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TABLE 5-7. PERSONAL MONITORING STUDIES FOR PARTICULATE MATTER: MEASURED CONCENTRATIONS AND CORRELATION COEFFICIENTS

Size Fraction	Avg. Time	Statistic	Sample Size ¹	Measured Concentration Levels (µg/m ³)				Type ³	Personal-Ambient ² Correlation Coefficients (r)		Notes	Other Correlation Coefficients (r)	
				Personal	Residential Indoor	Residential Outdoor	Ambient		Value (Range)			Type ³	Value (Range)
Longitudinal Studies													
Ebelt et al. (2000) – Vancouver, BC													
PM _{2.5}	24 h	$\bar{x} \pm$ SD Range	106	18.2 ± 14.6 2-91			11.4 ± 4.1 4-29	Median L P	0.48 (-0.63-0.83) 0.15		n = 16 COPD subjects		
Evans et al. (2000) – Fresno, CA													
PM _{2.5}	24 h	$\bar{x}$ Range	24	13.3 1-24	9.7 4-17	20.5 4-32	21.7 6-37	P	0.41 ⁴		Fresno-1 study	P _{pm} P _{pm}	0.81 ⁴ 0.80 ⁴
PM _{2.5}	24 h	$\bar{x}$ Range	12	11.1 7-16	8.0 4-12	10.1 5-20	8.6 4-16	P	0.84 ⁴		Fresno-2 study	P _{pm} P _{pm}	0.93 ⁴ 0.80 ⁴
Janssen et al. (1997) – Netherlands													
PM ₁₀	24 h	$\bar{x} \pm$ SD Range	301	105.2 ± 28.7 37-193			38.5 ± 5.6 25-56	Median L Median L Median L Mean P Mean P Mean P	0.63 (0.1-0.9) 0.63 0.59 0.28 (0.12) ⁵ 0.45 (0.16) ⁵ 0.20 (0.19) ⁵		n = 45 school children With nonsmoking parents With smoking parents All With nonsmoking parents With smoking parents		
Janssen et al. (1998a) – Netherlands													
PM ₁₀	24 h	$\bar{x} \pm$ SD Range	262	61.7 ± 18.3 38-113	35.0 ± 9.4 19-65		41.5 ± 4.3 32-50	Median L Median P Median P	0.50 (-0.41-0.92) 0.50 (0.07-0.83) ¹ 0.34 (-0.09-0.67) ¹		n = 37 adults No ETS exposure All	Med. L _{pm} Med. L _{pm}	0.72 (-0.10-0.98) 0.73 (-0.88-0.93)
Janssen et al. (1999c) – Netherlands													
PM _{2.5}	24 h	$\bar{x} \pm$ SD Range	77	28.3 ± 11.3 19-60			17.1 ± 2.8 14-22	Median L Median P	0.86 (-0.11-0.99) 0.41 (-0.28-0.93) ¹		n = 13 school children		
PM _{2.5}	24 h	$\bar{x} \pm$ SD Range	55	24.4 ± 4.9 19-33			17.1 ± 2.6 15-22	Median L Median P	0.92 0.82 ¹		With nonsmoking parents		
PM _{2.5}	24 h	$\bar{x} \pm$ SD Range	22	37.0 ± 17.4 21-60			17.1 ± 3.7 14-21				With smoking parents		

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TABLE 5-7 (cont.). PERSONAL MONITORING STUDIES FOR PM: MEASURED CONCENTRATIONS AND CORRELATION COEFFICIENTS

