Supplemental Material: Chapter 11 (Mortality) Integrated Science Assessment for Particulate Matter

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Contents

Supplemental Tables for Chapter 11 (Mortality)

Table S11-1. Corresponding data for Figure 11-1

Study	Location	Age	Lag	Averaging Time	% Increase (95% CI)
Multi-city Studies Evaluated in 2004 PM AQCD and 2009 PM ISA					
Burnett and Goldberg (2003)	8 Canadian cities	All	1	24-h avg	0.85 (0.05, 1.66)
Klemm and Mason (2003)	6 U.S. cities	All	0−1	24-h avg	0.80 (0.40, 1.30)
Burnett et al. (2004)	12 Canadian cities	All	1	24-h avg	0.60 (-0.03, 1.24)
Zanobetti and Schwartz (2009)	112 U.S. cities	All	0−1	24-h avg	0.98 (0.75, 1.22)
Dominici et al. (2007)	96 U.S. cities (NMMAPS)	All	1	24-h avg	0.29 (0.01, 0.57)
Franklin et al. (2007)	27 U.S. cities	All	1	24-h avg	1.21 (0.29, 2.14)
Franklin et al. (2008)	25 U.S. cities	All	0−1	24-h avg	1.78 (0.86, 2.70)
Ostro et al. (2006)	9 CA counties	All	0−1	24-h avg	0.60 (0.20, 1.00)
Recent Multicity Studies					
†Lippmann et al. (2013)	148 U.S. cities	All	0	24-h avg	0.19 (0.06, 0.32)
†Baxter et al. (2017)	77 U.S. cities	All	0−1	24-h avg	0.33 (0.13, 0.53)
†Dai et al. (2014)	75 U.S. cities	All	0−1	24-h avg	1.18 (0.93, 1.44)
†Krall et al. (2013)	72 U.S. cities	All	1	24-h avg	0.38 (0.14, 0.63)
†Kloog et al. (2013)	New England, USA	All	0−1	24-h avg	2.80 (2.00, 3.50)
†Lee et al. (2015b)[a]	3 Southeast states, U.S.	All	0−1	24-h avg	1.56 (1.19, 1.94)
†Janssen et al. (2013)	Netherlands	All	0	24-h avg	0.80 (0.30, 1.20)
†Samoli et al. (2013)	10 European Mediterranean cities	All	0−1	24-h avg	0.55 (0.27, 0.84)

Study	Location	Age	Lag	Averaging Time	% Increase (95% CI)
†Stafoggia et al. (2017)	8 European cities	All	1	24-h avg	0.59 (-0.03, 1.20)
†Lanzinger et al. (2016)[b]	5 Central European cities (UFIREG)	>1	0−1	24-h avg	-0.40 (-1.78, 0.97)
†Pascal et al. (2014)	9 French cities	All	0−1	24-h avg	0.70 (-0.10, 1.60)
†Lee et al. (2015a)	11 East Asian cities	All	0−1	24-h avg	0.38 (0.21, 0.55)
†Di et al. (2017a)[c]	U.S. (Nation)	65+	0-1	24-h avg	1.18 (1.09, 1.28)
†Zanobetti et al. (2014)[c]	121 U.S. cities	65+	0−1	24-h avg	0.64 (0.42, 0.85)
†Shi et al. (2015)[c]	New England, USA	65+	0−1	24-h avg	2.14 (1.38, 2.89)
†Young et al. (2017)	8 CA air basins	65+	0-1[d]	24-h avg	0.01 (-0.40, 0.43)
			0-3[e]	24-h avg	0.57 (-0.04, 1.19)
†Ueda et al. (2009)[f]	20 Japanese areas	65+	1	24-h avg	0.53, 0.77, 0.88 (0.13, 1.38)
Recent Meta-Analyses					
†Atkinson et al. (2014)	---	All	---[g]	24-h avg	1.04 (0.52, 1.56)
†Adar et al. (2014)	---	All	---[h]	24-h avg	0.70 (0.40, 0.90)

†Studies published since the 2009 PM Integrated Science Assessment.
[a]Results are from modeled $PM_{2.5}$ analysis, analysis focusing on measured $PM_{2.5}$ reported 1.21% (95% CI: 0.94, 1.47).
[b]Only 4 of the 5 cities measured $PM_{2.5}$.
[c]Zanobetti et al. (2014) and Shi et al. (2015) only had data for all-cause mortality including accidental mortalities.
[d]Main model used in Young et al. (2017) included current and average of 3 previous days daily maximum temperature, daily minimum temperature, and maximum daily relative humidity.
[e]Sensitivity analysis in Young et al. (2017) focusing on only the San Fransisco Bay air basin, dropping out the maximum daily relative humidty term, where the shortest duration of lag days examined was 0-3 days.
[f]Ueda et al. (2009) presented results for three different modeling approaches, which are presented here: GAM, GLM, and case-crossover.
[g]Atkinson et al. (2014) primarily focused on single-day lag results.
[h]Adar et al. (2014) focused on single-day lag results, specifically lag 0, 1, or 2.
AQCD = Air Quality Criteria Document; avg = average; CAPES = China Air Pollution and Health Effects Study; CI = confidence interval; NMMAPS = The National Morbidity Mortality Air Pollution Study; UFIREG = Ultrafine Particles—an evidence based contribution to the development of regional and European environmental and health policy.
% increases are standardized to a 10 μg/m^3 increase in 24-h average $PM_{2.5}$ concentrations.

