Supplemental Material for Chapter 5 (Respiratory) of the Integrated Science Assessment for Particulate Matter

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SUPPLEMENTAL TABLES FOR CHAPTER 5 (RESPIRATORY)

Table S5-1. Corresponding data for Figure 5-2 (Summary of associations between short-term PM2.5 exposures and asthma hospital admissions for a 10 μg/m3 increase in 24-h avg PM2.5 concentrations)

Study	**Location**	**Age**	**Lag**	**Averaging Time**	**RR/OR (95% CI)**
{Slaughter, 2005, 73854@@author-year}	Spokane, WA	All	1	24-h avg	1.01 (0.91, 1.11)
†{Winquist, 2012, 1668375@@author-year}	St. Louis, MO	All	0−4 DL	24-h avg	1.03 (0.99, 1.08)
†{Silverman, 2010, 386252@@author-year}	New York, NY	All	0−1[a]	24-h avg	1.04 (0.99, 1.09)
			0−1[b]		1.07 (1.05, 1.10)
†{Zhao, 2017, 3454343@@author-year}	Dongguan, China	All	0−3	24-h avg	1.05 (1.03, 1.07)
†{Yap, 2013, 2333295@@author-year}	Central Valley, CA[c]	1–9	0−2	24-h avg	1.03
	South Coast, CA[c]				1.07
†{Chen, 2016, 3426059@@author-year}	Adelaide, Australia	0−17	0−4	24-h avg	1.28 (1.17, 1.42)
†{Li, 2011, 807114@@author-year}[d]	Detroit, MI	2−18[e]	0−4	24-h avg	1.03 (1.00, 1.07)
		2−18[f]			1.04 (1.01, 1.07)
†{Winquist, 2012, 1668375@@author-year}	St. Louis, MO	2−18	0−4 DL	24-h avg	1.06 (0.98, 1.13)
†{Silverman, 2010, 386252@@author-year}	New York, NY	All	0−1[a]	24-h avg	1.21 (1.08, 1.36)
			0−1[b]		1.16 (1.09, 1.22)
†{Iskander, 2012, 1255367@@author-year}	Copenhagen, Denmark	6−18	0−4	24-h avg	1.20 (1.02, 1.36)

Study	Location	Age	Lag	Averaging Time	RR/OR (95% CI)
†{Silverman, 2010, 386252@@author-year}	New York, NY	50+	0−1[a]	24-h avg	1.03 (0.96, 1.11)
			0−1[b]		1.02 (1.00, 1.05)
†{Bell, 2015, 2854421@@author-year}	70 U.S. counties	65+	1	24-h avg	1.00 (0.99, 1.01)
†{Winquist, 2012, 1668375@@author-year}	St. Louis, MO	65+	0−4 DL	24-h avg	0.96 (0.86, 1.07)

† Studies published since the 2009 PM Integrated Science Assessment. a = Intensive Care Unit (ICU) hospital admissions; b = non-ICU hospital admissions; c = values of confidence intervals not reported, but above the null; d = combination of hospital admissions and ED visits; e = time-series model results; f = case-crossover model results

Table S5-2. Corresponding data for Figure 5-3 (Summary of associations between short-term PM2.5 exposures and asthma ED visits for a 10 µg/m3 increase in 24-h avg PM2.5 concentrations)

Study	Location	Age	Lag	Averaging Time	RR/OR (95% CI)
{Stieb, 2009, 195858@@author-year}	7 Canadian cities	All	0	24-h avg	1.02 (0.97, 1.07)
†{Malig, 2013, 1640381@@author-year}	35 CA counties	All	0	24-h avg	1.02 (1.01, 1.03)
†{Ostro, 2016, 3420293@@author-year}	8 CA metro areas	All	0	24-h avg	1.01 (1.00, 1.02)
†{Weichenthal, 2016, 3360923@@author-year}	Ontario, Canada	All	0−2	24-h avg	1.06 (1.05, 1.07)
†{Paulu, 2008, 180168@@author-year}	Maine	All	0−1	24-h avg	1.14 (1.03, 1.25)
†{ATSDR, 2006, 90132@@author-year}	Manhattan, NY	All	0−4	24-h avg	1.06 (1.02, 1.09)
	Bronx, NY				1.03 (1.01, 1.06)
{Ito, 2007, 156594@@author-year}	New York, NY	All	0−1	24-h avg	1.04 (1.02, 1.06)
{Peel, 2005, 56305@@author-year}	Atlanta, GA	All	0−2	24-h avg	1.01 (0.98, 1.03)
{Slaughter, 2005, 73854@@author-year}	Spokane, WA	All	1	24-h avg	1.03 (0.98, 1.09)
†{Winquist, 2012, 1668375@@author-year}	St. Louis, MO	All	0−4 DL	24-h avg	1.03 (1.01, 1.05)
†{Sarnat, 2015, 2772940@@author-year}	St. Louis, MO	All	0−2 DL	24-h avg	1.04 (1.00, 1.06)

