireland	7311	1322	39.5	47.2	41.6	45.7	19.0
Venezuela	24 672	46 732	60.3	82.3	80.2	55.8	44.7
Vietnam	25 887	2572	36.1	78.9	77.8	42.6	33.1
Zimbabwe	666	2094	37.3	49.7	45.0	57.4	25.8

Given the adverse impacts of COVID-19 on the management of chronic NCDs such as hypertension, the need for systematic screening of BP is likely to increase rather than decrease. Therefore, as witnessed by the MMM 2022⁶ and MMM 2023 (data in communication) campaigns, the number of countries involved and the number of participants screened are expected to increase.

Meanwhile, because of the generous financial support received from many sources around the world and the workforce being almost exclusively volunteer-based, MMM surveys continue to be an inexpensive and very effective means of not only detecting untreated or inadequately treated raised BP but also directly engaging with the community to raise awareness. We shall continue to raise global awareness of the importance of BP measurement, and in the process, MMM provides a temporary substitute for systematic BP screening which is urgently needed in most countries of the world.

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Conflict of interest: none declared.

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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