Table S11-2. Corresponding data for Figure 11-2

Study	Location	Age	Lag	Averaging Time	% Increase (95% CI)
Cardiovascular Mortality – Multi-city Studies Evaluated in 2004 PM AQCD and 2009 PM ISA					
Zanobetti and Schwartz (2009)	112 U.S. cities	All	0−1	24-h avg	0.85 (0.46, 1.24)
Ostro et al. (2006)	9 CA counties	All	0−1	24-h avg	0.60 (0.0, 1.1)
Franklin et al. (2008)	25	All	0-1	24-h avg	0.47 (0.02, 0.92)
Franklin et al. (2007)	27 U.S. cities	All	1	24-h avg	0.94 (-0.14, 2.02)
Cardiovascular Mortality – Recent Multicity Studies and Meta-analyses					
†Lippmann et al. (2013)	148 U.S. cities	All	1	24-h avg	0.09 (-0.18, 0.35)
†Dai et al. (2014)	75 U.S. cities	All	0−1	24-h avg	1.03 (0.65, 1.41)
†Lee et al. (2015b)	3 Southeast states, U.S.	All	0−1	24-h avg	2.32 (1.57, 3.07)
†Samoli et al. (2013)	10 European Mediterranean cities	All	0−1	24-h avg	0.57 (0.07, 1.08)
†Pascal et al. (2014)	9 French cities	All	0−1	24-h avg	0.70 (-0.20, 1.60)
†Lanzinger et al. (2016)[a]	5 Central European cities (UFIREG)	>1	0−1	24-h avg	-0.32 (-2.35, 1.77)
†Janssen et al. (2013)	Netherlands	All	0	24-h avg	1.10 (0.20, 1.90)
†Lee et al. (2015a)	11 East Asian cities	All	0−1	24-h avg	0.96 (0.46, 1.46)
†Atkinson et al. (2014)	---	All	---[b]	24-h avg	0.84 (0.41, 1.28)
†Adar et al. (2014)	---	All	---[c]	24-h avg	1.20 (0.50, 2.00)
Respiratory Mortality – Multi-city Studies Evaluated in 2004 PM AQCD and 2009 PM ISA					
Zanobetti and Schwartz (2009)	112 U.S. cities	All	0−1	24-h avg	1.68 (1.04, 2.33)
Ostro et al. (2006)	9 CA counties	All	0−1	24-h avg	2.20 (0.60, 3.90)
Franklin et al. (2008)	25 U.S. cities	All	1-2	24-h avg	1.01 (-0.03, 2.05)
Franklin et al. (2007)	27 U.S. cities	All	1	24-h avg	1.78 (0.20, 3.36)

Study	Location	Age	Lag	Averaging Time	% Increase (95% CI)
	Respiratory Mortality – Recent Multicity Studies and Meta-analyses				
†Lippmann et al. (2013)	148 U.S. cities	All	1	24-h avg	0.51 (-0.07, 1.10)
†Dai et al. (2014)	75 U.S. cities	All	0−1	24-h avg	1.71 (1.06, 2.35)
†Lee et al. (2015b)	3 Southeast states, U.S.	All	0−1	24-h avg	0.09 (-0.13, 0.32)
†Samoli et al. (2013)	10 European Mediterranean cities	All	0-5	24-h avg	1.91 (0.71, 3.12)
†Pascal et al. (2014)	9 French cities	All	0−1	24-h avg	-1.10 (-3.70, 1.50)
†Lanzinger et al. (2016)[a]	5 Central European cities (UFIREG)	>1	2-5	24-h avg	-0.73 (-6.59, 5.53)
†Janssen et al. (2013)	Netherlands	All	3	24-h avg	2.30 (1.10, 3.50)
†Lee et al. (2015a)	11 East Asian cities	All	0−1	24-h avg	1.00 (0.23, 1.78)
†Atkinson et al. (2014)	---	All	---[b]	24-h avg	1.51 (1.01, 2.01)
†Adar et al. (2014)	---	All	---[c]	24-h avg	1.20 (0.50, 2.00)

†Studies published since the 2009 PM Integrated Science Assessment.
[a]Only 4 of the 5 cities measured $PM_{2.5}$.
[b]Atkinson et al. (2014) primarily focused on single-day lag results.
[c]Adar et al. (2014) focused on single-day lag results, specifically lag 0, 1, or 2.
AQCD = Air Quality Criteria Document; avg = average; CI = confidence interval; UFIREG = Ultrafine Particles—an evidence-based contribution to the development of regional and European environmental and health policy.
% increases are standardized to a 10 μg/m^3 increase in 24-h average $PM_{2.5}$ concentrations.

Table S11-3. Corresponding data for Figure 11-3

Study	Location	Age	Lag	Copollutant	Correlation	% Increase (95% CI)
			Multi-city Studies Evaluated in 2009 PM ISA			
Burnett et al. (2004)[a]	12 Canadian cities	All	2			1.13 (NR)
				NO_2	0.48	0.98 (-0.16, 2.14)
Zanobetti and Schwartz (2009)[b]	47 U.S. cities	All	0–1			0.94 (0.65, 1.22)
				$PM_{10-2.5}$	--	0.77 (0.43, 1.12)

Study	Location	Age	Lag	Copollutant	Correlation	% Increase (95% CI)
Recent Multicity Studies and Meta-analyses						
†Lee et al. (2015a)	11 East Asian cities	All	0–1			0.38 (0.21, 0.55)
				SO_2	--	0.37 (0.18, 0.57)
				NO_2	--	0.37 (0.17, 0.56)
				O_3	--	0.41 (0.21, 0.61)
				$PM_{10-2.5}$	--	0.31 (0.12, 0.50)
†Samoli et al. (2013)	10 European Mediterranean cities	All	0−1			0.55 (0.27, 0.84)
				SO_2	< 0.4[c]	0.33 (-0.37, 1.03)
				NO_2	0.3−0.8	0.28 (-0.12, 0.68)
				O_3	< 0.4[c]	0.46 (0.16, 0.76)
				$PM_{10-2.5}$	0.2−0.7	0.59 (0.0, 1.18)
†Pascal et al. (2014)	9 French cities	All	0−1			0.70 (-0.10, 1.60)
				O_3	> 0.7[d]	0.90 (0.10, 1.80)
				$PM_{10-2.5}$	< 0.4	0.30 (-0.40, 1.0)
†Janssen et al. (2013)	Netherlands	All	0			0.80 (0.30, 1.20)
				$PM_{10-2.5}$	0.29	1.0 (0.50, 1.50)
†Di et al. (2017a)[c]	U.S. – Nation	65+	0-1			1.18 (1.09, 1.28)
				O_3	--	1.05 (0.95, 1.15)

†Studies published since the 2009 PM Integrated Science Assessment.
[a]Data from 1998 – 2000 when PM measured by TEOM. Standard error for the single-pollutant $PM_{2.5}$ result was not reported in the study so only the central estimate is included.
[b]Analysis focused on 112 U.S. cities, but $PM_{10-2.5}$ only measured in 47 U.S. cities.
[c]Study only examined all-cause mortality in individuals 65 years of age and older.
CI = confidence interval; NO_2 = nitrogen dioxide; O_3 = ozone; $PM_{10-2.5}$ = particulate matter with a nominal mean aerodynamic diameter ≤10 µm and >2.5 µm; SO_2 = sulfur dioxide.
% increases are standardized to a 10 µg/m^3 increase in 24-h average $PM_{2.5}$ concentrations.