Study	Location	Age	Lag	Averaging Time	RR/OR (95% CI)
†{Byers, 2015, 3019032@@author-year}	Indianapolis, IN	All	0−2	24-h avg	099 (0.98, 1.01)
†{Kim, 2015, 3012210@@author-year}	Seoul, South Korea	All	0−2	24-h avg	1.02 (0.98, 1.05)
†{Gleason, 2014, 3021136@@author-year}	New Jersey	3−17	0−2	24-h avg	1.01 (0.99, 1.03)
†{Strickland, 2010, 624878@@author-year}	Atlanta, GA	5−17	0−2	24-h avg	1.02 (1.00, 1.04)
†{Byers, 2015, 3019032@@author-year}	Indianapolis, IN	5−17	0−2	24-h avg	1.01 (0.98, 1.05)
†{Winquist, 2012, 1668375@@author-year}	St. Louis, MO	2−18	0−4 DL	24-h avg	1.05 (1.02, 1.09)
†{Xiao, 2016, 3455927@@author-year}	Georgia	2−18	0−2	24-h avg	1.05 (1.03, 1.06)
†{Strickland, 2016, 3007391@@author-year}	Georgia	2−18	0	24-h avg	1.01 (1.00, 1.02)
†{Alhanti, 2015, 3019562@@author-year}	3 U.S. cities	5−18	0−2	24-h avg	1.03 (1.01, 1.05)
†{Byers, 2015, 3019032@@author-year}	Indianapolis, IN	45+	0−2	24-h avg	0.99 (0.96, 1.02)
†{Winquist, 2012, 1668375@@author-year}	St. Louis, MO	65+	0−4 DL	24-h avg	1.00 (0.92, 1.09)
†{Alhanti, 2015, 3019562@@author-year}	3 U.S. cities	65+	0−2	24-h avg	1.03 (0.99, 1.06)

†Studies published since the 2009 PM Integrated Science Assessment. DL = distributed lag.

Table S5-3. Corresponding data for Figure 5-4 (Summary of associations between short-term PM2.5 exposures and respiratory symptoms and medication use in populations with asthma) – In Preparation

Table S5-4. Corresponding data for Figure 5-5 (Summary of associations between short-term PM2.5 exposures and exhaled nitric oxide in populations with asthma) – In Preparation

Table S5-5. Corresponding data for Figure 5-6 (Summary of associations between short-term PM2.5 exposures and COPD hospital admissions and emergency department visits for a 10 µg/m3 increase in 24-h avg PM2.5 concentrations) – In Preparation

Study	Location	Age	Lag	Averaging Time	RR/OR (95% CI)
Hospital Admissions					
†Hwang et al. (2017)	4 Taiwan cities	All	0-2	24-h avg	1.02 (1.01, 1.03)
Slaughter et al. (2005)	Spokane, WA	All	1	24-h avg	0.99 (0.91, 1.08)
†Cheng et al. (2015)	Kaohsuing, Taiwan	All	0-2a	24-h avg	1.00 (0.98, 1.03)
			0-2b	24-h avg	1.11 (1.09, 1.13)
†Belleudi et al. (2010)	Rome, Italy	≥35	0	24-h avg	
†Bell et al. (2015)	213 U.S. counties	≥65	0	24-h avg	
Dominici et al. (2006)	204 U.S. counties	≥65	0	24-h avg	
†Kloog et al. (2014)	8 Eastern U.S. states	≥65	0-1	24-h avg	
Chen et al. (2004)	Vancouver, Canada	≥65	0	24-h avg	
Ito (2003)	Detroit, MI	≥65	3	24-h avg	
†Halonen et al. (2009)	Helsinki, Finland	≥65	0	24-h avg	
†Hwang et al. (2017)	Los Angeles, CA	≥65	0	24-h avg	
Emergency Department Visits					
Stieb et al. (2009)	6 Canadian cities	All	0	24-h avg	

Study	Location	Age	Lag	Averaging Time	RR/OR (95% CI)
†Malig et al. (2013)	35 California counties	All	2	24-h avg	
†Weichenthal et al. (2016)	Ontario, Canada	All	2	24-h avg	
†Sarnat et al. (2015)	St. Louis, MO	All	0-2	24-h avg	
Peel et al. (2005)	Atlanta, GA	All	0-2	24-h avg	
Slaughter et al. (2005)	Spokane, WA	All	2	24-h avg	
†Zhao et al. (2017)	Dongguan, China	All	0-3	24-h avg	
†Rodopoulou et al. (2015)	Little Rock, AR	≥15	2	24-h avg	

†Studies published since the 2009 PM Integrated Science Assessment.

