

SUPPLEMENTAL MATERIAL

Biomass Burning as a Source of Ambient Fine Particulate Air Pollution and
Hospital Admissions for Acute Myocardial Infarction

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eTable 1. Linear regression models used to correct for spatial differences in PM_{2.5} and levoglucosan concentrations across each city

City	Site Id	Spatial Correction Model	Intercept	Beta (95% CI)	Covariates	R ²	RMSE
Courtenay	1	PM _{2.5}	0.11	0.57 (0.048, 1.10)	Fixed Site PM _{2.5}	0.49	2.59
	1	Levoglucosan	-75	0.46 (0.20, 0.71)	Fixed Site Levoglucosan	0.72	200
	2	PM _{2.5}	2.2	0.24 (0.034, 0.45)	Fixed Site PM _{2.5}	0.52	1.03
	2	Levoglucosan	88.5	0.15 (0.062, 0.23)	Fixed Site Levoglucosan	0.70	67.4
	3	PM _{2.5}	4.4	0.31 (0.018, 0.60)	Fixed Site PM _{2.5}	0.53	1.40
	3	Levoglucosan	73.1	0.43 (0.20, 0.65)	Fixed Site Levoglucosan	0.74	179
	4	PM _{2.5}	4.1	0.12 (-0.058, 0.29)	Fixed Site PM _{2.5}	0.46	0.735
	4	Levoglucosan	39.3	0.16 (0.055, 0.26)	Fixed Site Levoglucosan	0.70	76.4
	5	PM _{2.5}	1.78	0.30 (-0.093, 0.69)	Fixed Site PM _{2.5}	0.32	1.94
	5	Levoglucosan	47.8	0.20 (0.069, 0.33)	Fixed Site Levoglucosan	0.65	105
	6	PM _{2.5}	1.18	0.31 (0.050, 0.57)	Fixed Site PM _{2.5}	0.65	1.17
	6	Levoglucosan	109	0.075 (-0.020, 0.17)	Fixed Site Levoglucosan	0.33	75.7
	7	PM _{2.5}	4.09	0.51 (0.075, 0.94)	Fixed Site PM _{2.5}	0.52	2.13
	7	Levoglucosan	252	0.58 (0.27, 0.90)	Fixed Site Levoglucosan	0.74	251
	8	PM _{2.5}	2.83	1.03 (0.59, 1.48)	Fixed Site PM _{2.5}	0.81	2.21
	8	Levoglucosan	145	1.09 (0.59, 1.59)	Fixed Site Levoglucosan	0.79	398

eTable 1 continued. Linear regression models to correct for spatial differences in PM_{2.5} and levoglucosan concentrations across each city

City	Site Id	Spatial Correction Model	Intercept	Beta (95% CI)	Covariates	R ²	RMSE
Kamloops	1	PM _{2.5}	-0.17	0.83 (0.27, 1.39)	Fixed Site PM _{2.5}	0.56	2.86
	1	levoglucosan	59.6	1.60 (1.04, 2.17)	Fixed Site Levoglucosan	0.82	93.7
	2	PM _{2.5}	-1.07	0.89 (0.51, 1.27)	Fixed Site PM _{2.5}	0.73	1.99
	2	levoglucosan	9.9	1.05 (0.93, 1.17)	Fixed Site Levoglucosan	0.98	19.9
	3	PM _{2.5}	0.28	0.72 (0.40, 1.03)	Fixed Site PM _{2.5}	0.74	1.63
	3	levoglucosan	28.2	1.06 (0.81, 1.31)	Fixed Site Levoglucosan	0.91	41.6
	4	PM _{2.5}	-2.05	0.78 (0.64, 0.92)	Fixed Site PM _{2.5}	0.94	0.75
	4	levoglucosan	-23.2	0.99 (0.82, 1.17)	Fixed Site Levoglucosan	0.94	30.0
	5	PM _{2.5}	-2.7	0.75 (0.63, 0.88)	Fixed Site PM _{2.5}	0.95	0.65
	5	levoglucosan	-35.3	0.85 (0.66, 1.04)	Fixed Site Levoglucosan	0.91	32.5
	6	PM _{2.5}	0.34	0.89 (0.47, 1.31)	Fixed Site PM _{2.5}	0.69	2.21
	6	levoglucosan	72.2	1.32 (0.80, 1.85)	Fixed Site Levoglucosan	0.76	89.2
	7	PM _{2.5}	-1.79	0.98 (0.52, 1.45)	Fixed Site PM _{2.5}	0.69	2.43
	7	levoglucosan	16.8	1.45 (1.24, 1.66)	Fixed Site Levoglucosan	0.96	35.0
	8	PM _{2.5}	-2.49	1.04 (0.70, 1.37)	Fixed Site PM _{2.5}	0.83	1.75
	8	levoglucosan	8.57	1.42 (1.26, 1.58)	Fixed Site Levoglucosan	0.97	27.2