Table S11-4. Corresponding data for Figure 11-17

Reference	ACS Cohort	Years	Mean (µg/m^3)	Notes	Exposure Assessment	Hazard Ratio (95% CI)
All-Cause Mortality						

Reference	ACS Cohort	Years	Mean (µg/m^3)	Notes	Exposure Assessment	Hazard Ratio (95% CI)
Pope et al. (1995)	Original	1982-1989	18.2		Metropolitan average	1.03 (1.02, 1.05)
Krewski et al. (2000)	Reanalysis	1982-1989	18.2		Metropolitan average	1.03 (1.02, 1.05)
Pope et al. (2002)	Extended	1979-1983	21.1		Metropolitan average	1.02 (1.00, 1.04)
		1999-2000	14			1.03 (1.01, 1.05)
Jerrett et al. (2005)	Intra-Metro LA	1982-2000	19		Kriging	1.08 (1.02, 1.14)
Eftim et al. (2008)	ACS Medicare	2000-2002	13.6		County average	1.05 (1.04, 1.06)
Krewski et al. (2009)	Reanalysis II	1982-2000	14		LUR	1.01 (1.00, 1.02)
	Reanalysis II – Intra-Metro LA		20.5			1.06 (1.01, 1.12)
	Reanalysis II – Intra-Metro NYC		12.8			0.93 (0.79, 1.09)
†Jerrett et al. (2009a)	Reanalysis III	1982-2000	14.3		Metropolitan average	1.02 (1.01, 1.03)
†Jerrett et al. (2013)	Reanalysis III – California	1982-2000	14.1		LUR	1.03 (1.00, 1.06)
†Pope et al. (2014)	Extended II	1982-2004	12.6		Hybrid of LUR and BME	1.03 (1.03, 1.04)
†Turner et al. (2016)	Extended II	1982-2004	12	Near Source	LUR	1.13 (1.10, 1.16)
			0.5	Regional		1.02 (1.01, 1.03)
†Enstrom (2017)	Reanalysis of Original	1979-1983	21.2		IPN, 85 Counties	1.01 (0.99, 1.02)
			21.4		IPN, 50 Counties	1.01 (0.99, 1.03)
			18		HEI, 50 Counties	1.04 (1.02, 1.06)
			CPD Mortality			
Pope et al. (1995)	Original	1982-1989	18.2		Metropolitan average	1.06 (1.03, 1.08)
Krewski et al. (2000)	Reanalysis	1982-1989	18.2		Metropolitan average	1.06 (1.03, 1.08)
Pope et al. (2002)	Extended	1979-1983	21.1		Metropolitan average	1.03 (1.01, 1.05)
		1999-2000	14			1.04 (1.01, 1.07)
Jerrett et al. (2005)	Intra-Metro LA	1982-2000	19		Kriging	1.06 (0.98, 1.14)

Reference	ACS Cohort	Years	Mean (µg/m^3)	Notes	Exposure Assessment	Hazard Ratio (95% CI)
Krewski et al. (2009)	Reanalysis II	1982-2000	14		LUR	1.04 (1.03, 1.06)
	Reanalysis II – Intra-Metro LA		20.5			1.04 (0.97, 1.12)
	Reanalysis II – Intra-Metro NYC		12.8			0.81 (0.64, 1.04)
†Jerrett et al. (2009a)	Reanalysis III	1982-2000	--		Kriging	1.06 (1.05, 1.03)
CVD Mortality						
Krewski et al. (2000)	Reanalysis	1982-1989	18.2		Kriging	1.06 (1.04, 1.09)
Pope III et al. (2004)	Extended	1982-2000	17.1		Metropolitan average	1.06 (1.04, 1.07)
†Jerrett et al. (2009a)	Reanalysis III	1982-2000	14.3		Metropolitan average	1.07 (1.05, 1.09)
†Jerrett et al. (2013)	Reanalysis III – California	1982-2000	14.1		LUR	1.06 (1.02, 1.11)
†Pope et al. (2014)	Extended II	1982-2004	12.6		Hybrid of LUR and BME	1.06 (1.05, 1.07)
†Turner et al. (2016)	Extended II	1982-2004	12	Near Source	LUR	1.19 (1.14, 1.24)
			0.5	Regional		1.04 (1.03, 1.06)
†Jerrett et al. (2016)	Ensemble Exposure Model	1982-2004	--		Satellite-CMAQ-surface	1.07 (1.05, 1.08)
IHD Mortality						
Pope III et al. (2004)	Extended	1982-2000	17.1		Metropolitan average	1.09 (1.07, 1.11)
Jerrett et al. (2005)	Intra-Metro LA	1982-2000	19		Kriging	1.18 (1.06, 1.32)
Krewski et al. (2009)	Reanalysis II	1982-2000	14		LUR	1.07 (1.05, 1.10)
	Reanalysis II – Intra-Metro LA		20.5			1.12 (1.01, 1.25)
	Reanalysis II – Intra-Metro NYC		12.8			1.26 (0.93, 1.70)
†Jerrett et al. (2009a)	Reanalysis III	1982-2000	14.3		Metropolitan average	1.10 (1.08, 1.13)

Reference	ACS Cohort	Years	Mean (µg/m^3)	Notes	Exposure Assessment	Hazard Ratio (95% CI)
†Jerrett et al. (2013)	Reanalysis III – California	1982-2000	14.1		LUR	1.10 (1.04, 1.17)
†Pope et al. (2014)	Extended II	1982-2004	12.6		Hybrid of LUR and BME	1.07 (1.05, 1.09)
†Turner et al. (2016)	Extended II	1982-2004	12	Near Source	LUR	1.32 (1.24, 1.39)
			0.5	Regional		1.04 (1.02, 1.06)
†Jerrett et al. (2016)	Ensemble Exposure Model	1982-2004	--		Satellite-CMAQ-surface	1.07 (1.05, 1.09)
Other CVD						
†Pope et al. (2014)	Extended II	1982-2004	12.6	Heart Failure	Hybrid of LUR and BME	1.05 (1.02, 1.09)
†Turner et al. (2016)	Extended II	1982-2004	12	Heart Failure; Near Source	LUR	1.01 (0.93, 1.10)
			0.5	Heart Failure; Regional		1.06 (1.03, 1.09)
†Pope et al. (2014)	Extended II	1982-2004	12.6	CBVD	Hybrid of LUR and BME	1.05 (1.02, 1.08)
†Turner et al. (2016)	Extended II	1982-2004	12	CBVD; Near Source	LUR	1.10 (1.00, 1.20)
			0.5	CBVD; Regional		1.04 (1.01, 1.08)
†Pope et al. (2014)	Extended II	1982-2004	12.6	Hypertension	Hybrid of LUR and BME	1.05 (0.98, 1.12)
†Jerrett et al. (2013)	Reanalysis III – California	1982-2000	14.1	Stroke	LUR	1.06 (0.99, 1.14)
†Pope et al. (2014)	Extended II	1982-2004	12.6	Diabetes	Hybrid of LUR and BME	1.06 (1.01, 1.12)
†Turner et al. (2016)	Extended II	1982-2004	12	Diabetes; Near Source	LUR	1.37 (1.15, 1.63)
			0.5	Diabetes; Regional		1.03 (0.98, 1.10)
Respiratory Mortality						
†Jerrett et al. (2009a)	Reanalysis III	1982-2000	14.3		Metropolitan average	1.02 (0.98, 1.05)
†Jerrett et al. (2013)	Reanalysis III – California	1982-2000	14.1		LUR	1.04 (0.96, 1.14)