Table S5-6. Corresponding data for Figure 5-7 (Summary of associations between short-term PM2.5 exposures and respiratory infection hospital admissions and emergency department visits for a 10 µg/m3 increase in 24-h avg PM2.5 concentrations) – In Preparation

Table S5-7. Corresponding data for Figure 5-8 (Summary of associations from studies of short-term PM2.5 exposure and respiratory-related disease hospital admission and ED visits for a 10 µg/m3 increase in 24-h avg PM2.5 concentrations)

Study	Location	Age	Lag	Averaging Time	RR/OR (95% CI)
Hospital Admissions					
†{Samoli, 2016, 3357762@@author-year}	5 European cities	All	1	24-h avg	1.01 (1.00, 1.014)
†{Basagña, 2015, 2533224 @@author-year}a	5 European cities	All	1	24-h avg	1.02 (1.00, 1.04)
†{Lanzinger, 2016, 3358695@@author-year}b	4 European cities	All	0-5	24-h avg	1.06 (1.04, 1.08)
†{Kollanus, 2016, 3455189@@author-year}	4 Finland cities	All	0	24-h avg	1.01 (0.99, 1.03)
{Burnett, 1997, 84194@@author-year}	Toronto, Canada	All	1-4	24-h avg	1.03 (1.01, 1.05)
{Slaughter, 2005, 73854@@author-year}	Spokane, WA	All	3	24-h avg	1.01 (0.98, 1.05)
†{Winquist, 2012, 1668375@@author-year}	St. Louis, MO	All	0-4 DL	24-h avg	1.00 (0.98, 1.02)
†{Rodopoulou, 2014, 2333401@@author-year}	Doña Ana County, NM	All	1	24-h avg	1.01 (0.95, 1.08)

Study	Location	Age	Lag	Averaging Time	RR/OR (95% CI)
†{Adar, 2014, 2525825@@author-year}	Meta-analysis	All	---	24-h avg	1.01 (1.005, 1.013)
†{Stafoggia, 2013, 1936019@@author-year2013}	8 European cities	15+	0-5	24-h avg	1.01 (1.00, 1.02)
†{Yap, 2013, 2333295@@author-year}	Central Valley, CA	1-9	0-2c	24-h avg	1.00
	South Coast, CA		0-2c	24-h avg	1.07
†{Winquist, 2012, 1668375@@author-year}	St. Louis, MO	2-18	0-4 DL	24-h avg	1.02 (0.96, 1.07)
{Ostro, 2009, 191971@@author-year}	6 CA counties	< 19	3	24-h avg	1.03 (1.01, 1.04)
{Bell, 2008, 156266@@author-year}	202 U.S. counties	65+	2	24-h avg	1.004 (1.000, 1.007)
†{Kloog, 2014, 2332334@@author-year}	Mid-Atlantic U.S. states	65+	0-1	24-h avg	1.022 (1.019, 1.026)
†{Bravo, 2016, 3420336@@author-year}	708 U.S. counties	65+	0	24-h avg	1.012 (1.009, 1.015)
	418 U.S. counties		0d		1.011 (1.007, 1.015)
	418 U.S. counties		0e		1.011 (1.001, 1.016)

Study	Location	Age	Lag	Averaging Time	RR/OR (95% CI)
†{Bell, 2015, 2854421@@author-year}	213 U.S. counties	65+	0	24-h avg	1.003 (1.000, 1.005)
†{Kloog, 2012, 1255201@@author-year}	New England, U.S.	65+	0-1	24-h avg	1.007 (1.004, 1.0105)
†{Powell, 2015, 2826611@@author-year}	110 U.S. counties	65+	0	24-h avg	1.01 (1.00, 1.03)
†{Zanobetti, 2009, 1254262@@author-year}	26 U.S. counties	65+	0-1	24-h avg	1.02 (1.01, 1.03)
†{Kollanus, 2016, 3455189 @@author-year}	4 Finland cities	65+	0	24-h avg	0.996 (0.968, 1.024)
{Fung, 2006, 89789@@author-year}	Vancouver, Canada	65+	0-2	24-h avg	1.00 (0.96, 1.05)
†{Winquist, 2012, 1668375@@author-year}	St. Louis, MO	65+	0-4 DL	24-h avg	0.997 (0.972, 1.022)
†{Rodopoulou, 2014, 2333401@@author-year}	Doña Ana County, NM	65+	1	24-h avg	0.98 (0.90, 1.07)
Emergency Department Visits					
†{Malig, 2013, 1640381@@author-year}	35 California counties	All	1	24-h avg	1.016 (1.01, 1.023)

