

Supplementary Appendix

May Measurement Month 2022: results from the global blood pressure screening campaign

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Professor Barry J. McDonnell, Dr. Christopher J.A. Pugh, Professor John R. Cockcroft, Miss Abbie Williams

Zambia

Dr. Fastone Goma, Dr Dhruv Darji, Mr. Martin Katongo, Mr. Francis Mwansa, Ms. Annie Dinala, Ms. Annie Mubanga, Ms. Salome Funjo, Ms. Cynthia Chileshe, Ms. Lucy Chembe, Ms. Ethel Kampamba, Ms. Sylvia Sijamba, Ms. Womba Longwani, Ms. Flavia Luneta, Ms. Mirriam Kawangu, Mr. Bruce Mutakafimbo, Mr. Martin Nalikenka, Mr. Studio Madonda, Mr. Phillip Mambwe, Mr. Moses Katongo

Zimbabwe

Professor Jephath Chifamba, Dr. Rudo Gwini



MMM22 DATA CAPTURE FORM

PLEASE COMPLETE IN BLOCK CAPITALS ONLY, IN BLACK INK AND INSERT ONLY X IN THE CHECKBOX FIELDS **X**

THE SCREENING SITE	*1a	Name of Country:		*1b. Name of City/Town/Village:		
	2	Site ID and / or investigator email address:				
	3	Where is your screening site?	☐ Hospital/Clinic/Pharmacy ☐ Workplace ☐ Public area (indoors) ☐ Public area (outdoors) ☐ Home ☐ Other			
	*4	Date of measurement	/...../.....			
BY COMPLETING THIS FORM YOU ARE CONSENTING TO SHARE YOUR INFORMATION FOR ACADEMIC RESEARCH PURPOSES. IF YOU DO NOT KNOW THE ANSWER LEAVE BLANK. DO NOT RECORD ANY PERSONAL DATA THAT WOULD IDENTIFY THE PATIENT E.G NAME, ADDRESS						
ABOUT THE PARTICIPANT	*5	How old are you in years? (Estimate if unknown)		Yrs	☐ Mark with X if estimated	
	*6	What is your sex?		☐ Male ☐ Female ☐ Other		
	7	Ethnicity** (self-declared)	☐ Black ☐ White ☐ South Asian ☐ East/South East Asian ☐ Middle Eastern ☐ Mixed ☐ Other			
	8	When did you last have your blood pressure (BP) measured?		☐ Never ☐ Over 12 months ago ☐ Within the last 12 months		
	9	Have you participated in MMM at least once before?		☐ Yes ☐ No		
	*10	Have you ever been diagnosed with high BP by a health professional (except in pregnancy)?		☐ Yes ☐ No		
	*10a	If yes, at what age were you diagnosed?		Yrs		
	11	How many drug classes are you currently taking for your BP?***		☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5+ ☐ Don't know		
	12	Do you usually pay fees for your consultations when you get your BP treated?		☐ Pay nothing ☐ Pay part ☐ Pay fully ☐ Not sure if part or fully paid		
	13	Do you usually pay fees for your medications when you get your BP treated?		☐ Pay nothing ☐ Pay part ☐ Pay fully ☐ Not sure if part or fully paid		
	14	Do you take your BP medication regularly? If not - why? (Tick all that apply)		☐ I do ☐ Too expensive ☐ Not easily available ☐ Side effects ☐ Only take them when I need them ☐ Prefer alternative medicine ☐ I forget		
	15	Are you currently taking the following medications?	a) Statin ☐ Yes ☐ No ☐ Don't know c) Warfarin/oral anticoagulant (blood thinners) ☐ Yes ☐ No ☐ Don't know	b) Aspirin ☐ Yes ☐ No ☐ Don't know		
	16	If female, are you pregnant?		☐ Yes ☐ No		
	17	If female, have you had raised BP in this or a previous pregnancy?		☐ Yes ☐ No		
	18	If female, are you currently taking....	a) Hormonal contraception ☐ Yes ☐ No	b) Hormone replacement treatment (HRT) ☐ Yes ☐ No		
	19	Do you use tobacco? (including chewing tobacco, cigars and pipes)		☐ Yes ☐ No – but I did in the past ☐ Never		
	20	Do you consume alcohol?		☐ Never/rarely ☐ 1-3 times per month ☐ 1-6 times per week ☐ Daily		
	21	Have you been diagnosed as having diabetes by a health professional (except in pregnancy)?		☐ Yes ☐ No		
	22	Have you ever experienced or been diagnosed as having...	a) Heart attack ☐ Yes ☐ No c) Heart failure ☐ Yes ☐ No	b) Stroke ☐ Yes ☐ No d) Irregular heartbeat ☐ Yes ☐ No		
	23	Have you had a positive test for COVID-19? If so, when?		☐ No Yes: ☐ 0-3 mths ago ☐ 3-6mths ☐ 6-9mths ☐ 9-12mths ☐ >12 mths		
	23a	If you answered YES to Q23, how long did your symptoms persist?		☐ 0-3 mths ☐ 3-6mths ☐ 6-9mths ☐ 9-12mths ☐ >12 mths		
	24	Have you received the COVID-19 vaccination?		☐ No ☐ Yes – 1 st ☐ Yes – 1 st and 2 nd ☐ Yes – 1 st , 2 nd , 3 rd		
	25	Do you take part in at least 150 mins of moderate exercise (brisk walking) or 75 mins of more vigorous exercise per week?		☐ Yes ☐ No		
	26	How many years of education do you have?		☐ 0 ☐ 1-6 years ☐ 7-12 years ☐ over 12 years		
	MEASUREMENTS	27	Weight (estimate if not measured)	Kilograms (kg) OR Pounds (lbs)	☐ Mark with X if estimated	
		28	What was your birthweight?	Kilograms (kg) OR Pounds (lbs)	☐ Don't know	
29		What is the manufacturer of the BP machine being used?		☐ OMRON ☐ Other		
*30		1 st measurement	Systolic Blood Pressure (SBP)	Diastolic Blood Pressure (DBP)	Pulse	Was the pulse regular? ☐ Yes ☐ No
		2 nd measurement				☐ Yes ☐ No
		3 rd measurement				☐ Yes ☐ No
IF YOUR COUNTRY IS TAKING PART IN THE ATRIAL FIBRILLATION SUB STUDY PLEASE COMPLETE THE QUESTIONS BELOW						
AF	31	Was Atrial Fibrillation detected in the current assessment?		☐ Yes ☐ No		
	32	Have you ever been diagnosed as having Atrial Fibrillation by a health professional before?		☐ Yes ☐ No		

*These questions must be answered in order to be submitted for May Measurement Month

** South Asian – with origins from: India, Pakistan, Bangladesh, Nepal, Bhutan, Maldives and Sri Lanka. East and South-East Asian – With Origins from any countries east of the Indian sub-continent.

*** This means how many types of medications are being taken i.e. – ACE-inhibitors, ARBs, diuretics, beta-blockers, calcium channel blockers, alpha-blockers, others. If you are unsure, please enter the number of different tablets each day. (If you are taking 1 tablet twice a day, this counts as 1).

† N/A = Not applicable



MayMeasure.org

OUR TOP TIPS FOR HEALTHY BLOOD PRESSURE

THANK YOU FOR BEING PART OF MAY MEASUREMENT MONTH.

For more information visit
www.maymeasure.org

If you have concerns,
please seek advice from a
trained medical professional.



#TheBigSqueeze

- www.facebook.com/MayMeasure
- [@MayMeasureOrg](https://twitter.com/MayMeasureOrg)
- [maymeasureorg](https://www.instagram.com/maymeasureorg)



MAINTAIN A HEALTHY WEIGHT
Just doing this can help
bring down high blood pressure.