Reference	ACS Cohort	Years	Mean (μg/m³)	Notes	Exposure Assessment	Hazard Ratio (95% CI)
†Pope et al. (2014)	Extended II	1982-2004	12.6		Hybrid of LUR and BME	1.08 (1.05, 1.10)
†Turner et al. (2016)	Extended II	1982-2004	12	Near Source	LUR	1.03 (0.94, 1.12)
			0.5	Regional		1.08 (1.05, 1.11)
COPD Mortality						
†Pope et al. (2014)	Extended II	1982-2004	12.6		Hybrid of LUR and BME	1.05 (1.01, 1.09)
†Turner et al. (2016)	Extended II	1982-2004	12	Near Source	LUR	1.03 (0.92, 1.16)
			0.5	Regional		1.08 (1.05, 1.11)

†Studies published since the 2009 PM Integrated Science Assessment.
ACS = American Cancer Society; CBVD = cerebrovascular disease; CI = confidence interval; COPD = chronic obstructive pulmonary disease; CPD = cardiopulmonary disease; CVD = cardiovascular disease; HEI = $PM_{2.5}$ data from Health Effects Institute reanalysis; IHD = ischemic heart disease; IPN = inhalable particle network; LUR-BME = land use regression Bayesian maximum entropy.
Hazard Ratios are standardized to a 5 μg/m³ increase in $PM_{2.5}$ concentrations.

Table S11-5. Corresponding data for Figure 11-18

Reference	Cohort	Notes	Years	Mean (IQR) (μg/m³)	Hazard Ratio (95% CI)
†Pope et al. (2014)	ACS		1982-2004	12.6	1.03 (1.03, 1.04)
†Lepeule et al. (2012)	Harvard Six Cities		1974-2009	11.4−23.6	1.07 (1.03, 1.10)
†Thurston et al. (2016)	NIH-AARP		2000-2009	10.2−13.6	1.01 (1.00, 1.02)
Zeger et al. (2008)	MCAPS	Eastern	2000-2005	14.0 (3.0)	1.03 (1.02, 1.04)
		Western		13.1 (8.1)	0.99 (0.98, 1.00)
		Central		10.7 (2.4)	1.06 (1.05, 1.08)
Eftim et al. (2008)	ACS-Medicare		2000-2002	13.6	1.05 (1.04, 1.06)
†Di et al. (2017b)	Medicare		2000-2012	11.5	1.041 (1.039, 1.042)
		Exposure < 12		11.5	1.066 (1.063, 1.068)
		Nearest Monitor		11.5	1.03 (1.029, 1.031)
†Kioumourtzoglou et al. (2016)	Medicare		2000-2010	12	1.09 (1.05, 1.13)
†Pun et al. (2017)	Medicare		2000-2008	12.5	1.098 (1.094, 1.102)
†Shi et al. (2015)	Medicare	Mutual adj	2003-2008	8.12 (3.78)	1.04 (1.01, 1.06)

Reference	Cohort	Notes	Years	Mean (IQR) (µg/m^3)	Hazard Ratio (95% CI)
		Exp<10, mutual adj			1.05 (1.00, 1.09)
		No mutual adj			1.03 (1.00, 1.06)
		Exp<10, no mutual adj			1.04 (0.99, 1.08)
†{Wang, 2017, 3452658@@author-year)	Medicare		2000-2013	10.7 (3.8)	1.11 (1.10, 1.11)
		Exp<12			1.18 (1.16, 1.19)
Lipfert et al. (2006)	Veterans		1997-2001	14.34	1.03 (1.03, 1.03)
Goss et al. (2004)	U.S. Cystic Fibrosis		1999-2000	13.7	1.15 (0.95, 1.39)
†Crouse et al. (2012)	CanCHEC	Satellite data	1991-2001	8.9	1.07 (1.06, 1.08)
		Monitor data		11.2	1.05 (1.03, 1.07)
†Crouse et al. (2015)	CanCHEC		1991-2006	8.9	1.04 (1.03, 1.04)
†Chen et al. (2016)	EFFECT		1999-2011	10.7	1.16 (1.04, 1.29)
†Weichenthal et al. (2016)	Ag Health		1993-2009	8.84	0.97 (0.87, 1.10)
		More precise exposure			1.01 (0.89, 1.14)
†Pinault et al. (2016)	CCHS		1998-2011	6.3	1.12 (1.09, 1.16)
†Lipsett et al. (2011)	CA Teachers		2000-2005	15.6 (8.0)	1.00 (0.97, 1.04)
†Ostro et al. (2010)	CA Teachers	Within 30 km	2002-2007	17.5 (6.1)	1.36 (1.29, 1.43)
		Within 8 km		17 (6.1)	1.39 (1.22, 1.57)
†Ostro et al. (2015)	CA Teachers		2001-2007	17.9 (9.6)	1.01 (0.99, 1.03)
†Puett et al. (2009)	Nurses Health		1992-2002	13.9 (3.6)	1.12 (1.01, 1.24)
†Hart et al. (2015)	Nurses Health	Nearest monitor	2000-2006	12.7	1.10 (1.01, 1.20)
		Spatio-temporal model		12	1.09 (1.01, 1.17)
†Puett et al. (2011)	Health Professionals	Full model	1989-2003	17.8 (4.3)	0.93 (0.84, 1.03)
†Hart et al. (2011)	TrIPS		1985-2000	14.1 (4)	1.05 (1.01, 1.09)
†Kloog et al. (2013)	MA Cohort	CVD+Resp	2000-2008	9.9 (1.6)	1.26 (1.22, 1.34)
†Garcia et al. (2015)	CA Cohort	Kriging	2006	13.06	1.00 (1.00, 1.01)