Study	Location	Age	Lag	Averaging Time	RR/OR (95% CI)
†{Weichenthal, 2016, 3360923@@author-year}	Ontario, Canada	All	0-2	24-h avg	1.032 (1.022, 1.043)
{Peel, 2005, 56305@@author-year}	Atlanta, GA	All	0-2	24-h avg	1.016 (0.997, 1.035)
{Tolbert, 2007, 90316@@author-year}	Atlanta, GA	All	0-2	24-h avg	1.005 (0.995, 1.014)
†{Darrow, 2011, 202800@@author-year}	Atlanta, GA	All	1	24-h avg	1.004 (0.998, 1.010)
†{Rodopoulou, 2014, 2333401@@author-year}	Doña Ana County, NM	All	1	24-h avg	1.03 (0.998, 1.083)
{Slaughter, 2005, 73854@@author-year}	Spokane, WA	All	2	24-h avg	1.02 (0.99, 1.04)
†{Winquist, 2012, 1668375@@author-year}	St. Louis, MO	All	0-4 DL	24-h avg	1.013 (1.002, 1.024)
†{Winquist, 2012, 1668375@@author-year}	St. Louis, MO	2-18	0-4 DL	24-h avg	1.034 (1.016, 1.052)
†{Rodopoulou, 2014, 2333401@@author-year}	Doña Ana County, NM	65+	1	24-h avg	1.012 (0.887, 1.154)

Study	Location	Age	Lag	Averaging Time	RR/OR (95% CI)
†{Winquist, 2012, 1668375@@author-year}	St. Louis, MO	65+	0-4 DL	24-h avg	0.999 (0.976, 1.023)

† Studies published since the 2009 PM Integrated Science Assessment. DL = distributed lag. a = 5 European cities as part of the MED-PARTICLES project; b = only 4 of the 5 cities had PM2.5 data; c = quantitative data for confidence intervals not reported, but above the null; d = monitoring data result; e = downscaler CMAQ, only counties and days with monitoring data

Table S5-8. Corresponding data for Figure 5-9 (Summary of associations for short-term PM2.5 exposure and respiratory-related outcomes from copollutant models with O3 for a 10 μg/m3 increase in 24-h avg PM2.5 concentrations) – In Preparation

Table S5-9. Corresponding data for Figure 5-40 (Summary of associations from studies of short-term PM10-2.5 exposures and asthma hospital admissions and ED visits for a 10 µg/m3 increase in 24-h avg PM10-2.5 concentrations)

Table S5-10. Corresponding data for Figure 5-11 (Summary of associations for short-term PM2.5 exposure and respiratory-related outcomes from copollutant models with SO2 for a 10 µg/m3 increase in 24-h avg PM2.5 concentrations) – In Preparation

Table S5-11. Corresponding data for Figure 5-12 (Summary of associations for short-term PM2.5 exposure and respiratory-related outcomes from copollutant models with CO for a 10 μg/m3 increase in 24-h avg PM2.5 concentrations) – In Preparation

Table S5-12. Copollutant results from studies of long-term exposure to PM2.5 and lung function in children

