

Supplemental Materials

Stratification	N	N Troponin I	Lag	% change (95% CI)
None	2906	20709	0	0.34 (-0.19, 0.87)
None	2906	20709	1	0.51 (-0.06, 1.08)
None	2906	20709	2	-0.23 (-0.83, 0.38)
None	2906	20709	3	0.61 (0.05, 1.19)
None	2906	20709	4	-0.14 (-0.61, 0.34)
Female	1282	8992	0	-0.30 (-1.09, 0.51)
Female	1282	8992	1	0.5 (-0.44, 1.44)
Female	1282	8992	2	0.4 (-0.56, 1.37)
Female	1282	8992	3	0.27 (-0.49, 1.05)
Female	1282	8992	4	-0.19 (-0.8, 0.42)
Male	1624	11717	0	0.88 (0.18, 1.58)
Male	1624	11717	1	0.43 (-0.29, 1.15)
Male	1624	11717	2	-0.65 (-1.44, 0.14)
Male	1624	11717	3	0.90 (0.04, 1.77)
Male	1624	11717	4	0.19 (-0.58, 0.97)
White	1961	12204	0	0.41 (-0.29, 1.12)
White	1961	12204	1	0.74 (-0.03, 1.51)
White	1961	12204	2	-0.3 (-1.11, 0.53)
White	1961	12204	3	0.74 (-0.11, 1.6)
White	1961	12204	4	-0.05 (-0.9, 0.8)
Black	799	7532	0	0.43 (-0.45, 1.32)
Black	799	7532	1	-0.29 (-1.2, 0.63)
Black	799	7532	2	-0.07 (-0.99, 0.86)
Black	799	7532	3	0.49 (-0.29, 1.27)
Black	799	7532	4	-0.3 (-0.87, 0.28)
Age < 65	1039	9087	0	0.96 (0.11, 1.81)
Age < 65	1039	9087	1	0.57 (-0.23, 1.38)
Age < 65	1039	9087	2	-0.13 (-1, 0.74)
Age < 65	1039	9087	3	0.59 (-0.21, 1.4)
Age < 65	1039	9087	4	0.17 (-0.43, 0.77)
Age >= 65	1867	11622	0	0.03 (-0.65, 0.71)
Age >= 65	1867	11622	1	0.40 (-0.42, 1.23)
Age >= 65	1867	11622	2	-0.49 (-1.33, 0.35)
Age >= 65	1867	11622	3	0.75 (-0.08, 1.57)
Age >= 65	1867	11622	4	-0.44 (-1.24, 0.36)
Urban	1467	9183	0	0.29 (-0.54, 1.12)
Urban	1467	9183	1	0.82 (0.02, 1.63)
Urban	1467	9183	2	0.74 (-0.13, 1.61)

Urban	1467	9183	3	0.28 (-0.47, 1.05)
Urban	1467	9183	4	-0.28 (-0.86, 0.3)
Not-Urban	1685	11526	0	0.47 (-0.23, 1.17)
Not-Urban	1685	11526	1	0.15 (-0.67, 0.98)
Not-Urban	1685	11526	2	-1.03 (-1.88, -0.17)
Not-Urban	1685	11526	3	0.90 (0.03, 1.78)
Not-Urban	1685	11526	4	0.30 (-0.51, 1.12)
Below Median Troponin I	1458	9407	0	0.65 (0.13, 1.17)
Below Median Troponin I	1458	9407	1	-0.01 (-0.6, 0.59)
Below Median Troponin I	1458	9407	2	-0.04 (-0.68, 0.61)
Below Median Troponin I	1458	9407	3	0.06 (-0.47, 0.58)
Below Median Troponin I	1458	9407	4	-0.26 (-0.68, 0.15)
Above Median Troponin I	1448	11302	0	0.16 (-0.69, 1.02)
Above Median Troponin I	1448	11302	1	0.74 (-0.15, 1.64)
Above Median Troponin I	1448	11302	2	-0.65 (-1.59, 0.3)
Above Median Troponin I	1448	11302	3	1.17 (0.16, 2.2)
Above Median Troponin I	1448	11302	4	-0.13 (-1.09, 0.84)

Supplemental Table 1. Associations between PM_{2.5} and troponin I

Shown here are associations between daily PM_{2.5} and log-transformed troponin I. Associations were modeled using a distributed lag model with a linear lag-response. CI = 95% confidence interval; N = number of individuals; N troponin = number of troponin measurements.