Reference	Cohort	Notes	Years	Mean (IQR) (μg/m³)	Hazard Ratio (95% CI)
		IDW		12.94	1.01 (1.00, 1.01)
		Closest monitor		12.68	1.01 (1.00, 1.01)
†Wang et al. (2016)	NJ Cohort		2004-2009	11.3	1.08 (1.01, 1.15)
Enstrom (2005)	CA Cancer Prev		1973-1982	23.4	1.02 (1.00, 1.03)
			1983-2002		1.00 (0.99, 1.01)
			1973-2002		1.00 (0.99, 1.01)

†Studies published since the 2009 PM Integrated Science Assessment.
ACS = American Cancer Society; adj = Adjustment; Ag Health = Agricultural Health Study; Cancer Prev = Cancer Prevention; CanCHEC = Canadian Census Health and Environment Cohort; CCHS = Canadian Community Health Survey; CI = confidence interval; CVD = cardiovascular; exp = exposure; Health Prof = Health Professionals; IDW = Inverse Distance Weighting; IQR = Interquartile Range; km = kilometer; MCAPS = Medicare Cohort Air Pollution Study; NIH-AARP = National Institutes of Health American Association of Retired Persons; Resp = Respiratory; TrIPS = Trucking Industry Particle Study.
Hazard Ratios are standardized to a 5 μg/m³ increase in $PM_{2.5}$ concentrations.

Table S11-6. Corresponding Data for Figure 11-19

Reference	Cohort	Notes	Years	Mean (μg/m³)	Hazard Ratio (95% CI)
		All CVD			
†Pun et al. (2017)	Medicare		2000-2008	12.5	1.21 (1.20, 1.22)
†Lepeule et al. (2012)	Harvard Six Cities		1974-2009	11.4−23.6	1.12 (1.07, 1.18)
†Ostro et al. (2015)	CA Teachers		2001-2007	17.9	1.03 (0.99, 1.06)
†Lipsett et al. (2011)	CA Teachers		2000-2005	15.6	1.03 (0.97, 1.09)
†Hart et al. (2011)	TrIPS	Whole cohort	1985-2000	14.1	1.03 (0.96, 1.09)
		Excluding long-haul drivers			1.03 (0.94, 1.12)
†Thurston et al. (2016)	NIH-AARP		2000-2009	10.2−13.6	1.05 (1.02, 1.07)
Miller et al. (2007)	WHI		1994-2003	13.4	1.33 (1.12, 1.57)
†Garcia et al. (2015)	CA Cohort	Kriging	2006	13.06	1.04 (1.03, 1.05)
		IDW		12.94	1.05 (1.04, 1.06)
		Closest monitor		12.68	1.03 (1.03, 1.04)
†Pope et al. (2014)	ACS		1982-2004	12.6	1.06 (1.05, 1.07)

Reference	Cohort	Notes	Years	Mean (μg/m³)	Hazard Ratio (95% CI)
†Crouse et al. (2012)	CanCHEC		1991-2001	11.2	1.08 (1.06, 1.09)
†Crouse et al. (2015)	CanCHEC	Extended	1991-2006	8.9	1.03 (1.02, 1.04)
†Pinault et al. (2016)	CCHS		1998-2011	6.3	1.23 (1.12, 1.36)
†Chen et al. (2016)	EFFECT		1999-2011	10.7	1.16 (1.04, 1.29)
†Weichenthal et al. (2016)	Ag Health		1993-2009	8.84	1.07 (0.87, 1.31)
		More precise exposure			1.14 (0.92, 1.43)
All Respiratory					
†Pun et al. (2017)	Medicare		2000-2008	12.5	1.12 (1.11, 1.13)
†Ostro et al. (2015)	CA Teachers		2001-2007	17.9 (9.6)	0.99 (0.95, 1.05)
†Ostro et al. (2010)	CA Teachers	Monitor within 30 km	2002-2007	17.5 (6.1)	1.34 (1.17, 1.54)
		Monitor within 8 km		17 (6.1)	1.31 (0.93, 1.84)
†Lipsett et al. (2011)	CA Teachers		2000-2005	15.6 (8.0)	1.10 (0.98, 1.23)
†Hart et al. (2011)	TrIPS	Whole cohort	1985-2000	14.1 (4)	1.09 (0.96, 1.24)
		Excluding long-haul drivers			1.26 (1.09, 1.47)
†Thurston et al. (2016)	NIH-AARP		2000-2009	10.2−13.6	1.02 (0.99, 1.06)
†Turner et al. (2016)	ACS	LUR-BME	1982-2004	12.6 (3.9)	1.08 (1.05, 1.11)
†Turner et al. (2016)	ACS	Near-Source	1982-2004	12 (0.9)	0.97 (0.96, 0.99)
†Turner et al. (2016)	ACS	Regional	1982-2004	0.5 (3.8)	1.09 (1.04, 1.15)
†Pinault et al. (2016)	CCHS		1998-2011	6.3	1.23 (1.12, 1.36)
†Crouse et al. (2015)	CanCHEC	Extended	1991-2006	8.9	0.973 (0.955, 0.992)

†Studies published since the 2009 PM Integrated Science Assessment.
ACS = American Cancer Society; Ag Health = Agricultural Health Study; CanCHEC = Canadian Census Health and Environment Cohort; CCHS = Canadian Community Health Survey; CI = confidence interval; CVD = cardiovascular disease; EFFECT = Enhanced Feedback For Effective Cardiac Treatment; IDW = Inverse Distance Weighting; km = kilometer; LUR-BME = land use

regression – Bayesian maximum entropy; NIH-AARP = National Institutes of Health American Association of Retired Persons; TrIPS = Trucking Industry Particle Study; WHI = Women's Health Initiative.
Hazard Ratios are standardized to a 5 µg/m^3 increase in $PM_{2.5}$ concentrations.

Table S11-7. Corresponding data for Figure 11-20

Reference	Cohort	Copollutant	Correlation	Hazard Ratio (95% CI)
		Total Mortality		
†Di et al. (2017b)	Medicare			1.04 (1.04, 1.04)
		O_3	0.24	1.04 (1.04, 1.04)
†Crouse et al. (2015)	CanCHEC			1.04 (1.03, 1.04)
		O_3	0.73	1.04 (1.03, 1.04)
†Jerrett et al. (2009b)	ACS			1.02 (1.01, 1.03)
		O_3	0.64	1.04 (1.02, 1.05)
†Jerrett et al. (2013)	ACS-California			1.03 (1.00, 1.06)
		O_3	0.56	1.03 (1.00, 1.06)
†Thurston et al. (2016)	NIH-AARP			1.01 (1.00, 1.02)
		O_3	--	1.01 (0.99, 1.02)
†Turner et al. (2016)	ACS			1.03 (1.02, 1.04)
		O_3	0.49	1.03 (1.02, 1.04)
†Bentayeb et al. (2015)	Gazel			1.08 (0.96, 1.22)
		O_3	0.38	1.07 (0.98, 1.16)
		Cardiovascular Mortality		
†Crouse et al. (2015)	CanCHEC			1.03 (1.02, 1.04)
		O_3	0.73	1.04 (1.03, 1.05)
†Jerrett et al. (2009b)	ACS			1.07 (1.05, 1.09)
		O_3	0.64	1.10 (1.07, 1.12)
†Jerrett et al. (2013)	ACS-California			1.06 (1.02, 1.11)
		O_3	0.56	1.05 (1.01, 1.10)
†Thurston et al. (2016)	NIH-AARP			1.05 (1.02, 1.07)
		O_3	--	1.03 (1.01, 1.06)
†Turner et al. (2016)	ACS			1.04 (1.03, 1.06)