EXERCISE REGULARLY
Aim for an average of 30
minutes a day. For the
exercise to be worthwhile, you need
to feel warmer, breathe harder,
and your heart needs to beat faster
than it normally does.



**EAT PLENTY OF FRUIT AND/OR
VEGETABLES EVERY DAY**
Eat vegetables raw or
lightly steamed, rather than boiled,
to get maximum nutrition. Avoid
frying where possible.



ADD BEETROOT TO YOUR DIET
Regular consumption of
beetroot juice has been
found to help reduce your blood
pressure.



CUT DOWN ON SALT
Reduce your intake of salt.
Don't forget a lot of salt
is hidden in processed foods and is
very high in most breads, cereals,
soups and sauces. If possible, always
read the label. Eating a low-fat diet
that includes lots of fibre, such as
bread, pasta, rice and wholegrains
has also been found to help reduce
blood pressure.



CUT DOWN ON FAT AND SUGAR
Always check the label on
foods where possible and be
especially wary of hydrogenated or
'trans' fats, as well as sugars
'hidden' as other names such as
sucrose, dextrose, fructose, and
glucose. These can be commonly found
in items such as fruit juices and
fizzy drinks.



STOP SMOKING TOBACCO
Your arteries clog up even
faster if you smoke and this
causes many other health problems.
Your blood pressure actually rises
while you smoke.



REDUCE YOUR CAFFEINE INTAKE
Remember caffeine is found
in some fizzy drinks as well
as in coffee and tea.



DON'T DRINK TOO MUCH ALCOHOL
Stick to local daily
recommendations - usually
less than 2 drinks for men and 1 for
women (1 drink = small beer or wine).



REGULAR CHECK UPS
Have your blood pressure
measured by a trained
medical professional regularly.



RELAX
Stress contributes to
raising blood pressure.
So, avoid stress where possible
and allow time for relaxation.

DATA CLEANING RULES

Rules for cleaning continuous variables and dates.

Updated June 2023

Weight (weight and scale variables)

Upper limit: 160.0kg (25.2 stone, 353lbs)

Lower limit: 30.0kg (4.72 stone, 66lbs)

Extract measurement scale from measurement string if missing

Assume recorded in kg if unit of measurement missing

Convert all values to kg, then correct values:

Replace weight/1,000 if weight > 30,000

Replace weight/100 if weight > 3,000

Replace weight/10 if weight > 300

Exclude values > 160 or < 30

Birth weight

Upper limit: 5.5kg (based on Blencowe *et al* (2019))¹

Lower limit: 1.0kg

Extract measurement scale from measurement string if missing

Assume birth weight recorded in kg if unit of measurement missing

Replace birth weight/1,000 if birth weight > 1,000

Survey date

Assume format DD/MM/YYYY as specified on template

If month ≥ 13 then switch D & M

Exclude dates where day > 31, or >30 in months of April, June, September or November, or >28 in February

Age

Upper limit: 99 years (set ages > 99 to missing)

Lower limit: 18 years (drop participants < 18)

Set entries with age > 99 to missing

Exclude participants from study if age recorded as < 18

Systolic blood pressure

Upper limit: 260 mmHg

Lower limit: 80 mmHg

Multiply by 10 entries ≥ 8 and ≤ 26

Divide by 10 entries ≥ 1,200 & ≤ 2,600

Exclude entries outside of above range

Diastolic blood pressure

Upper limit: 160 mmHg

Lower limit: 40 mmHg

Multiply by 10 entries ≥ 4 and ≤ 16

Divide by 10 entries ≥ 400 & ≤ 1,500

Exclude entries outside of above range

Swap SBP and DBP if DBP ≥ SBP

Drop SBP where DBP missing and vice versa

Drop entries all BP readings missing

Heart rateUpper limit: 120 bpmLower limit: 30 bpmMultiply by 10 entries ≥ 3 and ≤ 12 Divide by 10 entries ≥ 300 & $\leq 1,200$

Exclude entries outside of above range

Sex and pregnancy/hypertension in pregnancy/hormone replacement therapy/hormonal contraception

Set to 'no' if gender = 'male' or 'other'

Antihypertensive medication status and number of medication classesIf medication classes = '0', medication status set as 'no'; if medication classes ≥ 1 , medication status set as 'yes';

if medication classes missing, medication status set as missing

Last BP measurement

If last BP measurement 'never' and known hypertension or medication = 'yes', set last BP measurement as missing

STATISTICAL ANALYSES

Of 765,718 participants in MMM22, 76.9% had three individual blood pressure (BP) readings. For 52,147 participants individual readings were not submitted and instead the average of the second and third readings was submitted. A total of 640,987 (83.7%) participants had either all three individual readings or the average of the second and third readings was submitted instead of individual readings.

Table S1 – Number of BP readings per participant

Readings per participant	N	perc % of 765,718
0 (average of readings 2 and 3 submitted only)	52,147	6.8
1	41,275	5.4
2	83,456	10.9
3	588,840	76.9

Multiple imputation

To provide comparable estimates of BP and hypertension across all participants surveyed, multiple imputation by chained equations was used to impute missing BP readings. The pattern of missing BP readings was assumed missing at random dependent on the observed data, given the known relationships between variables surveyed and mean BP, as well as the tendency for BP to decrease across subsequent readings (Table S2). Multiple imputation was performed on the core 715,518 MMM22 participants only; data from ZOE participants was not included in the imputation nor analysis of imputed data.

Table S2 – Mean BP and corresponding number and proportion of participants with hypertension based on the mean of each reading of 588,840 participants with three individual BP readings.

BP reading	Mean systolic BP (mmHg)	Mean diastolic BP (mmHg)	Number with hypertension	Percentage with hypertension
1	126.4	80.7	232,986	39.6%
2	124.6	79.6	217,743	37.0%
3	123.6	78.9	210,161	35.7%
Mean of 1 & 2	125.5	80.2	217,147	36.9%
Mean of 2 & 3	124.1	79.2	211,105	35.9%
Mean of 1 & 2 & 3	124.9	79.7	209,665	35.6%

A ‘complete’ model was created for those with no missing data in age, sex, ethnicity or antihypertensive medication use. Participants with a sex recorded as ‘other’ were excluded to small numbers in this group. The following variables were included: age, sex, an interaction between age and sex, ethnicity, antihypertensive medication use, known hypertension, diabetes, myocardial infarction, stroke, heart failure, irregular heartbeat, physical activity, alcohol intake, smoking status, weight, country income, pregnancy status, hypertension in a previous pregnancy, screening site type along with each of the three systolic BP, diastolic BP and heart rate (HR) measurements, and the mean of the second and third BP and HR readings. Age was included as a restricted cubic spline with five knots to allow flexibility to modelling its relationship and weight was included along with a quadratic term.

A second, ‘partial’ imputation model was created for those participants missed one or more of age, sex, ethnicity or antihypertensive medication use, or if sex was recorded as ‘other’. The partial model included each systolic BP and diastolic BP reading, along with the mean of the second and third BP readings.

Fifteen imputations were created for both the complete and partial models, corresponding to the percentage of participants missing data on the average of the second and third BP readings. The Monte Carlo errors of estimates were <10% of their standard errors indicating sufficient precision¹. A burn-in of 25 iterations was chosen based on inspection of trace plots which indicated chains had converged. Results from each imputation set were combined using Rubin’s combination rules.

A combined model was created which used imputations from the complete model where possible, but imputations from the partial model where the complete model could not impute data for a participant.

To demonstrate the impacts differing missing data assumptions and of excluding participants with missing data, Table S5 presents a comparison of the complete case analysis with each of the imputation models:

1.

The complete case sample only (those with a mean of BP readings 2 and 3).
2.

The partial multiple imputation model including BP readings for all participants.
3.

The complete multiple imputation model as described above for male or female individuals with complete data on age, gender, ethnicity and anti-hypertensive medication use.
4.