Stratification	N	N Troponin	% change (95% CI)
None	2906	20709	1.34 (0.7, 1.99)
Female	1282	8992	0.72 (-0.27, 1.71)
Male	1624	11717	1.89 (1.04, 2.74)
White	1961	12204	1.46 (0.57, 2.35)
Black	799	7532	0.68 (-0.26, 1.62)
Age < 65	1039	9087	1.97 (1.03, 2.91)
Age ≥ 65	1867	11622	0.74 (-0.14, 1.63)
Urban	1467	9183	1.98 (1.07, 2.90)
Not-Urban	1685	11526	0.88 (-0.03, 1.79)
Below Median Troponin I	1458	9407	0.5 (-0.11, 1.11)
Above Median Troponin I	1448	11302	1.63 (0.6, 2.67)

Supplemental Table 2. Associations between 5-day average PM_{2.5} and troponin I

Shown here are associations between 5-day average PM_{2.5} and troponin I stratified on demographics and troponin I concentrations. CI = 95% confidence interval; N = number of individuals; N troponin = number of troponin measurements.

Total Lag Days Considered	Lag	% change (95% CI)	AIC	BIC
1	0	0.48 (0.32, 0.64)	311482	311692
2	0	0.49 (0.28, 0.7)	251525	251814
2	1	0.25 (0.04, 0.46)	251525	251814
3	0	0.45 (0.2, 0.71)	191352	191713
3	1	0.35 (0.07, 0.63)	191352	191713
3	2	0.14 (-0.11, 0.39)	191352	191713
4	0	0.5 (0.17, 0.82)	130824	131247
4	1	0.26 (-0.1, 0.62)	130824	131247
4	2	0.19 (-0.17, 0.55)	130824	131247
4	3	0.18 (-0.13, 0.49)	130824	131247
5	0	0.34 (-0.19, 0.87)	69443	69904
5	1	0.51 (-0.06, 1.08)	69443	69904
5	2	-0.23 (-0.83, 0.38)	69443	69904
5	3	0.61 (0.05, 1.19)	69443	69904
5	4	-0.14 (-0.61, 0.34)	69443	69904

Supplemental Table 3. Associations varied by the total number of lag days considered.

To evaluate if associations differed based on the total number of days considered within the distributed lag model we considered lags of just one day (lag 0, day of measurement) up to 5 days (lag 0 – lag 4). The overall estimates as well as the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) supported our observations.

	Main Model	Time Trend Adjusted
Lag	% change (95% CI)	% change (95% CI)
0	0.34 (-0.19, 0.87)	0.30 (-0.22, 0.83)
1	0.51 (-0.06, 1.08)	0.50 (-0.08, 1.07)
2	-0.23 (-0.83, 0.38)	-0.25 (-0.85, 0.36)
3	0.61 (0.05, 1.19)	0.61 (0.04, 1.18)
4	-0.14 (-0.61, 0.34)	-0.13 (-0.6, 0.34)

Supplemental Table 4. Main Model and Time Trend Adjusted Model

Comparison of the main distributed lag model with the same model adjusted for a linear time trend. No substantial changes in the associations were observed.