Reference	Cohort	Copollutant	Correlation	Hazard Ratio (95% CI)
		O_3	0.49	1.04 (1.02, 1.05)
		Respiratory Mortality		
†Crouse et al. (2015)	CanCHEC			0.97 (0.96, 0.99)
		O_3	0.73	0.97 (0.95, 0.99)
†Jerrett et al. (2009b)	ACS			1.02 (0.98, 1.06)
		O_3	0.64	0.96 (0.91, 1.01)
†Jerrett et al. (2013)	ACS-California			1.04 (0.96, 1.14)
		O_3	0.56	1.04 (0.95, 1.14)
†Thurston et al. (2016)	NIH-AARP			1.02 (0.99, 1.06)
		O_3	--	1.01 (0.97, 1.05)
†Turner et al. (2016)	ACS			1.06 (1.02, 1.09)
		O_3	0.49	1.04 (1.01, 1.07)

†Studies published since the 2009 PM Integrated Science Assessment.
ACS = American Cancer Society; CanCHEC = Canadian Census Health and Environment Cohort; CI = confidence interval; CVD = cardiovascular disease; NIH-AARP = National Institutes of Health American Association of Retired Persons; O_3 = ozone.
Hazard Ratios are standardized to a 5 µg/m^3 increase in $PM_{2.5}$ concentrations.

Table S11-8. Corresponding data for Figure 11-21

Reference	Cohort	Copollutant	Corellation	Hazard Ratio (95% CI)
		Total Mortality		
†Crouse et al. (2015)	CanCHEC			1.04 (1.03, 1.04)
		NO_2	0.40	1.07 (1.06, 1.08)
†Jerrett et al. (2013)	ACS-California			1.03 (1.00, 1.06)
		NO_2	0.55	1.01 (0.98, 1.05)
†Beelen et al. (2014)	ESCAPE			1.07 (1.01, 1.13)
		NO_2	<0.7*	1.06 (0.98, 1.15)
†Beelen et al. (2014)	ESCAPE			1.08 (1.02, 1.14)
		$PM_{10-2.5}$	<0.7*	1.07 (1.01, 1.14)
†Puett, 2009, 1077434@@author-year}	Nurses Health Study			1.12 (1.01, 1.24)
		$PM_{10-2.5}$	--	1.14 (1.01, 1.27)

Reference	Cohort	Copollutant	Corellation	Hazard Ratio (95% CI)
†Bentayeb et al. (2015)	Gazel			1.08 (0.96, 1.22)
		Benzene	0.66	1.03 (0.95, 1.14)
		Cardiovascular Mortality		
†Crouse et al. (2015)	CanCHEC			1.03 (1.02, 1.04)
		NO_2	0.40	1.06 (1.04, 1.07)
†Jerrett et al. (2013)	ACS-California			1.06 (1.02, 1.11)
		NO_2	0.55	1.04 (0.99, 1.10)
		Respiratory Mortality		
†Crouse et al. (2015)	CanCHEC			0.97 (0.96, 0.99)
		NO_2	0.40	1.01 (0.98, 1.04)
†Jerrett et al. (2013)	ACS-California			1.04 (0.96, 1.14)
		NO_2	0.55	1.06 (0.96, 1.17)

†Studies published since the 2009 PM Integrated Science Assessment.
*includes cohorts from meta-analysis where the correlation was less than 0.7.
ACS = American Cancer Society; CanCHEC = Canadian Census Health and Environment Cohort; CI = confidence interval; CVD = cardiovascular disease; ESCAPE = European Study of Cohorts for Air Pollution Effects; NO_2 = nitrogen dioxide; $PM_{10-2.5}$ = particulate matter with a nominal mean aerodynamic diameter ≤10 µm and >2.5 µm.
Hazard Ratios are standardized to a 5 µg/m^3 increase in $PM_{2.5}$ concentrations.

Table S11-9. Corresponding data for Figure 11-26

Study	Location	Age	Lag	Averaging Time	% Increase (95% CI)
		Multi-city Studies Evaluated in 2004 PM AQCD and 2009 PM ISA			
Klemm and Mason (2003)	6 U.S. cities	All	0−1	24-h avg	0.20 (-0.40, 0.80)
Burnett and Goldberg (2003)	8 Canadian cities	All	1	24-h avg	0.73 (-0.25, 1.72)
Zanobetti and Schwartz (2009)	47 U.S. cities	All	0−1	24-h avg	0.46 (0.21, 0.71)
Burnett et al. (2004)	12 Canadian cities	All	1	24-h avg	0.65 (-0.10, 1.42)
		Recent Multicity Studies and Meta-analyses			
†Malig and Ostro (2009)	15 CA counties	All	2	24-h avg	0.70 (-0.10, 1.50)

Study	Location	Age	Lag	Averaging Time	% Increase (95% CI)
†Janssen et al. (2013)	Netherlands	All	2	24-h avg	0.90 (-0.20, 2.10)
†Samoli et al. (2013)	10 European Mediterranean cities	All	0−1	24-h avg	0.30 (-0.10, 0.69)
†Stafoggia et al. (2017)	8 European cities	All	1	24-h avg	0.77 (0.37, 1.17)
†Lanzinger et al. (2016)[a]	5 Central European cities (UFIREG)	>1	0-1	24-h avg	1.10 (-0.80, 3.00)
†Pascal et al. (2014)	9 French cities	All	0−1	24-h avg	1.70 (0.40, 3.00)
†Lee et al. (2015a)	11 East Asian cities	All	0−1	24-h avg	0.39 (-0.02, 0.81)
†Chen et al. (2011)	3 Chinese cities (CAPES)	All	1	24-h avg	0.25 (0.08, 0.41)
†Adar et al. (2014)	---	All	---[b]	24-h avg	0.60 (0.30, 0.80)

†Studies published since the 2009 PM Integrated Science Assessment.
[a]Only 4 of the 5 cities measured $PM_{2.5}$.
[b]Adar et al. (2014) focused on single-day lag results, specifically lag 0, 1, or 2.
avg = average; AQCD = Air Quality Criteria Document; CAPES = China Air Pollution and Health Effects Study; CI = confidence interval; DL = distributed lag; UFIREG = Ultrafine Particles—an evidence based contribution to the development of regional and European environmental and health policy.
% increases are standardized to a 10 $\mu g/m^3$ increase in 24-h average $PM_{10-2.5}$ concentrations.