Study	Cohort[a]	Pollutant Correlations (*r*)	Effect Estimates (95% CI)[b]	
{Gehring, 2013, 2233960@@author-year}	ESCAPE	NO_2: 0.75	**FVC (% difference)** $PM_{2.5}$: -8.83 (-20.0, 4.5) w/NO_2: -3.67 (-8.7, 1.7) **FEV_1 (% difference)** $PM_{2.5}$: -2.5 (-4.6, -0.36) w/NO_2: -1.7 (-4.1, 0.76) **PEF (% difference)** $PM_{2.5}$: -2.1 (-4.1, -0.01) w/NO_2: -1.6 (-5.8, 2.8)	
{Wang, 2015, 2832097@@author-year}	PIAMA	LUR NO_2: 0.75 Dis. NO_2: 0.92	**FVC (% difference)** LUR w/NO_2: -9.5 (-18.2, -0.9) Dis. w/NO2: -3.0 (-7.8, 2.0) *Single pollutant results presented graphically. Effect estimates were stronger in magnitude and more precise than copollutant estimates.	
{Hwang, 2015, 2991272@@author-year}	Taiwan middle school cohort	NO_2: 0.25 CO: 0.03 O_3: 0.78 SO_2: 0.69	**Boys** **FVC (ml)** $PM_{2.5}$: -21.5 (-33.8, -9.2) w/NO_2: -22.0 (-34.6, -9.3) w/CO: -21.3 (-33.5, -9.1) **FEV_1 (ml)** $PM_{2.5}$: -23.7 (-35.4, -12.2) w/NO_2: -24.3 (-36.3, -12.2) w/CO: -23.6 (-35.2, -12) **FEF_{25-75} (ml/sec)** $PM_{2.5}$: -32.6 (-56.6, -8.4) w/NO_2: -32.4 (-57.5, -7.4) w/CO: -32.1 (-56.1, -7.8)	**Girls** **FVC (ml)** $PM_{2.5}$: -17.9 (-27.5, -8.2) w/NO_2: -19.1 (-29, -9.2) w/CO: -17.9 (-27.6, -8.3) **FEV_1 (ml)** $PM_{2.5}$: -15.8 (-26, -5.7) w/NO_2: -18.4 (-28.7, -8) w/CO: -16.1 (-26.2, -5.9) **FEF_{25-75} (ml/sec)** $PM_{2.5}$: -14.0 (-39, 11.1) w/NO_2: -23.8 (-49.7, 2.1) w/CO: -14.8 (-40, 10.3)
{Chen, 2015, 2919633@@author-year}	ISSAC-C Taiwan	NO_2: 0.33 CO: 0.07 O_3: -0.03 SO_2: 0.69	**FVC (ml)** $PM_{2.5}$: -94.3 (-175.1, -13.5) w/NO_2: -106 (-169.5, -42.5) w/CO: -100.5 (-16, -39) w/O_3: -75.8 (-138.1, -13.5) w/SO_2: -115.8 (-195, -36.2)	**FEV_1 (ml)** $PM_{2.5}$: -77.1 (-129.2, -25) w/NO_2: -89.2 (-140, -38) w/CO: -84.4 (-133.8, -35) w/O_3: -57.2 (-106.2, -8.2) w/SO_2: -92.9 (-157, -29)

[a]Complete study details provided in Table 5-19
[b]Effect estimates are standardized to a 5 µg/m^3 increase in $PM_{2.5}$.
CI = confidence interval, CO = carbon monoxide, Dis. = Dispersion modeling, ESCAPE = European Study of Cohorts for Air Pollution Effects, FEF25-75 = forced expiratory flow between the 25th and 75th percentiles of the FVC, FEV_1 = forced expiratory volume in 1 second, FVC = forced vital capacity, ISSAC-C = Chinese version of the International Study of Asthma and Allergies in Children, LUR = land use regression, ml = milliliters, NO_2 = nitrogen dioxide, NR = not reported, O_3 = ozone, PEF = , PIAMA = Prevention and Incidence of Asthma and Mite Allergy, $PM_{2.5}$ = particulate matter with a nominal mean aerodynamic diameter ≤ 2.5 µm, *r* = correlation coefficient, sec = second, SO_2 = sulfur dioxide.

Table S5-13. Corresponding data for Figure 5-40 (Summary of associations from studies of short-term PM10-2.5 exposures and asthma hospital admissions and ED visits for a 10 µg/m3 increase in 24-h avg PM10-2.5 concentrations)

