Supplemental Material

Title: Estimating personal exposures from ambient air-pollution measures: Using meta-analysis to assess measurement error

Authors: Katelyn M Holliday, Christy L Avery, Charles Poole, Kathleen McGraw, Ronald Williams, Duanping Liao, Richard L Smith, and Eric A Whitsel

Table of Contents

eAppendix 1.

Databases
PubMed (1950 to October 2009)
Web of Science (1955 to October 2009 via ISI Web of Knowledge)
BIOSIS Previews (1969 to October 2009 via ISI Web of Knowledge)
EMBASE (1988 to 2009 Week 43 via OvidSP)
Environmental Sciences and Pollution Management (1967 to October 2009 via CSA Illumina)
Toxline (1965 to October 2009 via TOXNET)
Dissertations and Theses (1861 to October 2009 via Proquest)

Search Strategy
((coarse[tw] OR respirable[tw] OR inhalable[tw] OR thoracic[tw]) AND
(particle* OR particulate* OR dust[tw]) OR pm 10[tw] OR pm10[tw]) AND
(ambient[tw] OR outdoor[tw] OR outdoors[tw] OR outside[tw] OR exterior[tw] OR external[tw] OR background[tw] OR fixed site*) AND
(longitudinal[tw] OR individual[tw] OR within person[tw] OR within persons[tw] OR personal[tw]) AND
(correlat* OR associat* OR relat* OR compar* OR pearson[tw] OR spearman[tw]))

eTable 1. Study Characteristics

Author, Year	Sub-Study	Location		Date		Duration (months)
		City	State/ Country	Start	End	
Lioy 1990		Phillipsburg	New Jersey	1/8/1988	1/22/1988	0.5
Wallace 1996		Azusa	California	3/6/1989	3/13/1989	0.3
Janssen 1997		Wageningen and Amsterdam	Netherlands	2/16/1994	5/18/1995	15.0
Janssen 1998		Amsterdam	Netherlands	1/17/1994	12/23/1994	11.2
Linn 1999		Los Angeles	California	10/24/1996	2/17/1997	3.8
Rojas-Bracho 2000		Boston	Massachusetts	2/5/1996	2/22/1997	12.6
Sarnat 2000	1	Baltimore	Maryland	6/29/1998	8/7/1998	1.3
	2	Baltimore	Maryland	2/2/1999	3/13/1999	1.3
Wheeler 2000		London	England	1/1997	9/1997	9.0
Rodes 2001		Fresno	California	4/18/1999	5/15/1999	0.9
Yip 2004		Detroit	Michigan	2/12/2000	10/6/2001	19.8
Watchalayann 2005		Bangkok	Thailand	12/2002	8/2003	9.0
Williams 2008		central	North Carolina	4/2004	6/2004	3.0
Arhami 2009	1	San Gabriel Valley	California	7/6/2005	12/10/2005	5.2
	2	San Gabriel Valley	California	8/24/2005	2/18/2006	5.9
	3	San Gabriel Valley	California	7/5/2006	12/1/2006	4.9
	4	Riverside	California	8/23/2006	2/16/2007	5.8
Scapellato 2009		Padova	Italy	6/21/2004	3/20/2006	21.0
Hsu 2009	1	New York	New York	07/2000	10/2000	4.0
	2	New York	New York	11/2000	1/2001	3.0
	3	Seattle	Washington	11/2002	03/2003	5.0
1990-2009[a]	21	19	12	1988-2007		5

[a]Summary statistics: ranges (year, date), counts (sub-study, location), median (duration)

eTable 2. Participant Characteristics

Author	Sub-Study	n	Mean Age	%Female	Co-Morbidity
Lioy 1990		14	46.5	57.1	N
Wallace 1996		10	34.1	30	N
Janssen 1997		45	10	53.3	N
Janssen 1998		37	62	51.4	N
Linn 1999[14]		14	70[d]	53.3	P
Rojas-Bracho 2000		17	NR	NR	P
Sarnat 2000 [a]	1	14	75	60	N
	2	14	75	60	N
Wheeler 2000		10	10	30	N
Rodes 2001		14	85	68	N
Yip 2004		20	9[d]	68	A
Watchalayann 2005		28	47.5[d]	NR	N
Williams 2008		3	41	67	A
Arhami 2009	1	17	84	41	C
	2	14	84	41	C
	3	17	84	41	C
	4	18	84	41	C
Scapellato 2009		21	29[e]	48.4	A
Hsu 2009[c]	1	9	Elderly	NC	P
	2	9	Elderly	NC	P
	3	15	75.5	53.3	P, A
1990-2009[f]	21	342[g]	66 (9-85)	53.3	43% N, 24% P, 19% A, 19% C

Abbreviations: n, number of participants; NR, not reported; NC, not collected; N, none; P, chronic obstructive pulmonary disease; A, asthma; C, coronary artery disease

