

## SUPPLEMENTAL MATERIAL

### Title: Vulnerability to the Cardiovascular Effects of Ambient Heat in Six U.S. Cities: Results from the Multi-Ethnic Study of Atherosclerosis (MESA)

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eTable 1. Number of participants, total person-visits, and person-visits for participants who had at least one exam when two-day mean temperature was above the 75<sup>th</sup> percentile per participant for each health outcome, by anti-hypertensive medication status, overall and by site.

Outcome	Anti-hypertensive medications	Overall	Winston-Salem, NC	New York City, NY	Baltimore, MD	Minneapolis-St. Paul, MN	Chicago, IL	Los Angeles, CA
Number of participants <sup>b</sup>								
Heart rate	No	2648	423	455	360	389	581	441
	Yes	2182	460	411	373	228	391	320
Blood pressure <sup>a</sup>	No	2710	429	471	366	408	586	452
	Yes	2199	465	412	374	232	393	324
Total person-visits								
Heart rate	No	9642	1501	1735	1334	1152	2306	1611
	Yes	7965	1708	1544	1368	735	1459	1151
Blood pressure <sup>a</sup>	No	10203	1592	1835	1418	1260	2381	1715
	Yes	8268	1772	1597	1430	761	1516	1192
Person-visits for participants who had at least one exam when two-day mean temperature was above the 75 <sup>th</sup> percentile <sup>c</sup>								
Heart rate	No	2002	332	350	260	239	472	348
	Yes	1718	402	316	278	159	326	237
Blood pressure <sup>a</sup>	No	2045	341	356	263	245	476	364
	Yes	1738	407	323	281	159	330	238

<sup>a</sup>Identical for systolic and diastolic blood pressure.

<sup>b</sup>The number of participants for each outcome sums to more than the total number of participants because a given participant may have been included in both categories if they shifted antihypertensive use status across exams.

<sup>c</sup>These are instances where the within-person deviations of two-day mean temperature above the 75<sup>th</sup> percentile of temperature (the upper end of the temperature spline) are greater than zero and hence contribute information to the warm temperature components of these fixed-effects models.

eTable 2. Distributions of the deviations of time-varying outcomes and predictors from their within-person means, overall and by site.

	Overall	Winston-Salem, NC	New York City, NY	Baltimore, MD	Minneapolis-St. Paul, MN	Chicago, IL	Los Angeles, CA
<b>Heart rate (bpm)</b>							
Minimum	-30.5	-27.6	-30.5	-20.8	-25.7	-28.3	-24.4
25 <sup>th</sup> Percentile	-3.4	-3.5	-3.7	-3.2	-3.1	-3.5	-3.3
75 <sup>th</sup> Percentile	3.2	3.3	3.4	3.0	3.0	3.0	3.1
Maximum	53.4	38.6	53.1	47.4	27.9	36.4	53.4
<b>Systolic blood pressure (mmHg)</b>							
Minimum	-77.5	-77.5	-49.6	-48.1	-53.4	-43.1	-50.9
25 <sup>th</sup> Percentile	-6.7	-7.2	-6.8	-6.9	-6.0	-6.5	-6.6
75 <sup>th</sup> Percentile	6.2	7.3	6.0	6.3	5.3	6.2	6.0
Maximum	71.5	64.0	71.5	70.6	58.1	58.0	68.6
<b>Diastolic blood pressure (mmHg)</b>							
Minimum	-29.9	-29.0	-29.9	-22.2	-25.6	-21.4	-25.2
25 <sup>th</sup> Percentile	-3.2	-3.5	-3.1	-3.2	-2.9	-3.2	-3.2
75 <sup>th</sup> Percentile	3.2	3.7	3.2	3.2	2.8	3.2	3.1
Maximum	31.2	28.6	28.2	25.8	31.2	29.1	27.6
<b>Two-day mean ozone (ppb)</b>							
Minimum	-2.10	-2.10	-1.71	-2.02	-1.90	-1.52	-1.37
25 <sup>th</sup> Percentile	-0.52	-0.81	-0.45	-0.57	-0.61	-0.44	-0.39
75 <sup>th</sup> Percentile	0.49	0.75	0.43	0.52	0.60	0.41	0.38
Maximum	2.90	2.90	2.25	2.30	2.08	1.99	1.82
<b>Two-day mean PM<sub>2.5</sub> (µg/m<sup>3</sup>)</b>							
Minimum	-2.83	-2.02	-1.76	-2.14	-2.83	-1.79	-2.36
25 <sup>th</sup> Percentile	-0.46	-0.41	-0.45	-0.51	-0.34	-0.51	-0.56
75 <sup>th</sup> Percentile	0.37	0.36	0.36	0.41	0.27	0.41	0.39
Maximum	4.96	3.11	3.46	3.92	2.84	4.10	4.96
<b>Degrees above the 75<sup>th</sup> percentile of temperature (°C)</b>							
Minimum	-1.98	-1.17	-1.40	-1.20	-1.98	-1.64	-1.00
25 <sup>th</sup> Percentile	-0.25	-0.23	-0.30	-0.26	-0.29	-0.32	-0.13
75 <sup>th</sup> Percentile	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	3.00	2.08	2.97	2.35	2.67	2.95	3.00
<b>Degrees above the 90<sup>th</sup> percentile of temperature (°C)</b>							
Minimum	-1.75	-0.78	-1.08	-0.74	-1.75	-1.43	-1.01
25 <sup>th</sup> Percentile	-0.01	-0.03	-0.02	-0.01	0.00	-0.03	-0.02
75 <sup>th</sup> Percentile	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	3.04	2.00	3.04	2.86	2.36	3.00	3.04