Table S11-10. Corresponding data for Figure 11-27

Study	Location	Age	Lag	Averaging Time	% Increase (95% CI)
Cardiovascular Mortality – Multi-city Studies Evaluated in 2004 PM AQCD and 2009 PM ISA					
Zanobetti and Schwartz (2009)	47 U.S. cities	All	0−1	24-h avg	0.32 (0.0, 0.64)
Cardiovascular Mortality – Recent Multicity Studies and Meta-analyses					
†Lee et al. (2015a)	11 East Asian cities	All	0−1	24-h avg	0.69 (0.05, 1.33)
†Chen et al. (2011)	3 Chinese cities (CAPES)	All	1	24-h avg	0.25 (0.10, 0.39)
†Malig and Ostro (2009)	15 CA counties	All	2	24-h avg	1.30 (0.10, 2.50)
†Janssen et al. (2013)	Netherlands	All	3	24-h avg	1.80 (-0.20, 3.70)

Study	Location	Age	Lag	Averaging Time	% Increase (95% CI)
†Pascal et al. (2014)	9 French cities	All	0−1	24-h avg	3.20 (1.30, 5.10)
†Lanzinger et al. (2016)[a]	5 Central European cities (UFIREG)	>1	0−1	24-h avg	0.90 (-2.30, 4.30)
†Samoli et al. (2013)	10 European Mediterranean cities	All	0−1 DL	24-h avg	0.28 (-0.37, 0.93)
†Adar et al. (2014)	---	All	---[b]	24-h avg	0.70 (0.20, 1.20)
Respiratory Mortality – Multi-city Studies Evaluated in 2004 PM AQCD and 2009 PM ISA					
Zanobetti and Schwartz (2009)	47 U.S. cities	All	0−1	24-h avg	1.16 (0.43, 1.89)
Respiratory Mortality – Recent Multicity Studies and Meta-analyses					
†Lee et al. (2015a)	11 East Asian cities	All	0−1	24-h avg	0.46 (-0.07, 0.98)
†Chen et al. (2011)	3 Chinese cities (CAPES)	All	1	24-h avg	0.48 (0.20, 0.76)
†Janssen et al. (2013)	Netherlands	All	2	24-h avg	3.80 (0.60, 7.20)
†Pascal et al. (2014)	9 French cities	All	0−1	24-h avg	-1.60 (-5.50, 2.40)
†Lanzinger et al. (2016)[a]	5 Central European cities (UFIREG)	>1	0−1	24-h avg	-2.20 (-9.30, 5.40)
†Samoli et al. (2013)	10 European Mediterranean cities	All	0−5 DL	24-h avg	0.76 (-0.70, 2.25)
†Adar et al. (2014)	---	All	---[b]	24-h avg	1.40 (0.50, 2.40)

†Studies published since the 2009 PM Integrated Science Assessment.

[a]Only 4 of the 5 cities measured $PM_{2.5}$, study included ages > 1.

[b]Adar et al. (2014) focused on single-day lag results, specifically lag 0, 1, or 2.

avg = average; AQCD = Air Quality Criteria Document; CAPES = China Air Pollution and Health Effects Study; CI = confidence interval; UFIREG = Ultrafine Particles – an evidence based contribution to the development of regional and European environmental and health policy.

% increases are standardized to a 10 µg/m^3 increase in 24-h average $PM_{10-2.5}$ concentrations.

Table S11-11. Corresponding data for Figure 11-28

Study	Location	Lag	Copollutant	Correlation	% Increase (95% CI)
Multi-city Studies Evaluated in 2009 PM ISA					
Burnett et al. (2004)[a]	12 Canadian cities	1			0.65 (-0.10, 1.42)
			NO_2	0.27	0.31 (-0.49, 1.11)
Zanobetti and Schwartz (2009)[b]	47 U.S. cities	0–1			0.46 (0.21, 0.71)
			$PM_{2.5}$	--	0.47 (0.21, 0.73)
Recent Multicity Studies and Meta-analyses					
†Janssen et al. (2013)	Netherlands	2			0.90 (-0.20, 2.10)
			$PM_{2.5}$	0.29	0.40 (-0.70, 1.60)
†Samoli et al. (2013)[c]	10 European Mediterranean cities	0−5 DL			0.30 (-0.10, 0.69)
			SO_2	--	0.13 (-0.40, 0.66)
			NO_2	--	0.06 (-0.53, 0.66)
			O_3	--	0.22 (-0.50, 0.95)
			$PM_{2.5}$	0.19−0.68	-0.05 (-0.84, 0.75)
†Pascal et al. (2014)	9 French cities	0−1			1.70 (0.40, 3.00)
			O_3	>0.7[d]	1.15 (-0.30, 2.60)
			$PM_{2.5}$	<0.4	1.50 (0.20, 2.80)
†Lee et al. (2015a)	11 East Asian cities	0−1			0.39 (-0.02, 0.81)
			SO_2	--	0.22 (-0.16, 0.61)
			NO_2	--	0.31 (-0.12, 0.73)
			O_3	--	0.55 (-0.05, 1.16)
			$PM_{2.5}$	--	0.09 (-0.10, 0.29)
†Chen et al. (2011)	3 Chinese cities (CAPES)	1			0.25 (0.08, 0.41)
			$PM_{2.5}$	0.28−0.53	0.14 (-0.11, 0.39)

†Studies published since the 2009 PM Integrated Science Assessment.

[a]Data from 1998 – 2000 when PM measured by TEOM. Standard error for the single-pollutant $PM_{2.5}$ result was not reported in the study so only the central estimate is included.

[b]Analysis focused on 112 U.S. cities, but $PM_{10-2.5}$ only measured in 47 U.S.

[c]Copollutant results only presented for a lag of 0−5 days.

[d]Correlation is for the summer across cities, no correlation was observed in all-year analyses.

CAPES = China Air Pollution and Health Effects Study; CI = confidence interval; DL = distributed lag; NO_2 = nitrogen dioxide; O_3 = ozone; $PM_{2.5}$ = particulate matter with a nominal mean aerodynamic diameter ≤ 2.5 µm, SO_2 = sulfur dioxide.