The combined model, including imputations for individuals from the partial model, where readings could not be imputed from the full model.

Results were similar across the imputation models, and the combined model was used as the primary analysis (Table S5).

Table S3 – Mean systolic and diastolic BP and percentages with raised BP comparing the complete case to the partial, complete, and combined imputation models

Model	Total in analysis	Mean systolic BP (mmHg)	Mean diastolic BP (mmHg)	Percentage with raised BP			Percentage Hypertensive
				Overall	Of those not on medication	Of those on medication	
Complete case*	591,945	124.1	79.2	25.8%	20.5%	47.6%	35.9%
Partial model	715,518	124.9	79.3	26.7%	22.2%	47.1%	36.1%
Complete model	651,995	124.3	79.3	25.8%	20.7%	47.1%	36.0%
Combined model	715,518	124.8	79.3	26.6%	22.2%	47.1%	36.0%

*The average of the 2nd and 3rd readings was provided or could be calculated.

Measures of association

Regression analyses were conducted to identify associations between risk factors and systolic or diastolic BP. Separate linear mixed models of diastolic or systolic BP were run for each risk factor with country of survey incorporated as a random intercept. Models were created using data from participants with complete information for the focal risk factor, as well as age, sex, and antihypertensive medication use, and where the participant’s sex was not ‘other’. Age was incorporated as a restricted cubic spline with 5 knots and allowed to interact with sex.

ZOE Data

In addition to the routine MMM data collection, BP data was sourced from participating users of the ZOE app in the United Kingdom. ZOE app participants similarly completed three BP measurements but filled in a reduced questionnaire. ZOE data was supplied as average BP readings grouped by cohorts defined by age group, gender, hypertension diagnosis, antihypertensive medication status, and raised BP status (based on the average of the second and third BP readings). The midpoint of each age group (23.5, 34.5, 44.5, 54.5, 64.5, 80) was used where a linear age term was required for descriptive statistics and age-sex standardisation.

References

1. White IR, Royston P, Wood AM, Multiple imputation using chained equations: Issues and guidance for practice. *Statistics in Medicine*. 2010; 30:4.

SUPPLEMENTARY TABLES

Table S4 – Participant mean age, sex distribution and percentage on antihypertensive medication by region and country.

Region and country	Total participants	Percentage	Mean age (SD) in years	Females*	Males*	On anti-hypertensive medication
Americas	200,923	26.2%	52.2 (17.6)	115,971 (57.7%)	84,223 (41.9%)	52,437 (26.1%)
Argentina	50,967	6.7%				
Barbados	137	<0.1%				
Brazil	11,544	1.5%				
Colombia	38,924	5.1%				
Dominican Republic	309	<0.1%				
Guatemala	375	<0.1%				
Mexico	41,953	5.5%				
Paraguay	10,475	1.4%				
Venezuela	46,239	6.0%				
East Asia	190,823	24.9%	46.0 (16.2)	94,967 (49.8%)	95,789 (50.1%)	11,889 (6.2%)
China	188,975	24.7%				
Mongolia	1,848	0.2%				
Europe	114,456	14.9%	59.6 (16.3)	70,726 (61.8%)	43,447 (38.0%)	38,027 (33.3%)
Albania	12,348	1.6%				
Armenia	11,618	1.5%				
Azerbaijan	1,083	0.1%				
Belgium	788	0.1%				
Bulgaria	1,948	0.3%				
Denmark	24	<0.1%				
France	1,177	0.2%				
Georgia	8,538	1.1%				
Greece	6,366	0.8%				
Hungary	1,770	0.2%				
Italy	1,612	0.2%				
Kazakhstan	2,133	0.3%				
Lithuania	139	<0.1%				
Poland	829	0.1%				
Portugal	245	<0.1%				
Republic of Ireland	2,227	0.3%				
Slovakia	1,680	0.2%				
Slovenia	6,280	0.8%				
Spain	464	0.1%				
United Kingdom	51,007	6.7%				
Uzbekistan	2,180	0.3%				

Northern Africa and Middle East	23,075	3.0%	39.7 (15.9)	13,142 (57.0%)	9,925 (43.0%)	3,474 (15.1%)
Algeria	1,386	0.2%				
Iran	1,000	0.1%				
Libya	3,088	0.4%				
Oman	1,550	0.2%				
Sudan	16,051	2.1%				
South Asia	91,475	11.9%	43.3(16.4)	42,064 (46.0%)	49,069 (53.6%)	13,399 (14.6%)
Bangladesh	16,544	2.2%				
India	61,811	8.1%				
Nepal	13,120	1.7%				
South-east Asia and Australasia	66,575	8.7%	47.7 (16.1)	39,633 (59.5%)	26,872 (40.4%)	18,273 (27.4%)
Australia	1,317	0.2%				
Philippines	42,526	5.6%				
Singapore	374	<0.1%				
Thailand	10,562	1.4%				
Vietnam	11,796	1.5%				
Sub-Saharan Africa	78,391	10.2%	41.9 (16.4)	42,853 (54.7%)	35,023 (44.7%)	7,617 (9.7%)
Equatorial Guinea	11	<0.1%				
Ghana	3,654	0.5%				
Guinea-Bissau	232	<0.1%				
Kenya	9,605	1.3%				
Malawi	20,461	2.7%				
Mauritius	8,953	1.2%				
Mozambique	8,276	1.1%				
Niger	4,288	0.6%				
Nigeria	5,798	0.8%				
Republic of Congo	8,619	1.1%				
Sierra Leone	818	0.1%				
South Africa	4,602	0.6%				
Uganda	2,414	0.3%				
Zambia	56	<0.1%				
Zimbabwe	604	0.1%				
Worldwide	765,718	100.0%	48.8 (17.6)	419,356 (54.8%)	344,348 (45.0%)	145,161 (19.0%)

Table S5 – Participant characteristics screened in MMM22

Participant characteristic		Total participants	Percentage including unknown (%)	Percentage excluding unknown (%)
Age (years)	Mean (SD)		48.8 (17.6)	
	18-29	133,840	17.5	17.5
	30-39	123,780	16.2	16.2
	40-49	129,437	16.9	16.9
	50-59	141,285	18.5	18.5
	60-69	134,115	17.5	17.5
	70 or more	103,261	13.5	13.5
Sex	Female	419,356	54.8	54.9
	Male	344,348	45.0	45.1
	Other	410	0.1	0.1
	Unknown	1,604	0.2	
Ethnicity	South Asian	99,032	12.9	15.6
	Black	74,091	9.7	11.7
	East/Southeast Asian	256,881	33.5	40.6
	White	84,665	11.1	13.4
	Other	48,624	6.4	7.7
	Mixed	64,015	8.4	10.1
	Middle Eastern	5,849	0.8	0.9
	Unknown	132,561	17.3	
Previous diagnosis of hypertension	No	544,415	71.1	73.8
	Yes	193,757	25.3	26.2
	Unknown	27,546	3.6	
Previous diagnosis of diabetes	No	574,025	75.0	92.3
	Yes	47,914	6.3	7.7
	Unknown	143,779	18.8	
Previous myocardial infarction	No	629,931	82.3	97.8
	Yes	14,082	1.8	2.2
	Unknown	121,705	15.9	
Previous stroke	No	636,379	83.1	98.8
	Yes	7,454	1.0	1.2
	Unknown	121,885	15.9	
Previous diagnosis of irregular heartbeat	No	591,041	77.2	95.6
	Yes	27,347	3.6	4.4
	Unknown	147,330	19.2	
Previous heart failure	No	599,602	78.3	98.7
	Yes	7,973	1.0	1.3
	Unknown	158,143	20.7	
Meet WHO physical activity recommendations	No	428,953	56.0	67.7
	Yes	204,709	26.7	32.3
	Unknown	132,056	17.2	