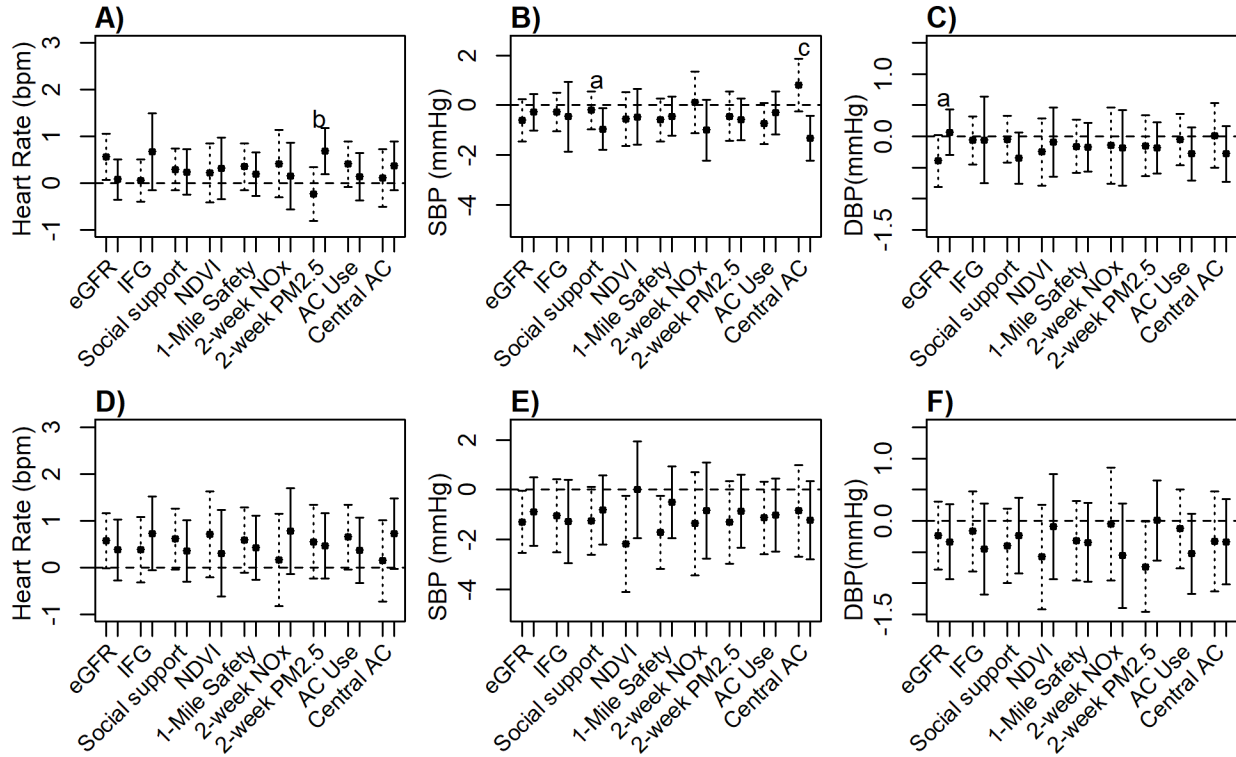
eTable 3. Changes (95% confidence intervals) in heart rate, systolic blood pressure and diastolic blood pressure for 2 °C changes in warm temperatures, or two-day mean temperature above the 75<sup>th</sup> percentile threshold, among individuals taking or not taking anti-hypertensive medications for each site.