% increases are standardized to a 10 µg/m^3 increase in 24-h average $PM_{10-2.5}$ concentrations.

Table S11-12. Summary of studies that examined alternative PM size fractions and exposure metrics

Study/Location/Years/ Mortality Outcome(s)	UFP Metric/Size Range	Mean	Upper Percentiles	Location of UFP Monitor(s)	Copollutant Examination	Results
†Breitner et al. (2011) Beijing, China 3/2004 – 8/2005 Cardiovascular Ischemic Heart Disease Cerebrovascular	SC (μm^2 cm^{-3}) 0.3 – 0.8 µm < 0.8 µm MC ($\mu g/m^3$) 0.3 – 0.8 µm < 0.8 µm	SC[a] 0.3 – 0.8 µm: 400.2 < 0.8 µm: 1,155.0 MC[a] 0.3 – 0.8 µm: 47.3 < 0.8 µm: 78.4	SC 0.3 – 0.8 µm: 75th: 679.1 Max: 2,631.0 < 0.8 µm: 75th: 1,687.0 Max: 4,849.0 MC 0.3 – 0.8 µm: 75th: 80.4 Max: 319.4 < 0.8 µm: 75th: 123.9 Max: 422.9	1 urban background site a few hundred meters from a major road	Correlation (r): NR Copollutant models examined with: NR	% Increase (95% CI) Cardiovascular SC (μm^2 cm^{-3}) 0.3 – 0.8 µm (per 486.7 μm^2 cm^{-3}): 0.52 (-1.69, 2.70); lag 1 < 0.8 µm (per 973.7 μm^2 cm^{-3}): 0.85 (-1.41, 3.16); lag 2 MC ($\mu g/m^3$) 0.3 – 0.8 µm (per 57.9 $\mu g/m^3$): 0.46 (-1.73, 2.70); lag 1 < 0.8 µm (per 81.8 $\mu g/m^3$): 0.52 (-1.65, 2.73); lag 2
†Pererz et al. (2009) Barcelona, Spain (3/2003 – 12/2005) Cardiovascular Cerebrovascular Respiratory	MC ($\mu g/m^3$) < 1.0 µm	20.0	75th: 24.3 Max: 80.1	1 urban background site exposed to road traffic emissions	Correlation (r): $PM_{2.5}$-1: 0.24 $PM_{10-2.5}$: 0.09 O_3: -0.19 NO_2: 0.13 Copollutant models examined with: O_3, NO_2	OR (95% CI) (per 10 $\mu g/m^3$) Cardiovascular 1.028 (1.000, 1.057); lag 0-1 Cerebrovascular 1.037 (0.981, 1.097); lag 0-1 Respiratory 1.042 (0.998, 1.087); lag 2
†Leitte et al. (2012) Beijing, China 3/2004 – 8/2005 Respiratory	NC (cm^{-3}) 100 – 300 nm 300 – 1000 nm	100 – 300 nm: 6,900 300 – 1000 nm: 890	100 – 300 nm: 11,900 300 – 1000 nm: 1,800	1 urban background site, 20 m above ground, and 500 m from major road	Correlation (r): Across NC size fractions PM_{10}: -0.23 – 0.60 SO_2: -0.06 – 0.51 NO_2: -0.33 – 0.69	% Increase (95% CI) 100 – 300 nm (per 4,500 cm^{-3}) 3.7 (-6.7, 15.2); lag 0-4

					Copollutant models examined with: PM_{10}, SO_2, NO_2	300 – 1000 nm (per 840 cm^{-3}) 11.5 (3.0, 20.7); lag 0-4
†Meng et al. (2013) Shenyang, China 12/2006 – 11/2008 Total Cardiovascular Respiratory	NC (cm^{-3}) 250 – 280 nm 280 – 300 nm 300 – 350 nm 350 – 400 nm 400 – 450 nm 450 – 500 nm 500 – 650 nm 650 – 1000 nm 1.0 – 2.5 µm	250 – 280 nm: 3,500 280 – 300 nm: 2,700 300 – 350 nm: 1,900 350 – 400 nm: 1,100 400 – 450 nm: 520 450 – 500 nm: 290 500 – 650 nm: 270 650 – 1000 nm: 110 1.0 – 2.5 µm: 32.0	Max: 250 – 280 nm: 16,000 280 – 300 nm: 15,000 300 – 350 nm: 13,000 350 – 400 nm: 9,600 400 – 450 nm: 6,400 450 – 500 nm: 4,300 500 – 650 nm: 4,300 650 – 1000 nm: 2,000 1.0 – 2.5 µm: 1,900	1 monitoring site located away from major roads, industrial sources, buildings, residential sources of emissions from burning coal, waste, or oil	Correlation (r): Across NC size fractions $PM_{2.5}$: 0.52 – 0.71 $PM_{10-2.5}$: 0.05 – 0.23 PM_{10}: 0.50 – 0.57 SO_2: 0.46 – 0.54 NO_2: 0.38 – 0.48 Copollutant models examined with: $PM_{2.5}$, PM_{10}, $PM_{10-2.5}$, SO_2, NO_2	% Increase (95% CI) 250 – 280 nm (per 2,600 cm^{-3}) 2.41 (1.23, 3.58) 280 – 300 nm (per 2,000 cm^{-3}) 2.10 (1.03, 3.18) 300 – 350 nm (per 1,510 cm^{-3}) 1.85 (0.84, 2.85) 350 – 400 nm (per 850 cm^{-3}) 1.31 (0.52, 2.09) 400 – 450 nm (per 360 cm^{-3}) 0.69 (0.18, 1.21) 450 – 500 nm (per 193 cm^{-3}) 0.45 (0.04, 0.87) 500 – 650 nm (per 188 cm^{-3}) 0.36 (-0.04, 0.76) 650 – 1000 nm (per 63 cm^{-3}) 0.12 (-0.22, 0.45) 1.0 – 2.5 µm (per 22 cm^{-3}) -0.12 (-0.43, 0.18)

†Studies published since the 2009 PM ISA.

MC = mass concentration; NC = number concentration; SC = surface area concentration; a = median concentration; NO_2 = nitrogen dioxide; O_3 = ozone; $PM_{2.5}$ = particulate matter with a nominal mean aerodynamic diameter ≤ 2.5 µm; $PM_{10-2.5}$ = particulate matter with a nominal mean aerodynamic diameter ≤10 µm and >2.5 µm; PM_{10} = particulate matter with a nominal aerodynamic diameter less than or equal to 10 µm; SO_2 = sulfur dioxide.

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