eTable 1 continued. Linear regression models to correct for spatial differences in PM_{2.5} and levoglucosan concentrations across each city

City	Site Id	Spatial Correction Model	Intercept	Beta (95% CI)	Covariates	R ²	RMSE
Prince George	1	PM _{2.5}	2.07	0.55 (0.34, 0.75)	Fixed Site PM _{2.5}	0.85	1.52
	1	levoglucosan	351	1.04 (0.75, 1.33)	Fixed Site Levoglucosan	0.91	118
	2	PM _{2.5}	-2.51	0.77 (0.57, 0.98)	Fixed Site PM _{2.5}	0.93	1.44
	2	levoglucosan	75.4	0.78 (0.64, 0.92)	Fixed Site Levoglucosan	0.97	54.5
	3	PM _{2.5}	-1.74	0.79 (0.62, 0.97)	Fixed Site PM _{2.5}	0.94	1.27
	3	levoglucosan	66.9	0.59 (0.48, 0.69)	Fixed Site Levoglucosan	0.96	42.6
	4	PM _{2.5}	-0.76	0.72 (0.64, 0.80)	Fixed Site PM _{2.5}	0.99	0.507
	4	levoglucosan	62.0	0.47 (0.41, 0.53)	Fixed Site Levoglucosan	0.98	23.7
	5	PM _{2.5}	-1.42	0.71 (0.053, 1.36)	Fixed Site PM _{2.5}	0.80	1.14
	5	levoglucosan	43.7	0.35 (-0.10, 0.81)	Fixed Site Levoglucosan	0.67	22.6
	6	PM _{2.5}	0.58	0.80 (0.58, 1.02)	Fixed Site PM _{2.5}	0.93	1.53
	6	levoglucosan	116	0.48 (0.33, 0.63)	Fixed Site Levoglucosan	0.91	58.8
	7	PM _{2.5}	-0.72	0.93 (0.73, 1.13)	Fixed Site PM _{2.5}	0.94	1.48
	7	levoglucosan	98.1	0.56 (0.44, 0.68)	Fixed Site Levoglucosan	0.94	49.4
	8	PM _{2.5}	-0.66	0.86 (0.70, 1.03)	Fixed Site PM _{2.5}	0.95	1.24
	8	levoglucosan	110	0.57 (0.44, 0.71)	Fixed Site Levoglucosan	0.94	53.8

eTable 2. Ambient PM_{2.5} and Hospitalization for Myocardial Infarction (per 5 µg/m³ change) using a restricted cubic spline for temperature adjustment