Time Window Excluded	N	N troponin measurement	Lag	% change (95% CI)
7 days	2906	20709	0	0.34 (-0.19, 0.87)
14 days	2675	19376	0	0.52 (-0.01, 1.06)
30 days	2437	17706	0	0.67 (0.13, 1.23)
7 days	2906	20709	1	0.51 (-0.06, 1.08)
14 days	2675	19376	1	0.67 (0.1, 1.24)
30 days	2437	17706	1	0.66 (0.08, 1.24)
7 days	2906	20709	2	-0.23 (-0.83, 0.38)
14 days	2675	19376	2	-0.3 (-0.9, 0.31)
30 days	2437	17706	2	-0.15 (-0.77, 0.48)
7 days	2906	20709	3	0.61 (0.05, 1.19)
14 days	2675	19376	3	0.5 (-0.07, 1.06)
30 days	2437	17706	3	0.55 (-0.03, 1.13)
7 days	2906	20709	4	-0.14 (-0.61, 0.34)
14 days	2675	19376	4	-0.16 (-0.63, 0.31)
30 days	2437	17706	4	-0.23 (-0.7, 0.25)

Supplemental Table 5. Comparing time windows of exclusion around an observed myocardial infarction.

We explored increasing the window of excluded days around a diagnosed myocardial infarction by examining both 14 and 30 day exclusions using the primary distributed lag non-linear model. Model results remained similar and if anything were strengthened for some of the earlier lags as more days were excluded.

Stratification	N	N troponin measurement	Rolling Average Lag	% change (95% CI)
None	2906	20709	0-1	1.15 (0.2, 2.1)
None	2906	20709	1-2	-0.57 (-1.95, 0.83)
None	2906	20709	2-3	0.71 (-0.67, 2.1)
None	2906	20709	3-4	-0.08 (-0.93, 0.78)
Female	1282	8992	0-1	-0.23 (-1.66, 1.22)
Female	1282	8992	1-2	0.86 (-1.23, 3)
Female	1282	8992	2-3	0.41 (-1.57, 2.43)
Female	1282	8992	3-4	-0.39 (-1.53, 0.76)
Male	1624	11717	0-1	2.19 (0.93, 3.47)
Male	1624	11717	1-2	-1.56 (-3.39, 0.32)
Male	1624	11717	2-3	0.47 (-1.46, 2.43)
Male	1624	11717	3-4	0.81 (-0.49, 2.13)
White	1961	12204	0-1	1.22 (-0.05, 2.5)
White	1961	12204	1-2	-0.16 (-2.08, 1.8)
White	1961	12204	2-3	0.26 (-1.75, 2.31)
White	1961	12204	3-4	0.42 (-0.97, 1.82)
Black	799	7532	0-1	1.33 (-0.19, 2.87)
Black	799	7532	1-2	-1.94 (-4.05, 0.21)
Black	799	7532	2-3	1.74 (-0.24, 3.76)
Black	799	7532	3-4	-0.88 (-1.96, 0.2)
Age < 65	1039	9087	0-1	2.21 (0.71, 3.73)
Age < 65	1039	9087	1-2	-1 (-3.01, 1.05)
Age < 65	1039	9087	2-3	0.69 (-1.26, 2.68)
Age < 65	1039	9087	3-4	0.17 (-0.95, 1.3)
Age >= 65	1867	11622	0-1	0.67 (-0.55, 1.9)
Age >= 65	1867	11622	1-2	-0.75 (-2.66, 1.2)
Age >= 65	1867	11622	2-3	0.91 (-1.08, 2.95)
Age >= 65	1867	11622	3-4	-0.33 (-1.65, 1)
Urban	1467	9183	0-1	0.82 (-0.63, 2.29)
Urban	1467	9183	1-2	0.56 (-1.44, 2.61)
Urban	1467	9183	2-3	1.16 (-0.71, 3.07)
Urban	1467	9183	3-4	-0.77 (-1.83, 0.31)
Not-Urban	1685	11526	0-1	1.37 (0.12, 2.65)
Not-Urban	1685	11526	1-2	-1.39 (-3.32, 0.58)
Not-Urban	1685	11526	2-3	-0.09 (-2.15, 2.01)
Not-Urban	1685	11526	3-4	1.05 (-0.35, 2.46)
Below Median Troponin I	1458	9407	0-1	1.38 (0.44, 2.33)