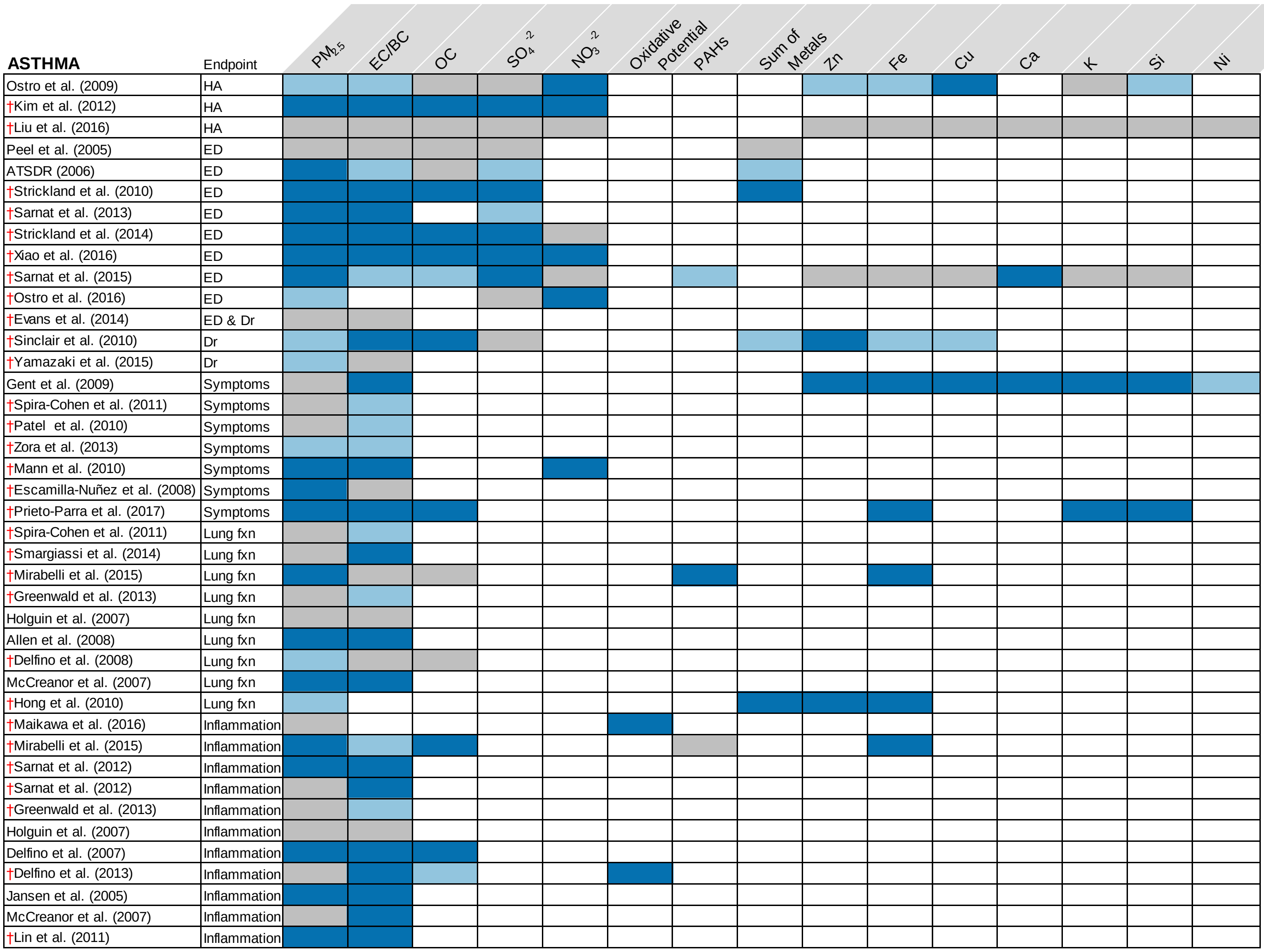
Table S5-14. Corresponding data for Figure 5-42 (Summary of associations between short-term PM10-2.5 exposures and COPD hospital admissions and emergency department visits for a 10 µg/m3 increase in 24-h avg PM10-2.5 concentrations) – In Preparation

Table S5-15. Corresponding data for Figure 5-43 (Summary of associations between short-term PM10-2.5 exposures and respiratory infection hospital admissions and emergency department visits for a 10 μg/m3 increase in 24-h avg PM10-2.5 concentrations) – In Preparation

Table S5-16. Corresponding data for Figure 5-44 (Summary of associations from studies of short-term PM10-2.5 exposures and respiratory-related hospital admissions and ED visits for a 10 µg/m3 increase in 24-h avg PM2.5 concentrations) – In Preparation