Size Fraction	Avg. Time	Statistic	Sample Size ¹	Measured Concentration Levels ($\mu\text{g}/\text{m}^3$)				Personal-Ambient ² Correlation Coefficients (r)			Other Correlation Coefficients (r)	
				Personal	Residential Indoor	Residential Outdoor	Ambient	Type ³	Value (Range)	Notes	Type ³	Value (Range)
Janssen et al. (2000) – Netherlands												
PM ₁₀	24 h	$\bar{x} \pm \text{SD}$ Range	338	24.3 $\pm$ 25.7 9 - 134	28.6 $\pm$ 41.8 9 - 239		20.6 $\pm$ 4.0 13 - 31	Median L Median L	0.79 (-0.41-0.98) 0.83	n = 36 elderly w/CV disease No ETS exposures	Med. L _{PM} Med. L _{PM}	0.91 (-0.28-1.0) 0.84(-0.00-0.98)
Janssen et al. (2000) – Finland												
PM ₁₀	24 h	$\bar{x} \pm \text{SD}$ Range	336	10.8 $\pm$ 4.4 4 - 33	11.0 $\pm$ 4.0 3 - 27		12.6 $\pm$ 2.0 10 - 18	Median L	0.76 (-0.12-0.97)	n = 46 elderly w/CV disease	Med. L _{PM} Med. L _{PM}	0.89 (0.14-1.0) 0.70 (-0.15-0.94)
Linn et al. (1999) – Los Angeles												
PM _{2.5}	24 h	$\bar{x} \pm \text{SD}$ Range	60	23.8 $\pm$ 15.1 4 - 63	23.5 $\pm$ 15.3 4 - 92	24.8 $\pm$ 14.5 4 - 63		P	0.26 ^a		P _{PM} P _{PM}	0.26 ^a 0.47 ^a
PM ₁₀	24 h	$\bar{x} \pm \text{SD}$ Range	59	34.8 $\pm$ 14.8 5 - 85	32.6 $\pm$ 15.6 9 - 105	39.8 $\pm$ 18.3 7 - 97	33 $\pm$ 15 9 - ??	P	0.22 ^a		P _{PM} P _{PM}	0.32 ^a 0.66 ^a
Rojas-Bracho et al. (2000) – Boston												
PM ₁₀	12 h	$\bar{x} \pm \text{SD}$ Range	224	21.6 $\pm$ 13.6 1 - 128	17.5 $\pm$ 14.1 2 - 73	14.2 $\pm$ 11.2 1 - 57		Median L	0.61 (0.10-0.93) ^a	n = 17 adults	Med. L _{PM} Med. L _{PM}	0.87 ^a 0.74 ^a
PM ₁₀	12 h	$\bar{x} \pm \text{SD}$ Range	225	37.2 $\pm$ 22.8 9 - 211	31.9 $\pm$ 25.2 2 - 329	22.2 $\pm$ 18.7 3 - 76		Median L	0.35 (0.0-0.72) ^a		Med. L _{PM} Med. L _{PM}	0.71 ^a 0.50 ^a
PM _{2.5}	12 h	$\bar{x} \pm \text{SD}$ Range	222	15.6 $\pm$ 14.6 -11 - 103	14.5 $\pm$ 9.2 -3 - 255	8.1 $\pm$ 6.8 -2 - 64		Median L	0.30 (0.0-0.97) ^a		Med. L _{PM} Med. L _{PM}	0.42 ^a 0.20 ^a
Sarnat et al. (2000) – Baltimore												
PM _{2.5}	24 h	$\bar{x} \pm \text{SD}$ $\bar{x} \pm \text{SD}$	37 36	26.7 $\pm$ 13.7 18.5 $\pm$ 11.2			25.2 $\pm$ 11.5 5.6 $\pm$ 49.0	Median L Median L P P P P	0.76 (-0.21-0.95) ^b 0.23 (-0.38-0.81) ^b 0.89 ^a 0.75 ^a 0.50 ^a 0.44 ^a	n = 15 adults; summer n = 15 adults; winter High ventilation; summer Med. ventilation; summer Low ventilation; summer WINTER		
PM ₁₀	24 h	$\bar{x} \pm \text{SD}$ $\bar{x} \pm \text{SD}$	37 36	33.9 $\pm$ 11.7 28.0 $\pm$ 16.5			34.0 $\pm$ 12.8 7.5 $\pm$ 73.2	Median L Median L	0.64 (0.08-0.86) ^b 0.53 (-0.79-0.89) ^b	SUMMER WINTER		
PM _{2.5}	24 h	$\bar{x} \pm \text{SD}$ $\bar{x} \pm \text{SD}$	37 36	7.2 $\pm$ 4.0 9.6 $\pm$ 7.9			8.4 $\pm$ 2.3 -1.3 $\pm$ 24.2	Median L Median L	0.11 (-0.60-0.64) ^b 0.32 (-0.48-0.68) ^b	SUMMER WINTER		

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TABLE 5-7 (cont.). PERSONAL MONITORING STUDIES FOR PM: MEASURED CONCENTRATIONS AND CORRELATION COEFFICIENTS