Location	Anti-hypertensive medications	Heart rate (bpm)	Systolic blood pressure (mmHg)	Diastolic blood pressure (mmHg)
Winston-Salem, NC	No	-0.6 (-1.5, 0.3)	-1.8 (-3.3, -0.3) <sup>a</sup>	-1.2 (-2.0, -0.5) <sup>b</sup>
New York City, NY	No	-0.1 (-0.7, 0.5)	-0.7 (-1.7, 0.3)	0.2 (-0.3, 0.7)
Baltimore, MD	No	-0.1 (-0.9, 0.7)	-0.1 (-1.5, 1.2)	-0.2 (-0.9, 0.4)
Minneapolis-St. Paul, MN	No	-0.1 (-0.7, 0.5)	-0.6 (-1.7, 0.5)	-0.0 (-0.5, 0.5)
Chicago, IL	No	-0.0 (-0.6, 0.5)	0.3 (-0.7, 1.2)	0.4 (-0.0, 0.9)
Los Angeles, CA	No	0.5 (-0.3, 1.4)	0.1 (-1.4, 1.6)	-0.2 (-1.0, 0.5)
Winston-Salem, NC	Yes	0.2 (-0.8, 1.3)	-1.1 (-3.4, 1.1)	-0.5 (-1.5, 0.5)
New York City, NY	Yes	-0.1 (-0.8, 0.7)	-1.0 (-2.6, 0.6)	0.0 (-0.7, 0.7)
Baltimore, MD	Yes	0.8 (-0.1, 1.8) <sup>a</sup>	-1.6 (-3.6, 0.4)	-0.3 (-1.1, 0.6)
Minneapolis-St. Paul, MN	Yes	0.1 (-1.0, 1.1)	-0.2 (-2.4, 2.0)	0.0 (-1.0, 1.0)
Chicago, IL	Yes	-0.6 (-1.4, 0.1)	-1.4 (-3.0, 0.1)	-0.7 (-1.4, 0.0)
Los Angeles, CA	Yes	0.2 (-1.2, 1.5)	-1.9 (-4.8, 0.9)	-0.6 (-1.8, 0.6)

<sup>a</sup>Type 1 error rate for site interaction with temperature (Chicago, IL is reference) of 0.05.

<sup>b</sup>Type 1 error rate for site interaction with temperature (Chicago, IL is reference) of 0.01.

eFigure 1. Changes in heart rate, systolic blood pressure (SBP) and diastolic blood pressure (DBP) for 2 °C changes in two-day mean temperature above the 75<sup>th</sup> percentile threshold, among individuals with high (75<sup>th</sup> percentile or present: —) or low (25<sup>th</sup> percentile or absent: - - -) values of each characteristic, for exams during which individuals were not taking (A-C) or taking (D-F) anti-hypertensive medications, with *bimonthly indicator variables*. - - - Low or Absent. - - - - High or Present. SBP = systolic blood pressure, DBP = diastolic blood pressure, PM2.5 = particulate matter less than 2.5 μm, BMI = body mass index, eGFR = estimated glomerular filtration rate, IFG = impaired fasting glucose, NDVI = normalized difference vegetation index, NOx = oxides of nitrogen, AC = air conditioning. Interactions notable for the following type 1 error rates: a: 0.0222, b: 0.0074, c: 0.0037.



eFigure 2. Changes in heart rate, systolic blood pressure (SBP) and diastolic blood pressure (DBP) for 2 °C changes in two-day mean temperature above the 75<sup>th</sup> percentile threshold, among individuals with high (75<sup>th</sup> percentile or present: —) or low (25<sup>th</sup> percentile or absent: - - -) values of each characteristic, for exams during which individuals were not taking (A-C) or taking (D-F) anti-hypertensive medications, *excluding* individuals whose effect modifier values changed substantially across the study, or for whom the within-person standard deviation of the effect modifier of interest was greater than the third quartile of the within-person standard deviations of that effect modifier. SBP = systolic blood pressure, DBP = diastolic blood pressure, PM2.5 = particulate matter less than 2.5 μm, BMI = body mass index, eGFR = estimated glomerular filtration rate, IFG = impaired fasting glucose, NDVI = normalized difference vegetation index, NOx = oxides of nitrogen, AC = air conditioning. Interactions notable for the following type 1 error rates: a: 0.0222, b: 0.0074, c: 0.0037.