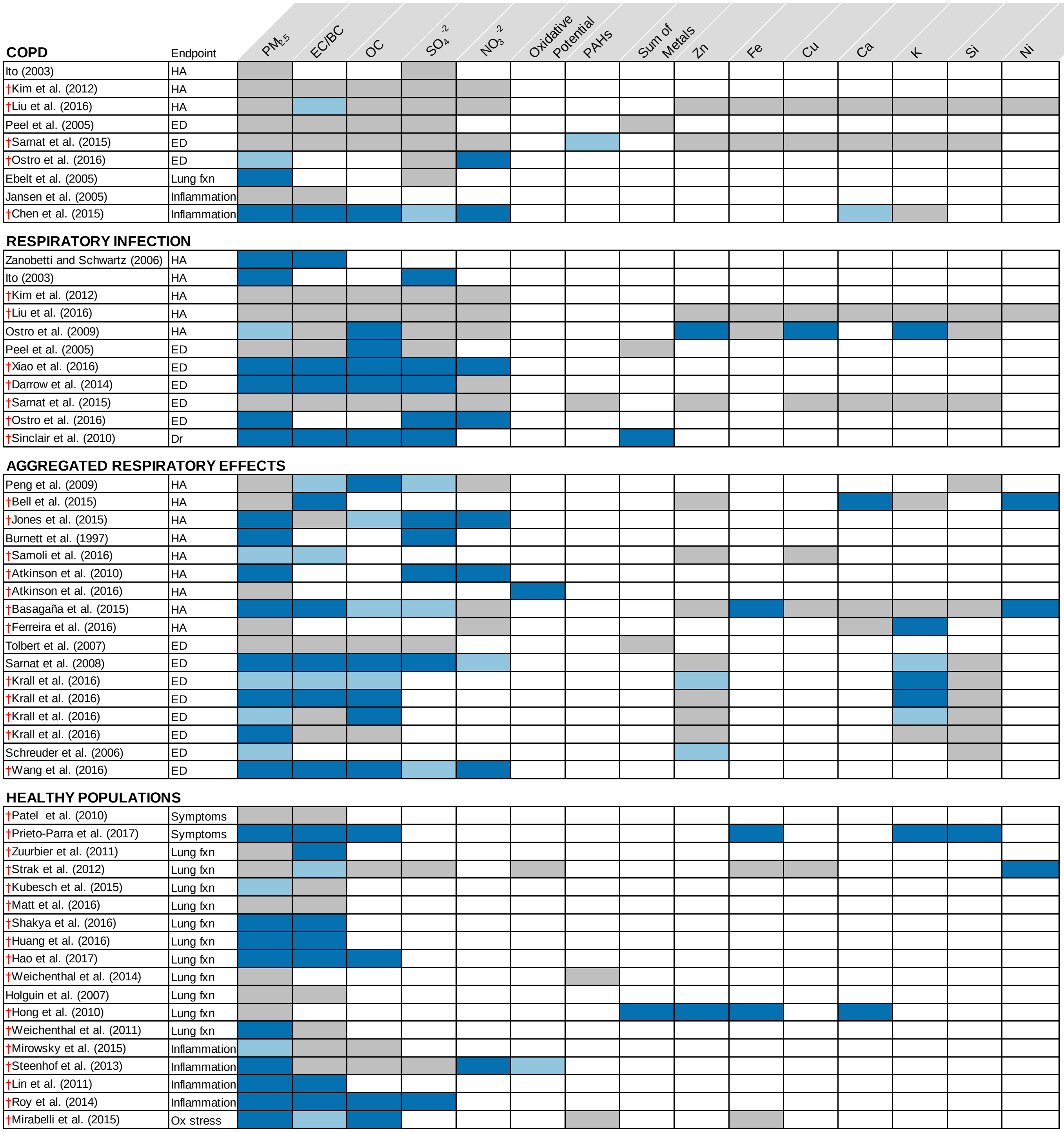
Table S5-17. Corresponding data for Figure 5-46 (Percent increase in respiratory mortality for a 10 μg/m3 increase in 24-h avg PM10-2.5 concentrations in single- and co-pollutant models) – In Preparation

SUPPLEMENTAL FIGURES FOR CHAPTER 5 (RESPIRATORY)



Note: † = $PM_{2.5}$ component studies published since the 2009 PM ISA. Dark blue = study reported statistically significant adverse association; Light blue = study reported an adverse association regardless of width of confidence intervals; Gray = study reported null or negative association; Red = study reported statistically significant negative association; White = study did not examine individual component. Only those $PM_{2.5}$ components that were examined in at least 3 studies are included in this table.

Figure S5-1a. Heat map of associations observed between $PM_{2.5}$ and $PM_{2.5}$ components and asthma-related endpoints.



Note: † = $PM_{2.5}$ component studies published since the 2009 PM ISA. Dark blue = study reported statistically significant adverse association; Light blue = study reported an adverse association regardless of width of confidence intervals; Gray = study reported null or negative association; Red = study reported statistically significant negative association; White = study did not examine individual component. Only those $PM_{2.5}$ components that were examined in at least 3 studies are included in this table.

Figure S5-1b. Heat map of associations observed between $PM_{2.5}$ and $PM_{2.5}$ components and other respiratory endpoints.