Strata	n	Without Spatial Correction		With Spatial Correction	
		Odds Ratios (95% CI)		Odds Ratios (95% CI)	
		Lag-0	3-Day Mean	Lag-0	3-Day Mean
<i>All Days</i>	2833	1.01 (0.97, 1.04)	1.00 (0.96, 1.04)	1.02 (0.97, 1.07)	1.00 (0.95, 1.06)
Sex					
Men	1922	1.01 (0.99, 1.04)	1.00 (0.97, 1.03)	1.03 (1.00, 1.05)	1.00 (0.96, 1.05)
Women	912	0.99 (0.89, 1.10)	1.00 (0.92, 1.09)	0.98 (0.85, 1.14)	1.00 (0.90, 1.11)
Age ^a					
< 65 years	1302	1.00 (0.95, 1.04)	0.96 (0.89, 1.03)	1.00 (0.94, 1.07)	0.96 (0.88, 1.05)
≥ 65 years	1531	1.02 (1.00, 1.05)	1.05 (1.04, 1.06)	1.03 (0.99, 1.07)	1.06 (1.03, 1.08)
City					
Courtenay	488	1.01 (0.91, 1.12)	1.05 (0.92, 1.20)	1.10 (0.91, 1.32)	1.12 (0.89, 1.40)
< 65 years	152	0.93 (0.76, 1.13)	0.88 (0.69, 1.14)	1.01 (0.71, 1.43)	0.92 (0.59, 1.44)
≥ 65 years	336	1.05 (0.93, 1.19)	1.13 (0.96, 1.32)	1.15 (0.92, 1.44)	1.21 (0.92, 1.58)
Kamloops	863	1.05 (0.98, 1.12)	1.03 (0.95, 1.12)	1.06 (0.98, 1.15)	1.04 (0.95, 1.15)
< 65 years	346	1.05 (0.96, 1.15)	1.03 (0.93, 1.14)	1.07 (0.96, 1.19)	1.04 (0.91, 1.18)
≥ 65 years	517	1.06 (0.95, 1.17)	1.04 (0.92, 1.18)	1.05 (0.93, 1.18)	1.05 (0.92, 1.21)
Prince George	1482	0.99 (0.95, 1.03)	0.98 (0.93, 1.03)	0.99 (0.94, 1.04)	0.97 (0.91, 1.04)
< 65 years	804	0.98 (0.92, 1.03)	0.93 (0.86, 1.00)	0.97 (0.91, 1.05)	0.92 (0.83, 1.01)
≥ 65 years	678	1.01 (0.95, 1.07)	1.04 (0.96, 1.12)	1.01 (0.93, 1.09)	1.04 (0.95, 1.15)

All models are adjusted for mean temperature (restricted cubic spline, 3-knots); Age strata are based on the median case age.

eTable 3. Sensitivity Analyses Removing Individual Years from the Analyses: Three-day mean PM_{2.5} and hospitalization for myocardial Infarction (per 5 µg/m³ change) among elderly subjects (≥ 65 years) during the cold season (3-day mean temperature < 6.44 °C) across strata of monthly mean levoglucosan/PM_{2.5}

Year Removed from Analyses	Monthly mean levoglucosan/PM _{2.5}		
	High OR (95% CI)	Mid OR (95% CI)	Low OR (95% CI)
2008	1.25 (1.01, 1.55)	1.08 (1.05, 1.11)	1.16 (1.13, 1.18)
2009	1.16 (1.03, 1.32)	1.06 (1.05, 1.07)	1.08 (1.06, 1.10)
2010	1.18 (1.02, 1.36)	1.10 (0.98, 1.24)	1.05 (1.03, 1.07)
2011	1.14 (0.98, 1.32)	1.07 (0.98, 1.16)	1.04 (1.03, 1.06)
2012	1.20 (1.06, 1.36)	1.04 (0.91, 1.18)	0.94 (0.92, 0.96)
2013	1.17 (1.15, 1.19)	1.01 (0.99, 1.03)	1.02 (1.00, 1.04)
2014	1.27 (1.13, 1.42)	1.25 (1.20, 1.31)	1.04 (1.02, 1.06)
2015	1.13 (0.90, 1.43)	1.06 (1.02, 1.10)	1.05 (1.04, 1.07)

All PM_{2.5} and levoglucosan data are corrected for spatial variations across each region. Monthly mean levoglucosan/PM_{2.5} tertile values: High (>1.5%); Mid (>0.93-1.5%); Low (≤0.93%). All models are adjusted for 3-day mean temperature (linear term).

eFigure 1. Concentration-response relationship between 3-day mean temperature (using a cubic spline with 3-knots) and emergency room visits for myocardial infarction among subjects ≥ 65 years of age (adjusted for 3-day mean $PM_{2.5}$). The range of -5 to 5°C represents the 10th and 90th percentiles of the mean differences between case and referent days.