Below Median Troponin I	1458	9407	1-2	-1.22 (-2.6, 0.19)
Below Median Troponin I	1458	9407	2-3	0.85 (-0.48, 2.21)
Below Median Troponin I	1458	9407	3-4	-0.63 (-1.4, 0.15)
Above Median Troponin I	1448	11302	0-1	1.07 (-0.45, 2.62)
Above Median Troponin I	1448	11302	1-2	-0.54 (-2.75, 1.72)
Above Median Troponin I	1448	11302	2-3	0.56 (-1.78, 2.95)
Above Median Troponin I	1448	11302	3-4	0.44 (-1.13, 2.02)

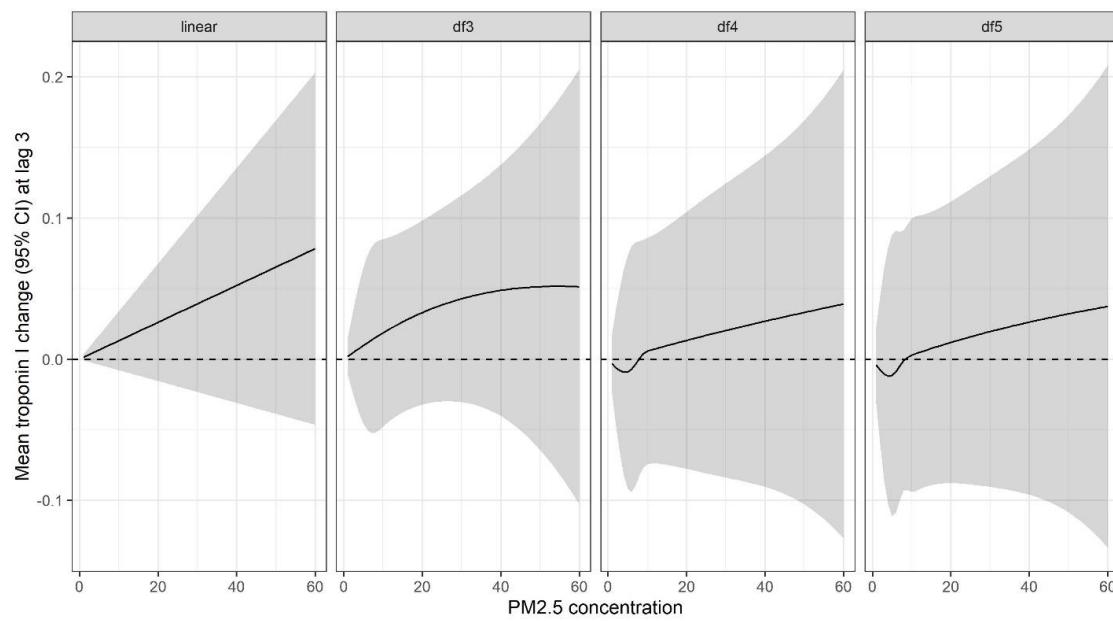
Supplemental Table 6. Associations between troponin I and 2-day rolling average PM2.5

Associations with 2-day rolling average PM2.5 used the same distributed lag modeling set up as for the non-averaged lags. N = number of individuals; N troponin measurements = number of troponin measurements; 95% CI = 95% confidence interval