Years of formal education	0 years	48,191	6.3	7.8
	1-6 years	109,341	14.3	17.7
	7-12 years	230,538	30.1	37.3
	Over 12 years	229,369	30.0	37.1
	Unknown	148,279	19.4	
Current smoker	No	582,773	76.1	89.8
	Yes	66,313	8.7	10.2
	Unknown	116,632	15.2	
Alcohol intake	Never/Rarely	510,768	66.7	78.9
	1-3 times per month	94,713	12.4	14.6
	1-3 times per week	33,524	4.4	5.2
	Daily	8,127	1.1	1.3
	Unknown	118,586	15.5	
Pregnant*	No	307,644	73.4	97.5
	Yes	7,981	1.9	2.5
	Unknown	103,731	24.7	
Hypertensive in previous pregnancy*	No	292,479	69.7	94.2
	Yes	18,063	4.3	5.8
	Unknown	108,814	25.9	
Hormonal contraception use*	No	278,549	66.4	93.5
	Yes	19,443	4.6	6.5
	Unknown	121,364	28.9	
Hormone replacement treatment (HRT) use*	No	285,712	68.1	97.4
	Yes	7,643	1.8	2.6
	Unknown	126,001	30.0	
On aspirin	No	517,019	67.5	91.9
	Yes	45,448	5.9	8.1
	Unknown	203,251	26.5	
On statin	No	513,284	67.0	91.1
	Yes	50,442	6.6	8.9
	Unknown	201,992	26.4	
On anticoagulant	No	524,175	68.5	98
	Yes	10,736	1.4	2.0
	Unknown	230,807	30.1	
Payment for consultations and/or medication	Pay nothing	125,039	16.3	54.4
	Pay at least something	104,704	13.7	45.6
	Unknown	535,975	70	
Payment for consultations	Pay nothing	161,344	21.1	71.3
	Pay part	24,368	3.2	10.8
	Pay fully	38,006	5.0	16.8
	Not sure if part or fully paid	2,662	0.3	1.2
	Unknown	539,338	70.4	
Payment for medication	Pay nothing	113,380	14.8	54
	Pay part	30,979	4.0	14.7

	Pay fully	46,723	6.1	22.2
	Not sure if part or fully paid	19,066	2.5	9.1
	Unknown	555,570	72.6	
Previous COVID-19 vaccination	No	84,101	11.0	13.2
	Yes	552,350	72.1	86.8
	Unknown	129,267	16.9	
1 dose of COVID-19 vaccination	No	118,847	15.5	18.7
	Yes	517,610	67.6	81.3
	Unknown	129,261	16.9	
2 doses of COVID-19 vaccination	No	148,418	19.4	23.3
	Yes	488,039	63.7	76.7
	Unknown	129,261	16.9	
3 doses of COVID-19 vaccination	No	300,173	39.2	47.2
	Yes	336,284	43.9	52.8
	Unknown	129,261	16.9	
Previous positive test for COVID-19	No	529,526	69.2	83.3
	Yes	105,930	13.8	16.7
	Unknown	130,262	17.0	
Date of previous positive test for COVID-19 [§]	0-3 months ago	23,197	21.9	23.3
	3-6 months ago	14,636	13.8	14.7
	6-9 months ago	14,474	13.7	14.5
	9-12 months ago	16,083	15.2	16.2
	Over 12 months ago	31,097	29.4	31.3
	Unknown	6,443	6.1	
Duration of COVID-19 symptoms [§]	0-3 months	78,492	74.1	80.3
	3-6 months	9,604	9.1	9.8
	6-9 months	3,933	3.7	4.0
	9-12 months	1,949	1.8	2.0
	Over 12 months	3,732	3.5	3.8
	Unknown	8,220	7.8	
On antihypertensive medication	No	559,695	73.1	79.4
	Yes	145,161	19.0	20.6
	Unknown	60,862	7.9	
Number of anti-hypertensive medication classes [^]	1	66,939	46.1	53.1
	2	43,193	29.8	34.3
	3	12,100	8.3	9.6
	4	3,309	2.3	2.6
	5 or more	566	0.4	0.4
	Unknown	19,054	13.1	
Take antihypertensive medication regularly [^]	No	16,994	11.7	14.5
	Yes	100,080	68.9	85.5
	Unknown	28,087	19.3	
Do not take their medication regularly as it is too expensive [^]	No	100,080	68.9	97.7

	Yes	2,401	1.7	2.3
	Unknown	42,680	29.4	
Do not take their medication regularly as it is not easily available^	No	100,080	68.9	97.4
	Yes	2,636	1.8	2.6
	Unknown	42,445	29.2	
Do not take their medication regularly due to its potential side effects^	No	100,080	68.9	99.4
	Yes	586	0.4	0.6
	Unknown	44,495	30.7	
Do not take their medication regularly as only take them when needed^	No	100,080	68.9	93.2
	Yes	7,246	5.0	6.8
	Unknown	37,835	26.1	
Do not take their medication regularly as prefer alternative medication^	No	100,080	68.9	99.0
	Yes	981	0.7	1.0
	Unknown	44,100	30.4	
Do not take their medication regularly due to forgetfulness^	No	100,080	68.9	97.5
	Yes	2,549	1.8	2.5
	Unknown	42,532	29.3	
Mean of 2 nd and 3 rd heart rate readings	Mean (SD)	77.5 (11.2)		
	<60	19,711	2.6	3.4
	60-69	117,615	15.4	20.1
	70-79	204,083	26.7	34.8
	80-89	158,573	20.7	27.1
	90-99	64,542	8.4	11.0
	100 or more	21,187	2.8	3.6
	Unknown	180,007	23.5	
Weight (Kg)	Mean (SD)	68.9 (14.8)		
	<50 kg	35,061	4.6	6.4
	50-59kg	112,885	14.7	20.7
	60-69kg	153,368	20.0	28.1
	70-79kg	122,448	16.0	22.5
	80-89kg	74,857	9.8	13.7
	90-99kg	28,629	3.7	5.3
	100kg or more	17,701	2.3	3.2
	Unknown	220,769	28.8	
Birth weight (Kg)	Mean (SD)	3.0 (0.7)		
	Unknown	715,344	93.4	
Country income	Low income	52,596	6.9	6.9
	Lower middle income	180,491	23.6	23.6

	Upper middle income	454,645	59.4	59.4
	High income	77,986	10.2	10.2
Participant in previous MMM campaign	No	576,977	75.4	93.1
	Yes	42,636	5.6	6.9
	Unknown	146,105	19.1	
Last BP measurement	Never	141,412	18.5	22.1
	Within the last 12 months	117,055	15.3	18.3
	Over 12 months ago	382,366	49.9	59.7
	Unknown	124,885	16.3	
Day of the week of screening	Sunday	54,140	7.1	8.3
	Monday	116,685	15.2	17.8
	Tuesday	108,263	14.1	16.5
	Wednesday	101,747	13.3	15.5
	Thursday	100,321	13.1	15.3
	Friday	111,638	14.6	17.0
	Saturday	61,979	8.1	9.5
	Unknown	110,945	14.5	
Location of screening site	Hospital/Clinic/Pharmacy	350,639	45.8	55.7
	Public area (outdoors)	85,000	11.1	13.5
	Public area (indoors)	64,357	8.4	10.2
	Workplace	67,391	8.8	10.7
	Other	13,268	1.7	2.1
	Home	49,236	6.4	7.8
	Unknown	135,827	17.7	

*Percentage given of females

^Percentage given of those on antihypertensive medication

§Percentage given of those with a previous positive test for COVID-19

Supplementary Table S6 –Worldwide and regional estimates of percentage with hypertension, awareness, on treatment and controlled of 765,718 participants.*