Size Fraction	Avg. Time	Statistic	Sample Size ¹	Measured Concentration Levels (µg/m ³)				Personal-Ambient ¹ Correlation Coefficients (r)			Other Correlation Coefficients (r)		
				Personal	Residential Indoor	Residential Outdoor	Ambient	Type ¹	Value (Range)	Notes	Type ¹	Value (Range)	
Tamura et al. (1996a) - Tokyo													
PM ₁₀	48 h							P	0.83	n = 7 elderly adults			
Wilkins et al. (2000a,b) - Baltimore													
PM _{2.5}	24 h	$\bar{x}$ Range	23	13.0 7 - 25	9.4 4 - 19	22.0 7 - 52	22.0 8 - 59	Median L P	0.80 (0.38-0.98) ^d 0.89 ^d	n = 21 elderly adults	P _{indoor} P _{outdoor} P _{personal} P _{ambient} P _{total}	0.90 ^d 0.93 ^d 0.94 ^d 0.87 ^d 0.96 ^d	
PM ₁₁	24 h	$\bar{x}$ Range	28		11.0 4 - 23	30.0 13 - 66	29.9 13 - 74				P _{indoor} P _{outdoor} P _{personal}	0.82 ^d 0.81 ^d 0.94 ^d	
PM _{1+2.5}	24 h	$\bar{x}$ Range	26		1.0 -3 - 5	8.0 -2 - 16	8.0 1 - 15				P _{indoor} P _{outdoor} P _{personal}	0.18 ^d 0.08 ^d 0.45 ^d	
Pooled Studies													
Bahadori (1998) - Nashville													
PM _{2.5}	12 h	$\bar{x} \pm$ SD Range	30	21.7 $\pm$ 10.5 10 - 67	15.5 $\pm$ 6.6 5 - 40	23.4 $\pm$ 6.8 3 - 61		P	0.09	n = 10 COPD subjects; daytime	P _{indoor} P _{outdoor}	0.72 0.31	
PM ₁₁	12 h	$\bar{x} \pm$ SD Range	30	33.0 $\pm$ 16.9 5 - 88	21.6 $\pm$ 10.7 9 - 77	32.5 $\pm$ 8.1 7 - 76		P	-0.08	n = 10 COPD subjects; daytime	P _{indoor} P _{outdoor}	0.41 0.06	
Pettizzari et al. (1999) - Toronto													
PM _{2.5}	3 d	$\bar{x}$	922	28.4	21.1	15.1		P	0.23	n = 178; n for indoor, outdoor lower than personal	P _{indoor} P _{outdoor}	0.79 0.33	
PM ₁₀	3 d	$\bar{x}$	141	67.9	29.8	24.3				No correlations reported			
Ogleby et al. (2000a) - EXPOLIS Basel													
PM _{2.5}	48 h	$\bar{x} \pm$ SD	44 20	23.7 $\pm$ 17.1 17.5 $\pm$ 13.0		19.0 $\pm$ 11.7 17.7 $\pm$ 7.1		P P	0.07 0.21	All No ETS exposure			

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TABLE 5-7 (cont.). PERSONAL MONITORING STUDIES FOR PM: MEASURED CONCENTRATIONS AND CORRELATION COEFFICIENTS

Size Fraction	Avg. Time	Measured Concentration Levels (µg/m³)						Personal-Ambient ¹ Correlation Coefficients (r)			Other Correlation Coefficients (r)	
		Statistic	Sample Size ¹	Personal	Residential Indoor	Residential Outdoor	Ambient	Type ¹	Value (Range)	Notes	Type ²	Value (Range)
Sanjon-Burgos et al. (1998) - Mexico City												
PM ₁₀	24 h	$\bar{x} \pm SD$	66	97 ± 44	99 ± 50			P	0.26		P _{po}	0.47
											P _{ia}	0.23
Tennaro et al. (1996b) - Osaka												
PM ₁	48 h							P	0.74			
PM ₁₀	48 h							P	0.67			

Abbreviations used:

Avg. = Averaging (time)
Conc. = Concentration
CV = Cardiovascular
d = Day
ETS = Environmental tobacco smoke
h = Hour

i-a = Indoor-ambient correlation
i-o = Indoor-outdoor correlation
L = Longitudinal correlation
Med. = Median
o-a = Outdoor-ambient correlation
P = Pooled correlation

p-i = Personal-indoor correlation
p-o = Personal-outdoor correlation
SD = Standard deviation
Stat. = Statistic
 $\bar{x}$ = Mean

Notes:

1. Sample size is for personal concentrations; indoor, outdoor and ambient sample sizes may differ.
2. Correlation coefficient is for personal-residential outdoor if no ambient concentration data reported.
3. See text for description of types of correlations.
4. Daily-averaged correlation (values for individual subjects averaged for each day).
5. Pooled correlations estimated using a Monte Carlo sampling procedure, n = 1000. If mean P is shown, then SD given; if median P is shown, then range is given.
6. Obtained from a regression equation; $r = \sqrt{(R^2)}$.
6. Spearman rank correlations.
7. Calculated, $r = \sqrt{(R^2)}$, from R² from a mixed model regression.

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