[a] Includes 9 overlapping participants in the two sub-studies, [b] Includes 4 sub-studies of independent participants, [c] Includes 9 overlapping participants in the two NY sub-studies, [d] Median of range, [e] Median of inclusion criteria age range, [f] Summary Statistics: range (year, age), counts (sub-studies), totals (n), median (age, percent female), percent of studies (co-morbidities), [g] Number of independent participants

eTable 3. Environmental Characteristics

Author	Sub-Study	T (°C)	DP (°C)	SLP (kPa)	RH (%)	WS (m/s)	n	PM_{10} µg/m^3 Mean (SD)		r_j (95% CI)
								Personal	Ambient[a]	
Lioy 1990		-3.8	-9.6	102.3	64.0	3.0	12.9	86	60[a]	0.70 (0.57 to 0.79)[c]
Wallace 1996		16.6	4.9	.	45.9	2.8	7.2	115	62.6 (3.5)	0.27 (-0.02 to 0.52)
Janssen 1997		6.7	3.6	101.2	80.6	4.7	6.7	105.2 (28.7)	38.5 (5.6)[a]	0.63 (0.53 to 0.71)[c]
Janssen 1998		6.7	4.4	101.5	85.3	6.6	7.1	61.7 (18.3)	41.5 (4.3)[a]	0.58 (0.45 to 0.69)[c]
Linn 1999		15.0	7.2	101.8	59.6	3.2	4.0	34.9 (15.1)	32.4 (12.9)[a]	0.35 (-0.25 to 0.75)[c]
Rojas-Bracho 2000		13.6	7.8	101.5	68.0	4.6	12.8	37.2 (22.8)	22.2 (18.7)	0.32 (0.17 to 0.46)
Sarnat 2000	1	25.1	17.5	101.6	62.8	2.6	11.3	29.9(10.8)	34.0(12.8)[a]	0.62 (0.49 to 0.72)
	2	3.4	-3.9	101.8	58.8	4.1	11.3	23.3(15.1)	26.8 (12.0)[a]	0.45 (0.17 to 0.67)
Wheeler 2000		13.0	6.9	101.8	66.5	4.0	8.1	56.0 (31.8)	25.8 (20.9)	0.38 (0.02 to 0.65)[c]
Rodes 2001[18, 19]		17.6	5.1	101.4	43.7	4.5	6.6	37.7 (14.7)	24.3 (5.9)[a]	0.23 (-0.10 to 0.52)[c]
Yip 2004		13.2	7.4	101.8	67.9	3.8	18.0	56.5 (38.2)	25.9 (13.4)[a]	0.30 (0.19 to 0.40)[c]
Watchalayann 2005		29.5	23.7	100.9	71.1	1.6	9.3	81.6 (14.3)	130.7(39.0)	0.71 (0.62 to 0.77)[b]
Williams 2008		18.3	11.0	101.6	62.5	2.3	4.0	34.4 (7.5)	19.4 (8.0)[a]	0.69 (-0.28 to 0.96)[c]
Arhami 2009	1	19.7	10.0	101.5	53.6	2.4	8.6	19.9 (15.6)	33.0 (11.0)	0.46 (0.19 to 0.67)[c]
	2	17.1	7.3	101.5	52.5	1.4	8.0	17.5 (8.3)	32.8 (12.2)	0.62 (0.33 to 0.80)[c]
	3	20.9	9.6	101.5	48.4	2.2	7.6	15.3 (6.7)	30.8 (13.2)	0.72 (0.53 to 0.85)[c]
	4	18.7	5.9	101.5	43.1	2.6	8.9	11.5 (6.5)	25.7 (13.8)	0.67 (0.56 to 0.76)[c]
Scapellato 2009		12.9	7.4	101.7	69.2	1.1	5.1	78.8	60.6[a]	0.68 (0.49 to 0.81)[b]
Hsu 2009	1	18.5	13.2	101.7	71.3	3.5	12.0	71.1	20.6	0.25 (-0.01 to 0.48)[b]
	2	1.9	-3.7	101.7	66.4	4.5	12.0	52.6	18.8	0.43 (0.19 to 0.62)[b]
	3	7.9	4.7	101.7	80.2	3.5	12.0	30.2	13.6	0.13 (-0.02 to 0.27)[b]
15 Studies, 1990-2009[d]	21	15.0	7.2	101.6	64.0	3.2	8.6	37.7	30.8	0.46

Abbreviations: T, mean temperature; DP, mean dew point; SLP, mean sea level pressure; RH, mean relative humidity; WS, mean wind speed; n, mean number of paired ambient-personal measurements per participant; SD, standard deviation; r, random-effects meta-analyzed summary correlation coefficient weighting individual correlation coefficients by number of measurements; CI, confidence interval

[a] Indicates ambient; otherwise outdoor

[b] Individual level data unavailable for random-effects meta-analysis; reported median used for r and fixed-effects used for SD

[c] Authors contacted for primary data; additional data for Lioy 1990 published in Wallace 1996 Table 12[13]

[d] Summary statistics: medians

eTable 4. Bivariable Meta-Regressions of the Relationship Between *r* and Selected Environment Characteristics

			r difference (95% CI)
Regression 1	Mean Ambient PM_{10}	≥30.8 $\mu g/m^3$ (n=11)	0.18 (-0.02 to 0.37)
		<30.8 $\mu g/m^3$ (n=10)	0
	Ambient/Personal	≥0.67 (n=11)	0.28 (0.09 to 0.37)
	PM_{10}	<0.67 (n=10)	0
Regression 2	Mean Ambient PM_{10}	≥30.8 $\mu g/m^3$ (n=11)	0.21 (-0.01 to 0.42)
		<30.8 $\mu g/m^3$ (n=10)	0
	Wind Speed	≥3.2 m/s (n=11)	-0.22 (-0.43 to -0.003)
		<3.2 m/s (n=10)	0
Regression 3	Ambient/Personal	≥0.67 (n=11)	0.28 (0.04 to 0.52)
	PM_{10}	<0.67 (n=10)	0
	Wind Speed	≥3.2 m/s (n=11)	-0.15 (-0.39 to 0.09)
		<3.2 m/s (n=10)	0