Region	Number with hypertension	Percentage of total participants with hypertension (%)	Percentage of hypertensives aware (%)	Percentage of hypertensives on medication (%)	Percentage of those on medication with BP <140/90 mmHg (%) ^β	Percentage of those on medication with BP <130/80 mmHg (%)	Percentage of all hypertensives with BP <140/90 mmHg (%) ^β	Percentage of all hypertensives with BP <130/80 mmHg (%)
Americas	86,632	43.1	75.5	60.5	60.3	28.6	36.5	17.3
East Asia	50,830	26.6	24.1	23.4	58.1	29.2	13.6	6.8
Europe (including ZOE)	56,389	49.3	73.8	67.5	55.6	37.4	37.5	25.2
Europe (excluding ZOE)	31,422	48.9	70.8	63.3	48.9	21.1	30.9	13.3
Northern Africa and Middle East	7,277	31.5	51.2	47.7	49.0	20.7	23.4	9.9
South-East Asia and Australasia	27,965	42.0	72.1	65.3	34.2	13.5	22.4	8.8
South Asia	29,426	32.2	52.8	45.5	55.7	25.7	25.4	11.7
Sub-Saharan Africa	23,969	30.6	37.6	31.8	46.5	21.8	14.8	6.9
Worldwide (including ZOE)	282,488	36.9	59.4	51.4	54.2	28.2	27.8	14.5
Worldwide (excluding ZOE)	257,421	36.0	57.6	49.3	52.9	24.4	26.1	12.0

*Associated 95% confidence intervals in Supplementary Appendix Table S7. β For participants screened at home using the ZOE app, a target of <135/85 was used.

Table S7 – Number and percentage with hypertension according to sex and age group

	Female			Male		
Age category (years)	Number with hypertension	Percentage with hypertension	Denominator	Number with hypertension	Percentage with hypertension	Denominator
18 to 29	8,567	11.5%	74,268	8,396	14.2%	59,295
30 to 39	12,990	19.3%	67,274	13,276	23.6%	56,260
40 to 49	21,354	30.4%	70,252	20,645	35.1%	58,831
50 to 59	33,814	43.2%	78,306	28,973	46.3%	62,533
60 to 69	38,479	51.9%	74,116	33,157	55.6%	59,632
70 or more	33,005	59.9%	55,140	28,870	60.4%	47,797

One thousand Four hundred and ten participants with sex recorded as ‘other’ are not shown.

Table S8 – Worldwide and regional 95% confidence intervals (CI) for unstandardised estimates of percentage with hypertension, awareness, on treatment and controlled, of 765,718 participants. NB: 95% confidence intervals (CI) could not be calculated for ZOE data, which are shown separately.

Region	Hypertensive			Percentage of Hypertensives aware		Percentage of Hypertensives on medication		Percentage of those on antihypertensive medication with BP <140/90 mmHg		Percentage of all hypertensives with BP <140/90 mmHg	
	Number	Percent (%)	95% CI	Percent (%)	95% CI	Percent (%)	95% CI	Percent (%)	95% CI	Percent (%)	95% CI
East Asia	50,830	26.6	26.4 to 26.8	24.1	24.1 to 24.2	23.4	23.2 to 23.6	58.1	57.2 to 59	13.6	13.4 to 13.8
Americas	86,632	43.1	42.9 to 43.3	75.5	75.3 to 75.8	60.5	60.2 to 60.8	60.3	59.9 to 60.7	36.5	36.2 to 36.8
South-east Asia and Australasia	27,965	42.0	41.6 to 42.4	72.1	71.8 to 72.5	65.3	64.8 to 65.9	34.2	33.6 to 34.9	22.4	21.9 to 22.8
Sub-Saharan Africa	23,969	30.6	30.2 to 30.9	37.6	37.3 to 38	31.8	31.4 to 32.1	46.5	45.3 to 47.6	14.8	14.4 to 15.1
South Asia	29,426	32.2	31.8 to 32.5	52.8	52.5 to 53.2	45.5	45.1 to 46	55.7	54.8 to 56.6	25.4	25.0 to 25.8
Europe (without ZOE)	31,422	48.9	48.5 to 49.3	70.8	70.6 to 71.1	63.3	62.8 to 63.8	48.9	48.2 to 49.6	30.9	30.5 to 31.4
Europe (with ZOE)	56,389	49.3	-	73.8	-	67.5	-	55.6	-	37.5	-
Northern Africa and Middle East	7,277	31.5	30.9 to 32.1	51.2	50.8 to 51.7	47.7	46.8 to 48.7	49.0	47.3 to 50.6	23.4	22.6 to 24.2
Worldwide (without ZOE)	257,521	36.0	35.9 to 36.1	57.6	57.5 to 57.8	49.3	49.1 to 49.5	52.9	52.7 to 53.2	26.1	26.0 to 26.2
Worldwide (with ZOE)	282,488	36.9	-	59.4	-	51.4	-	54.2	-	27.8	-

Table S9 – Worldwide and regional estimates of percentage with hypertension and parameters of awareness, treatment and control after age and sex standardisation (of 764,114 participants with age and sex recorded). NB: 95% confidence intervals (CI) could not be calculated for ZOE data, which are shown separately.

Region	Hypertensive			Percentage of Hypertensives aware		Percentage of Hypertensives on medication		Percentage of those on antihypertensive medication with BP <140/90 mmHg		Percentage of all hypertensives with BP <140/90 mmHg	
	Number	Percent (%)	95% CI	Percent (%)	95% CI	Percent (%)	95% CI	Percent (%)	95% CI	Percent (%)	95% CI
East Asia	46,871	24.6	24.3 to 24.8	21.3	20.9 to 22.0	20.9	20.5 to 21.2	56.5	54.5 to 58.5	11.8	11.4 to 12.2
Americas	67,550	33.7	33.4 to 34.0	76.1	75.7 to 76.6	52.7	52.3 to 53.2	65.1	63.9 to 66.4	34.4	33.7 to 35.0
South-east Asia and Australasia	23,959	36.0	35.5 to 36.5	65.0	64.3 to 65.7	57.4	56.7 to 58.1	46.0	44.1 to 47.8	26.4	25.3 to 27.4
Sub-Saharan Africa	25,136	32.3	31.7 to 32.8	58.0	57.1 to 59.0	32.4	31.7 to 33.0	49.7	47.3 to 52.0	16.1	15.3 to 16.8
South Asia	28,391	31.1	30.6 to 31.7	59.7	58.7 to 60.7	43.0	42.1 to 43.8	62.3	60.8 to 63.8	26.8	26.1 to 27.4
Europe (without ZOE)	22,892	35.7	35.2 to 36.3	75.5	74.8 to 76.3	49.1	48.5 to 49.8	57.9	55.4 to 60.4	28.5	27.2 to 29.7
Europe (with ZOE)	39,459	34.5	-	87.8	-	52.6	-	72.8	-	38.3	-
Northern Africa and Middle East	7,250	31.4	30.5 to 32.4	51.6	49.8 to 53.4	36.6	35.6 to 37.6	51.7	48.7 to 54.8	18.9	17.8 to 20.1
Worldwide (without ZOE)	226,019	31.7	31.5 to 31.8	58.0	57.7 to 58.3	43.0	42.8 to 43.2	58.2	57.5 to 59.0	25.0	24.7 to 25.4
Worldwide (with ZOE)	242,586	31.7	-	61.2	-	44.0	-	61.1	-	26.9	-

Tabel S10 – Worldwide and regional estimates of percentages with BP ≥130/80 mmHg, by medication use.