Study	Endpoint	$PM_{2.5}$	Motor vehicles	Dust/Soil	Biomass	Wildfires	Long-range transport	Oil	Salt	Specific industries	Ambient-generated	Nonambient generated
ASTHMA												
Delfino et al. (2009)	HA	Dark blue				Dark blue						
†Krall et al. (2016)	ED	Dark blue	Dark blue	Gray	Dark blue							
†Krall et al. (2016)	ED	Dark blue	Gray	Gray	Light blue							
†Krall et al. (2016)	ED	Dark blue	Light blue	Gray	Gray							
†Krall et al. (2016)	ED	Gray	Dark blue	Gray	Gray							
†Ostro et al. (2016)	ED	Dark blue	Dark blue	Dark blue	Light blue							
†Haikerwal et al. (2015)	ED	Dark blue				Dark blue						
†Alman et al. (2016)	ED	Dark blue				Dark blue						
†Sinclair et al. (2014)	Dr	Light blue	Gray									
Johnston et al. (2006)	Symptoms	Dark blue				Dark blue						
Gent et al. (2009)	Symptoms	Gray	Light blue	Dark blue	Gray		Gray	Gray	Gray			
†Prieto-Parra et al. (2017)	Symptoms	Dark blue	Dark blue	Dark blue	Dark blue					Dark blue		
Allen et al. (2008)	Lung fxn	Dark blue			Dark blue						Light blue	Gray
†Vora et al. (2011)	Lung fxn	Gray				Gray						
†Greenwald et al. (2013)	Lung fxn	Gray	Gray									
Allen et al. (2008)	Inflammation	Light blue			Gray						Dark blue	Gray
†Sarnat et al. (2012)	Inflammation	Gray	Gray									
†Sarnat et al. (2012)	Inflammation	Dark blue	Dark blue									
COPD												
Delfino et al. (2009)	HA	Gray				Dark blue						
†Krall et al. (2016)	ED	Light blue	Light blue	Gray	Dark blue							
†Krall et al. (2016)	ED	Light blue	Gray	Gray	Light blue							
†Krall et al. (2016)	ED	Dark blue	Dark blue	Gray	Light blue							
†Krall et al. (2016)	ED	Dark blue	Gray	Gray	Gray							
†Ostro et al. (2016)	ED	Light blue	Light blue	Gray	Gray							
†Haikerwal et al. (2015)	ED	Gray				Gray						
†Alman et al. (2016)	ED	Dark blue				Dark blue						
Ebelt et al. (2005)	Lung fxn	Gray									Dark blue	Gray
RESPIRATORY INFECTION												
Delfino et al. (2009)	HA	Dark blue				Dark blue						
Zanobetti and Schwartz (2006)	HA	Dark blue	Dark blue									
Halonen et al. (2009)	HA	Dark blue	Gray	Gray			Gray	Gray				
†Krall et al. (2016)	ED	Light blue	Light blue	Gray	Dark blue							
†Krall et al. (2016)	ED	Dark blue	Gray	Light blue	Dark blue							
†Krall et al. (2016)	ED	Light blue	Gray	Gray	Dark blue							
†Krall et al. (2016)	ED	Dark blue	Gray	Gray	Light blue							
†Ostro et al. (2016)	ED	Dark blue	Gray	Gray	Light blue							
†Alman et al. (2016)	ED	Light blue				Light blue						
AGGREGATED RESPIRATORY EFFECTS												
†Bell et al. (2014)	HA	Gray	Gray	Dark blue			Gray	Gray	Light blue			
†Liu et al. (2017)	HA	Dark blue				Dark blue						
†Lewin et al. (2013)	HA	Dark blue								Gray		
†Brand et al. (2016)	HA	Gray						Light blue		Light blue		
Halonen et al. (2009)	HA	Dark blue	Dark blue	Dark blue			Dark blue	Gray				
†Kollanus et al. (2016)	HA	Gray				Light blue						
†Alessandrini et al. (2013)	HA	Gray		Light blue								
Sarnat et al. (2008)	ED	Gray	Gray	Gray	Gray					Gray		
†Rodopoulou et al. (2014)	ED	Light blue					Gray					
†Salimi et al. (2016)	EMS calls	Dark blue				Dark blue						
HEALTHY POPULATIONS												
†Zhao et al. (2015)	Lung fxn	Gray	Gray									
†Shakya et al. (2016)	Lung fxn	Dark blue	Dark blue									
†Prieto-Parra et al. (2017)	Symptoms	Dark blue		Dark blue	Dark blue					Dark blue		

Note: † = $PM_{2.5}$ component studies published since the 2009 PM ISA. Dark blue = study reported statistically significant adverse association; Light blue = study reported an adverse association regardless of width of confidence intervals; Gray = study reported null or negative association; Red = study reported statistically significant negative association; White = study did not examine individual component. Only those $PM_{2.5}$ components that were examined in at least 3 studies are included in this table.

Figure S5-2. Heat map of associations observed between $PM_{2.5}$ and $PM_{2.5}$ sources respiratory endpoints.