Stratification	N	N troponin measurement	Lag	% change (95% CI)
None	2906	20709	0	0.36 (-0.04, 0.76)
None	2906	20709	1	0.71 (0.28, 1.14)
None	2906	20709	2	0.59 (0.14, 1.04)
None	2906	20709	3	0.87 (0.44, 1.3)
None	2906	20709	4	0.72 (0.27, 1.18)
None	2906	20709	5-day avg	1.34 (0.7, 1.99)
Female	1282	8992	0	0.13 (-0.4, 0.66)
Female	1282	8992	1	0.4 (-0.2, 1.01)
Female	1282	8992	2	0.78 (0.07, 1.49)
Female	1282	8992	3	0.81 (0.12, 1.52)
Female	1282	8992	4	0.12 (-0.57, 0.82)
Female	1282	8992	5-day avg	0.72 (-0.27, 1.71)
Male	1624	11717	0	0.84 (0.23, 1.46)
Male	1624	11717	1	1.06 (0.46, 1.67)
Male	1624	11717	2	0.46 (-0.12, 1.04)
Male	1624	11717	3	0.9 (0.36, 1.45)
Male	1624	11717	4	1.2 (0.6, 1.79)
Male	1624	11717	5-day avg	1.89 (1.04, 2.74)
White	1961	12204	0	0.46 (-0.2, 1.13)
White	1961	12204	1	0.84 (0.24, 1.45)
White	1961	12204	2	0.73 (0.13, 1.34)
White	1961	12204	3	1.08 (0.49, 1.67)
White	1961	12204	4	0.85 (0.24, 1.45)
White	1961	12204	5-day avg	1.46 (0.57, 2.35)
Black	799	7532	0	0.11 (-0.38, 0.61)
Black	799	7532	1	0.44 (-0.17, 1.05)
Black	799	7532	2	0.21 (-0.47, 0.89)
Black	799	7532	3	0.33 (-0.32, 0.99)
Black	799	7532	4	0.62 (-0.11, 1.34)
Black	799	7532	5-day avg	0.68 (-0.26, 1.62)
Age < 65	1039	9087	0	0.62 (0.11, 1.14)
Age < 65	1039	9087	1	0.82 (0.2, 1.45)
Age < 65	1039	9087	2	0.74 (0.09, 1.39)
Age < 65	1039	9087	3	1.09 (0.48, 1.7)
Age < 65	1039	9087	4	1.54 (0.81, 2.28)
Age < 65	1039	9087	5-day avg	1.97 (1.03, 2.91)
Age ≥ 65	1867	11622	0	0.02 (-0.62, 0.65)
Age ≥ 65	1867	11622	1	0.62 (0.03, 1.21)
Age ≥ 65	1867	11622	2	0.45 (-0.17, 1.07)