Region	Number with BP ≥130/80 mmHg	Percentage of participants with BP ≥130/80 mmHg	Number on medication with BP <130/80 mmHg	Percentage of those on medication with BP <130/80 mmHg	Percentage of hypertensives with BP <130/80 mmHg
East Asia	95,165	49.9%	3,472	29.2%	6.8%
Americas	113,655	56.6%	15,015	28.6%	17.3%
South-east Asia and Australasia	39,076	58.7%	2,472	13.5%	8.8%
Sub-Saharan Africa	43,810	55.9%	1,664	21.8%	6.9%
South Asia	49,357	54.0%	3,440	25.7%	11.7%
Europe	56,824	49.6%	14,223	37.4%	25.2%
Northern Africa and Middle East	12,330	53.4%	720	20.7%	9.9%
Worldwide	410,217	53.6%	41,006	28.2%	14.5%

Supplementary Table S11 – Worldwide and regional age-sex standardised estimates of percentage with BP ≥ 130/80 mmHg by antihypertensive medication use (for 764,114 participants with complete age and sex).

Region	Number with BP ≥130/80 mmHg	Percentage of total participants with BP ≥130/80 mmHg	Number on medication with BP <130/80 mmHg	Percentage of on medication with BP <130/80 mmHg (%)	Percentage of hypertensives with BP <130/80 mmHg (%)
East Asia	91,081	47.7	2,755	28.2	5.9
Americas	103,294	51.6	11,146	31.3	16.5
South-east Asia and Australasia	36,269	54.5	2,729	19.8	11.4
Sub-Saharan Africa	44,422	57.0	2,034	25.0	8.1
South Asia	48,340	53.0	3,686	30.2	13
Europe	47,870	41.8	7,302	35.2	18.5
Northern Africa and Middle East	12,864	55.8	603	22.7	8.3
Worldwide	385,508	50.3	31,357	29.4	12.9

Supplementary Table S12 – Results from linear mixed models for antihypertensive medication, adjusted for age and sex (with interaction).

BP	Predictor	Change in BP compared to baseline	Standard error	t value	p value	95% Confidence Interval	
						Lower bound	Upper bound
systolic	On antihypertensive medication	10.564	0.064	165.740	<0.001	10.439	10.689
systolic	Number of antihypertensive medication classes						
systolic	0	-	-	-	-	-	-
systolic	1	10.156	0.078	129.590	<0.001	10.002	10.310
systolic	2	11.112	0.093	119.130	<0.001	10.929	11.295
systolic	3	10.789	0.165	65.370	<0.001	10.466	11.113
systolic	4	11.068	0.304	36.380	<0.001	10.472	11.664
systolic	5 or more	9.549	0.737	12.960	<0.001	8.105	10.993
diastolic	On antihypertensive medication	4.069	0.041	98.830	<0.001	3.989	4.150
diastolic	Number of antihypertensive medication classes						
diastolic	0	-	-	-	-	-	-
diastolic	1	4.040	0.051	80.000	<0.001	3.941	4.139
diastolic	2	4.148	0.060	68.960	<0.001	4.030	4.266
diastolic	3	3.964	0.106	37.500	<0.001	3.756	4.171
diastolic	4	4.232	0.195	21.690	<0.001	3.849	4.614
diastolic	5 or more	3.577	0.473	7.570	<0.001	2.650	4.504

Supplementary Table S13 – Results from linear mixed models for long-term conditions, adjusted for age and sex (with interaction) and antihypertensive medication use.

BP	Predictor	Change in BP compared to baseline	Standard error	t value	p value	95% Confidence Interval	
						Lower bound	Upper bound
systolic	Known hypertension	7.662	0.171	44.910	<0.001	7.327	7.996
systolic	Diabetes	1.071	0.094	11.390	<0.001	0.886	1.255
systolic	Previous myocardial infarction	-0.289	0.155	-1.860	0.063	-0.594	0.016
systolic	Previous stroke	0.621	0.218	2.850	0.004	0.193	1.048
systolic	Previous irregular heartbeat	-0.596	0.113	-5.290	<0.001	-0.816	-0.375
systolic	Previous heart failure	-0.270	0.209	-1.300	0.195	-0.680	0.139
diastolic	Known hypertension	3.978	0.109	36.380	<0.001	3.763	4.192
diastolic	Diabetes	-0.274	0.058	-4.700	<0.001	-0.388	-0.160
diastolic	Previous myocardial infarction	-0.784	0.099	-7.910	<0.001	-0.978	-0.590
diastolic	Previous stroke	0.327	0.136	2.410	0.016	0.061	0.593
diastolic	Previous irregular heartbeat	-0.045	0.076	-0.600	0.552	-0.194	0.104
diastolic	Previous heart failure	-0.164	0.130	-1.260	0.206	-0.419	0.091

Supplementary Table S14 – Results from linear mixed models for lifestyle factors, adjusted for age and sex (with interaction) and antihypertensive medication use.

BP	Predictor	Change in BP compared to baseline	Standard error	t value	p value	95% Confidence Interval	
						Lower bound	Upper bound
systolic	Current smoker	0.123	0.078	1.580	0.115	-0.030	0.275
systolic	Alcohol						
systolic	Never/Rarely	-	-	-	-	-	-
systolic	1-3 times per month	0.676	0.065	10.380	<0.001	0.548	0.804
systolic	1-3 times per week	1.935	0.106	18.330	<0.001	1.728	2.141
systolic	Daily	2.442	0.205	11.920	<0.001	2.040	2.843
systolic	Education						
systolic	0 years	-	-	-	-	-	-
systolic	1-6 years	-0.076	0.114	-0.670	0.503	-0.300	0.147
systolic	7-12 years	-0.441	0.108	-4.090	<0.001	-0.652	-0.230
systolic	Over 12 years	-1.206	0.108	-11.140	<0.001	-1.418	-0.994
systolic	>150mins of moderate exercise or 75 mins of vigorous exercise per week	-1.029	0.052	-19.910	<0.001	-1.131	-0.928
diastolic	Current smoker	0.461	0.050	9.160	<0.001	0.362	0.560
diastolic	Alcohol						
diastolic	Never/Rarely	-	-	-	-	-	-
diastolic	1-3 times per month	0.655	0.042	15.690	<0.001	0.573	0.737
diastolic	1-3 times per week	1.207	0.067	18.060	<0.001	1.076	1.337
diastolic	Daily	0.982	0.131	7.520	<0.001	0.726	1.238
diastolic	Education						
diastolic	0 years	-	-	-	-	-	-
diastolic	1-6 years	-0.685	0.075	-9.090	<0.001	-0.833	-0.538
diastolic	7-12 years	-0.484	0.071	-6.820	<0.001	-0.623	-0.345
diastolic	Over 12 years	-0.882	0.072	-12.240	<0.001	-1.024	-0.741
diastolic	>150mins of moderate exercise or 75 mins of vigorous exercise per week	-0.660	0.034	-19.670	<0.001	-0.725	-0.594

Supplementary Table S15 – Results from linear mixed models for women-specific factors, adjusted for age and antihypertensive medication use. Denominator was female participants only.

BP	Predictor	Change in BP compared to baseline	Standard error	t value	p value	95% Confidence Interval	
						Lower bound	Upper bound
systolic	Pregnant	-0.889	0.211	-4.220	<0.001	-1.303	-0.476
systolic	Hypertension in previous pregnancy	2.037	0.146	13.960	<0.001	1.751	2.324
systolic	On HRT	-0.966	0.219	-4.410	<0.001	-1.396	-0.536
systolic	On contraception	-0.090	0.144	-0.630	0.532	-0.372	0.192
diastolic	Pregnant	-0.910	0.134	-6.780	<0.001	-1.173	-0.647
diastolic	Hypertension in previous pregnancy	1.449	0.092	15.770	<0.001	1.269	1.629
diastolic	On HRT	-0.099	0.138	-0.720	0.473	-0.370	0.172
diastolic	On contraception	-0.014	0.091	-0.150	0.877	-0.193	0.165

Supplementary Table S16 – Results from linear mixed models for ethnicity, adjusted for age and sex (with interaction) and antihypertensive medication use.

BP	Predictor	Change in BP compared to baseline	Standard error	t value	p value	95% Confidence Interval	
						Lower bound	Upper bound
systolic	South Asian	-	-	-	-	-	-
systolic	Black	3.502	0.328	10.680	<0.001	2.859	4.145
systolic	East/South East Asian	6.650	0.177	37.670	<0.001	6.304	6.996
systolic	White	1.412	0.335	4.210	<0.001	0.755	2.069
systolic	Other	0.947	0.347	2.730	0.006	0.268	1.627
systolic	Mixed	1.976	0.341	5.790	<0.001	1.307	2.644
systolic	Middle Eastern	1.026	0.524	1.960	0.050	-0.001	2.053
diastolic	South Asian	-	-	-	-	-	-
diastolic	Black	1.286	0.210	6.130	<0.001	0.875	1.697
diastolic	East/South East Asian	3.717	0.113	32.920	<0.001	3.495	3.938
diastolic	White	0.330	0.213	1.540	0.123	-0.089	0.748
diastolic	Other	-0.077	0.222	-0.350	0.728	-0.511	0.357
diastolic	Mixed	0.359	0.217	1.650	0.098	-0.066	0.785
diastolic	Middle Eastern	0.214	0.335	0.640	0.523	-0.442	0.870

Supplementary Table S17 – Results from linear mixed models for screening factors, adjusted for age and sex (with interaction) and antihypertensive medication use.

BP	Predictor	Change in BP compared to baseline	Standard error	t value	p value	95% Confidence Interval	
						Lower bound	Upper bound
systolic	Site type						
systolic	Hospital/Clinic/Pharmacy	-	-	-	-	-	-
systolic	Public area (outdoors)	-1.076	0.085	-12.650	<0.001	-1.243	-0.909
systolic	Public area (indoors)	0.158	0.082	1.940	0.053	-0.002	0.319
systolic	Workplace	0.432	0.085	5.060	<0.001	0.265	0.600
systolic	Other	1.183	0.155	7.620	<0.001	0.879	1.487
systolic	Home	1.297	0.112	11.570	<0.001	1.077	1.517
systolic	Day of the week						
systolic	Monday	-	-	-	-	-	-
systolic	Tuesday	-0.452	0.077	-5.900	<0.001	-0.603	-0.302
systolic	Wednesday	-0.470	0.078	-6.070	<0.001	-0.622	-0.318
systolic	Thursday	-0.862	0.078	-11.020	<0.001	-1.015	-0.708
systolic	Friday	-0.521	0.077	-6.780	<0.001	-0.671	-0.370
systolic	Saturday	0.203	0.091	2.250	0.025	0.026	0.381
systolic	Sunday	0.575	0.097	5.960	<0.001	0.386	0.765
systolic	Country income						
systolic	Low income	-0.382	1.601	-0.240	0.811	-3.520	2.755
systolic	Lower middle income	-	-	-	-	-	-
systolic	Upper middle income	-2.352	1.190	-1.980	0.048	-4.685	-0.019
systolic	High income	-1.813	1.226	-1.480	0.139	-4.215	0.589
diastolic	Site type						
diastolic	Hospital/Clinic/Pharmacy	-	-	-	-	-	-
diastolic	Public area (outdoors)	-0.562	0.055	-10.280	<0.001	-0.670	-0.455

diastolic	Public area (indoors)	0.562	0.053	10.620	<0.001	0.458	0.665
diastolic	Workplace	-0.304	0.054	-5.600	<0.001	-0.410	-0.198
diastolic	Other	0.152	0.100	1.520	0.129	-0.044	0.348
diastolic	Home	0.948	0.073	13.040	<0.001	0.806	1.091
diastolic	Day of the week						
diastolic	Monday	-	-	-	-	-	-
diastolic	Tuesday	-0.090	0.049	-1.830	0.068	-0.186	0.007
diastolic	Wednesday	-0.110	0.050	-2.220	0.026	-0.208	-0.013
diastolic	Thursday	-0.221	0.050	-4.410	<0.001	-0.319	-0.123
diastolic	Friday	-0.153	0.049	-3.110	0.002	-0.249	-0.057
diastolic	Saturday	-0.079	0.058	-1.360	0.175	-0.193	0.035
diastolic	Sunday	-0.133	0.062	-2.170	0.030	-0.254	-0.013
diastolic	Country income						
diastolic	Low income	0.317	1.024	0.310	0.757	-1.689	2.324
diastolic	Lower middle income	-	-	-	-	-	-
diastolic	Upper middle income	-1.032	0.761	-1.360	0.175	-2.524	0.460
diastolic	High income	-1.687	0.784	-2.150	0.031	-3.223	-0.150

Supplementary Table S18 – Results from linear mixed models for COVID-19 factors, adjusted for age and sex (with interaction) and antihypertensive medication use.

BP	Predictor	Change in BP compared to baseline	Standard error	t value	p value	95% Confidence Interval	
						Lower bound	Upper bound
systolic	Previous COVID-19 positive test	-0.115	0.069	-1.680	0.093	-0.250	0.019
systolic	COVID-19 vaccinated	-0.739	0.091	-8.100	<0.001	-0.918	-0.560
systolic	COVID-19 symptom duration: >3 months	0.492	0.134	3.670	<0.001	0.229	0.755
diastolic	Previous COVID-19 positive test	0.178	0.044	4.020	<0.001	0.091	0.265
diastolic	COVID-19 vaccinated	-0.282	0.059	-4.800	<0.001	-0.397	-0.167
diastolic	COVID-19 symptom duration: >3 months	0.283	0.083	3.420	0.001	0.121	0.445

Supplementary Table S19 – Results from linear mixed models for heart rate, adjusted for age and sex (with interaction) and stratified by antihypertensive medication use.

BP	Predictor	Change in BP compared to baseline	Standard error	t value	p value	95% Confidence Interval	
						Lower bound	Upper bound
systolic	<60	0.354	0.131	2.700	0.007	0.097	0.611
systolic	60-69	-2.647	0.065	-40.960	<0.001	-2.773	-2.520
systolic	70-79	-	-	-	-	-	-
systolic	80-89	-0.299	0.059	-5.070	<0.001	-0.414	-0.183
systolic	90-99	0.835	0.080	10.370	<0.001	0.677	0.993
systolic	100 or more	2.515	0.131	19.230	<0.001	2.259	2.771
diastolic	<60	-4.103	0.084	-49.130	<0.001	-4.267	-3.940
diastolic	60-69	-2.589	0.041	-62.940	<0.001	-2.670	-2.509
diastolic	70-79	-	-	-	-	-	-
diastolic	80-89	1.172	0.037	31.250	<0.001	1.098	1.245
diastolic	90-99	2.603	0.051	50.800	<0.001	2.503	2.704
diastolic	100 or more	4.740	0.083	56.930	<0.001	4.576	4.903

Supplementary Table S20 – Comparison of key statistics from MMM22 compared to previous MMM campaigns.