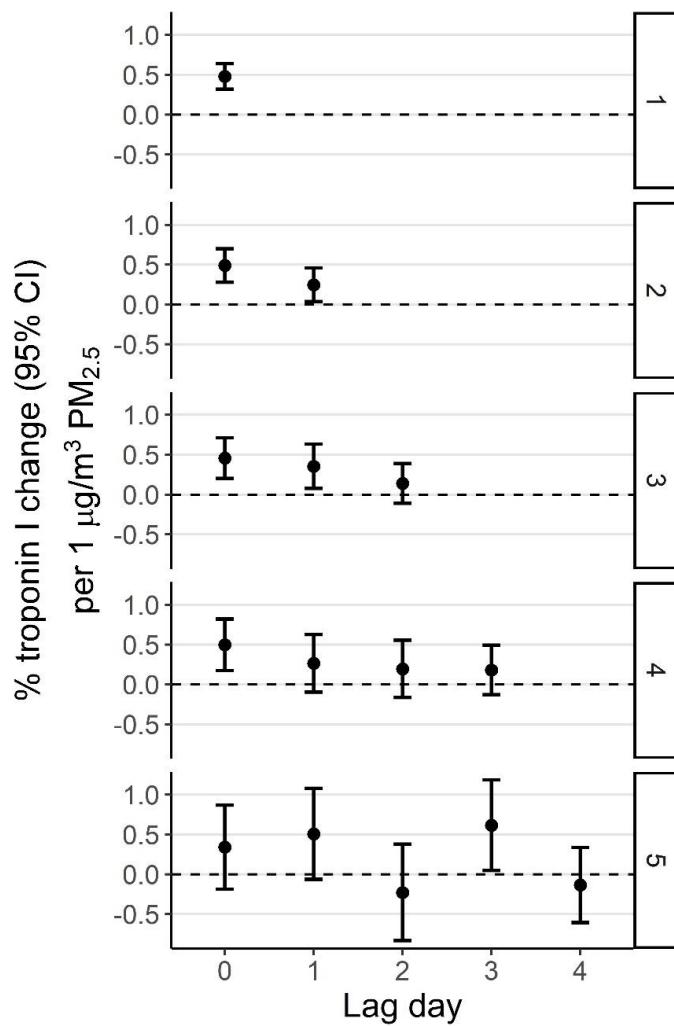
Age ≥ 65	1867	11622	3	0.63 (0.02, 1.24)
Age ≥ 65	1867	11622	4	0.18 (-0.39, 0.75)
Age ≥ 65	1867	11622	5-day avg	0.74 (-0.14, 1.63)
Urban	1467	9183	0	0.33 (-0.17, 0.83)
Urban	1467	9183	1	0.78 (0.19, 1.37)
Urban	1467	9183	2	1.39 (0.74, 2.04)
Urban	1467	9183	3	1.29 (0.69, 1.9)
Urban	1467	9183	4	0.85 (0.14, 1.56)
Urban	1467	9183	5-day avg	1.98 (1.07, 2.9)
Not-Urban	1685	11526	0	0.59 (-0.07, 1.25)
Not-Urban	1685	11526	1	0.67 (0.05, 1.3)
Not-Urban	1685	11526	2	-0.04 (-0.67, 0.58)
Not-Urban	1685	11526	3	0.45 (-0.16, 1.07)
Not-Urban	1685	11526	4	0.67 (0.08, 1.27)
Not-Urban	1685	11526	5-day avg	0.88 (-0.03, 1.79)
Below Median Troponin I	1458	9407	0	0.02 (-0.33, 0.38)
Below Median Troponin I	1458	9407	1	0.11 (-0.28, 0.52)
Below Median Troponin I	1458	9407	2	0.2 (-0.26, 0.66)
Below Median Troponin I	1458	9407	3	0.35 (-0.07, 0.78)
Below Median Troponin I	1458	9407	4	0.7 (0.27, 1.13)
Below Median Troponin I	1458	9407	5-day avg	0.5 (-0.11, 1.11)
Above Median Troponin I	1448	11302	0	0.61 (-0.14, 1.36)
Above Median Troponin I	1448	11302	1	1.05 (0.34, 1.75)
Above Median Troponin I	1448	11302	2	0.64 (-0.04, 1.33)
Above Median Troponin I	1448	11302	3	0.99 (0.33, 1.66)
Above Median Troponin I	1448	11302	4	0.65 (-0.09, 1.4)
Above Median Troponin I	1448	11302	5-day avg	1.63 (0.6, 2.67)

Supplemental Table 7. Associations between PM2.5 and troponin for the individual day lags without the distributed lag non-linear model



Supplemental Figure 1: Comparison of linear and non-linear lag-response.

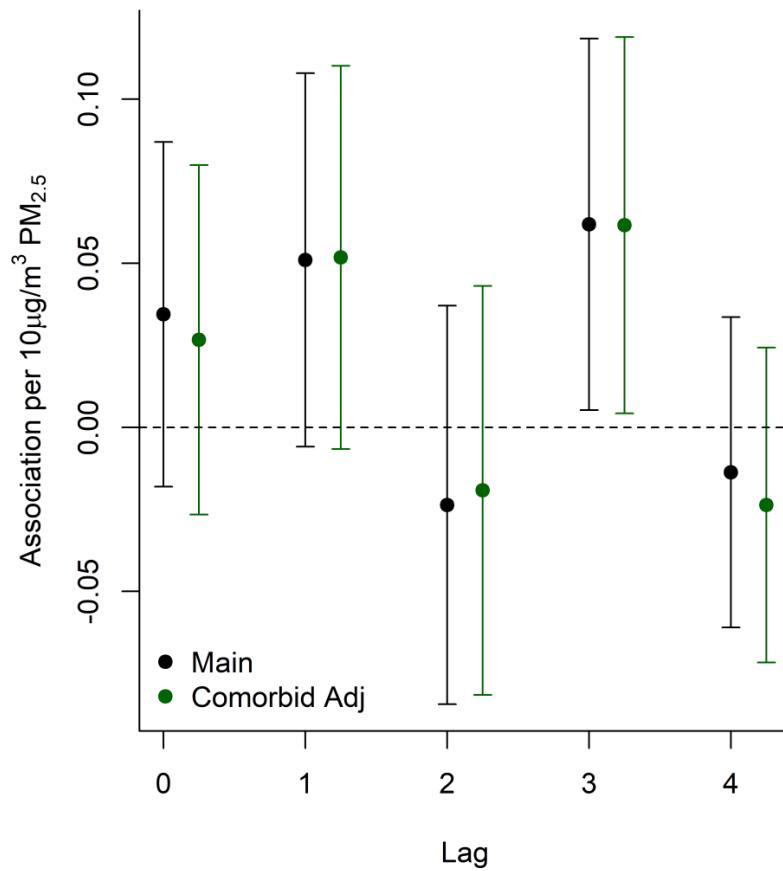
In comparing linear (linear) to non-linear lag-responses for the distributed lag model there was no evidence for non-linearity in the lag response for lag 3, the representative lag and most strongly associated lag in the distributed lag model.