MMM campaign	Total participants (N of countries)	Mean age (years) (SD)	Percentage female:male*	Percentage with hypertension	Percentage of hypertensives aware	Percentage of hypertensives on medication	Percentage of those on medication with BP <140/90 mmHg	Percentage of all hypertensives with BP <140/90 mmHg
MMM17	1,201,570 (80)	44.9 (16.9)	54.0 : 45.0	34.9	N/A	57.8	53.7	31.0
MMM18	1,504,963 (89)	45.3 (17.0)	52.4 : 46.7	33.4	59.5	55.3	60.0	33.2
MMM19	1,508,130 (92)	45.8 (17.0)	51.6 : 48.4	34.0	58.7	54.7	57.8	31.7
2020 COVID-19 pandemic								
MMM21	642,057 (54)	46.4 (16.5)	52.2 : 47.8	35.2	56.8	50.3	53.9	27.1
MMM22 (Excluding ZOE)	715,518 (60)	47.5 (17.2)	54.0 : 45.7	36.0	57.6	49.3	52.9	26.1
MMM22 (including ZOE)	765,718 (60)	48.8 (17.6)	54.8 : 45.0	36.9	59.4	51.4	54.2	27.8

SUPPLEMENTARY FIGURES

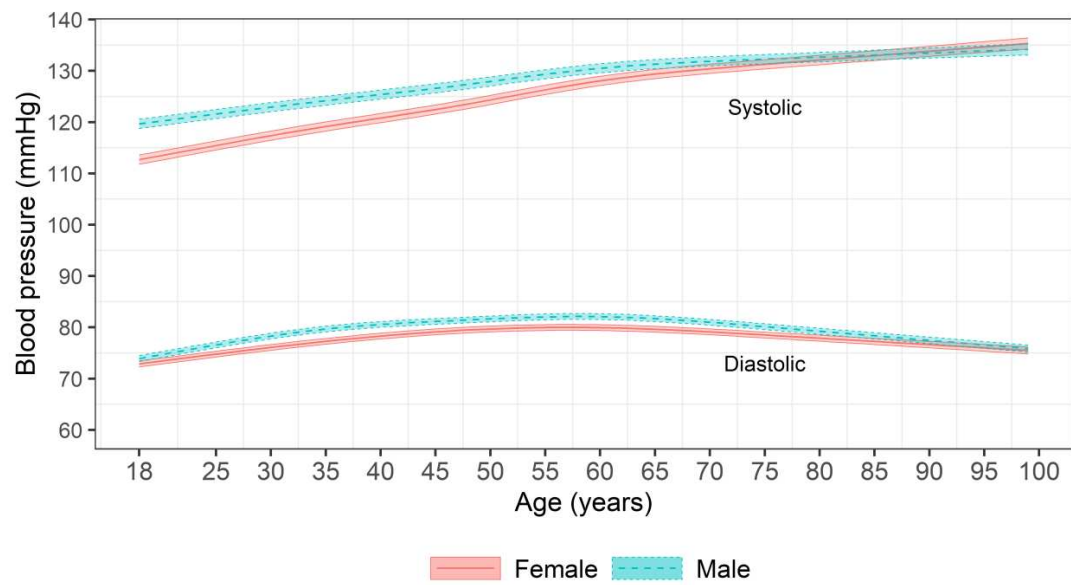


Figure S1: Mean systolic and blood pressure by age and sex from linear mixed models, in participants not taking antihypertensive medication. Shaded areas represent 95% confidence intervals.

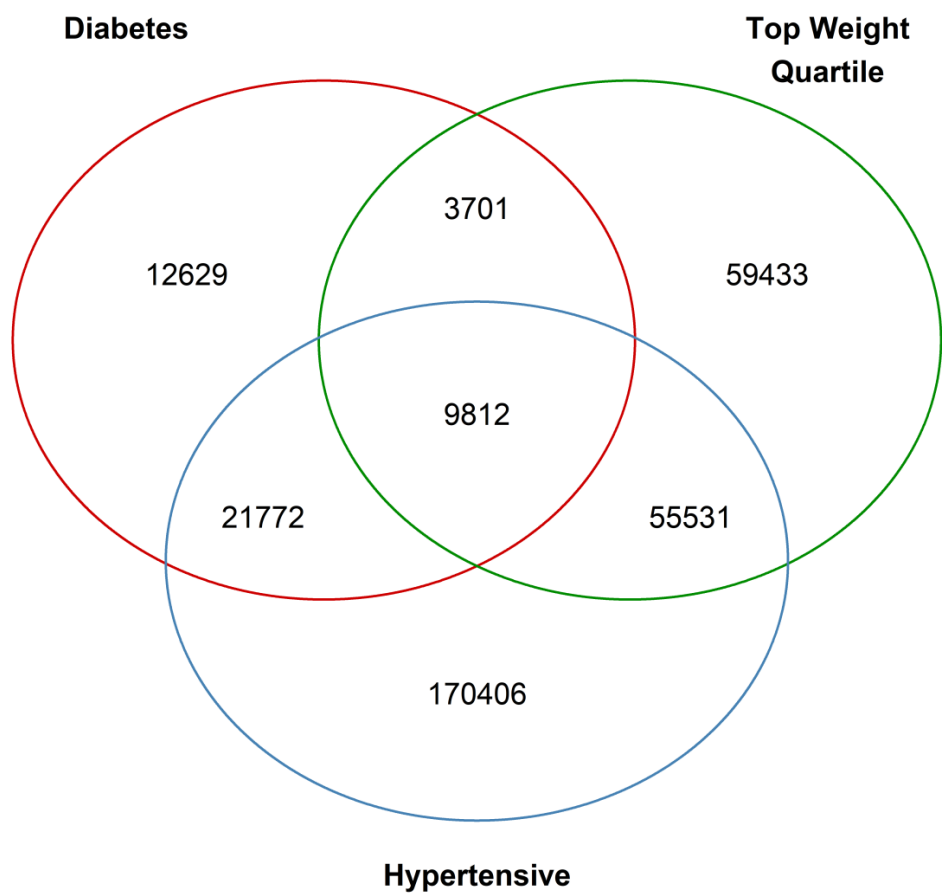


Figure S2: Non-proportional Venn diagram of overlap in prevalence of diabetes, being in the top quartile of weight, and hypertension. Top weight quartile was defined as ≥ 78 Kg.

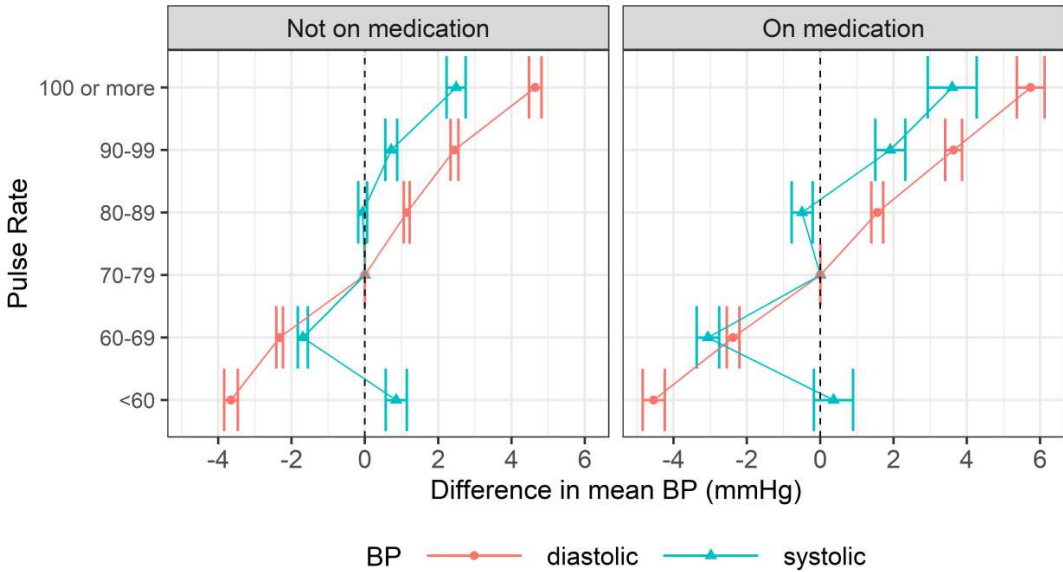


Figure S3: Difference in mean blood pressure across heart rate categories compared to a heart rate of 70 to 79 beats per minute (BPM), by antihypertensive medication use. Estimates are derived from linear mixed model adjusted for age and sex and stratified by antihypertensive medication use. Error bars represent 95% confidence intervals.