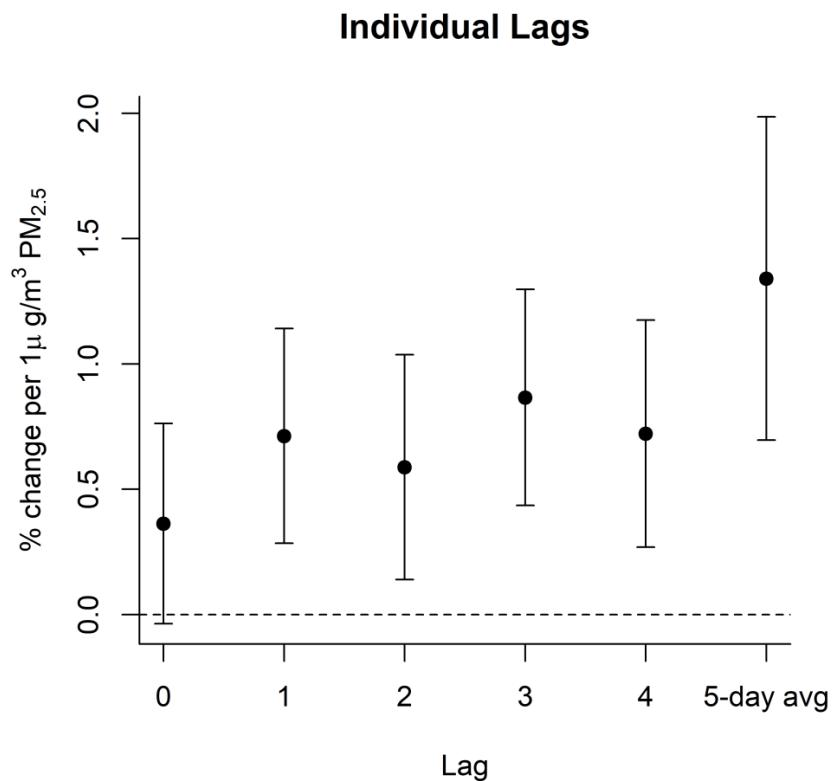
Supplemental Figure 2: Sensitivity analyses for the number of lag days considered.

To explore how the number of lag days considered in the distributed lag model impacted associations we varied the number of lag days considered (right label on each plot) from 1 (Lag 0 alone) to 5 (Lags 0 – 4). The associations and the model fit (see Supplemental Table 3) supported a delayed response and consideration of an increased number of lags.

Main vs Cormorbidites Model



Supplemental Figure 3: Associations for the main model and adjusted for co-morbidities.
Adjustment for co-morbidities (Comorbid Adj) did not change associations from the main model
which did not include any co-morbidity adjustment.



Supplemental Figure 4: Associations between troponin I and PM_{2.5} with individual lags

In this figure each lag is represented by a separate linear mixed effects model (random intercept for individual). The confounder adjustment remained identical to that used in the distributed lag non-linear model. The 5-day average is the same as appears in **Figure 2**.