

Supplementary material

Characteristics of PM₁₀ levels monitored for more than a decade in subway stations in South Korea

Sangjun Choi¹, Ju-Hyun Park², Seo-Yeon Bae³, So-Yeon Kim³, Hyeajeong Byun⁴, Hyunseok Kwak⁵, Sungho Hwang⁶, Jihoon Park⁷, Hyunhee Park⁸, Kyong-Hui Lee⁹, Won Kim¹⁰, Dong-Uk Park^{3*}

¹ Department of Occupational Health, Daegu Catholic University, Gyeongsangbuk-do, Republic of Korea 38430, ² Department of Statistics, Dongguk University, Seoul, Republic of Korea 04620, ³ Department of Environmental Health, Korea National Open University, Seoul, Republic of Korea 03087, ⁴ Samsung SDS CO., LTD., Seoul, Republic of Korea 05510, ⁵ Occupational Lung Diseases Institute, Korea Workers' Compensation and Welfare Service, Incheon, Republic of Korea 21417, ⁶ National Cancer Control Institute, National Cancer Center, Ilsan Republic of Korea 10408, ⁷ Environmental Safety Group, Korea Institute of Science and Technology Europe Forschungsgesellschaft mbH, 66123 Saarbrücken, Germany, ⁸ Occupational Safety and Health Research Institute, Ulsan, Republic of Korea 44429, ⁹ Force Health Protection & Preventive Medicine, MEDDAC-Korea, US Army, ¹⁰ Wonjin Institute of Occupational and Environmental Health, Seoul, Republic of Korea 02221

* Corresponding author. Tel: 82-2-3668-4707; Fax: 82-2-741-4701

E-mail address: pdw545@gmail.com

List of Contents

Table S1. Subway characteristics influencing the level of PM ₁₀ in Incheon metro lines	S1
Table S2. Subway characteristics influencing the level of PM ₁₀ in Busan metro lines	S2
Table S3. Subway characteristics influencing the level of PM ₁₀ in Daegu metro lines	S3
Table S4. Subway characteristics influencing the level of PM ₁₀ in Gwangju metro lines	S4
Table S5. Subway characteristics influencing the level of PM ₁₀ in Daejeon metro lines	S5

Table S1. Subway characteristics influencing the level of PM₁₀ in Incheon metro lines

Variable ^a		Univariate analysis				Multiple analysis			
		Estimate	Lower 95% CI	Upper 95% CI	p-value	Estimate	Lower 95% CI	Upper 95% CI	p-value
Route	Line 2	-18.69	-26.22	-11.17	<0.001	3.56	-4.79	11.92	0.215
	Airport railroad	-18.86	-41.00	3.28		13.50	-6.51	33.50	
Year	2009-2011	-12.38	-16.34	-8.44	<0.001	-0.87	-7.32	5.59	<0.001
	2012-2014	-25.60	-29.50	-21.73		-20.84	-25.02	-16.64	
	2015-2017	-33.89	-37.69	-30.11		-18.77	-24.70	-12.75	
Season	Winter	-52.68	-60.03	-45.32	<0.001	-47.64	-54.12	-41.04	<0.001
	Spring	-4.02	-5.46	-2.58		-3.30	-4.57	-2.02	
	Summer	-1.91	-3.07	-0.73		-3.17	-4.23	-2.10	
Other	Transfer station	-14.70	-22.83	-6.57	<0.001	-1.28	-7.99	5.40	0.273
	Screen door	-22.13	-25.46	-18.83	<0.001	-13.57	-18.57	-8.70	<0.001

^a Reference group: Line 1, non-transfer station, year (from 2005 to 2008), no screen door, season (autumn).

Table S2. Subway characteristics influencing the level of PM₁₀ in Busan metro lines

Variable ^a	Univariate analysis				Multiple analysis				
	Estimate	Lower 95% CI	Upper 95% CI	p-value	Estimate	Lower 95% CI	Upper 95% CI	p-value	
Route	Line 2	-3.50	-5.81	-1.19		-3.82	-6.00	-1.64	
	Line 3	-7.46	-10.52	-4.39	<0.001	-8.98	-12.06	-5.92	<0.001
	Line 4	-12.34	-16.08	-8.60		-12.29	-15.94	-8.67	
Year	2012-2014	12.96	10.03	15.89		-1.89	-4.56	0.76	
	2015-2017	11.02	8.31	13.71	<0.001	-12.54	-15.64	-9.48	<0.001
Season	Spring	0.56	-2.45	3.56		-8.17	-10.99	-5.36	
	Summer	5.14	2.59	7.70	<0.001	-2.82	-7.07	1.45	<0.001
	Spring from 2012 to 2014		-			-0.67	-4.07	2.73	
	Spring from 2015 to 2017		-			7.09	3.55	10.63	
	Summer from 2012 to 2014		-			-2.02	-7.70	3.72	
	Summer from 2015 to 2017		-			1.58	-3.59	6.74	
									<0.001
Other	Transfer station	-1.90	-4.84	1.01	<0.001	1.99	-0.53	4.54	0.120
	Screen door	-5.77	-7.10	-4.45	<0.001	1.18	-0.72	3.13	0.219

^a Reference group: Line 1, non-transfer station, year (from 2009 to 2011), no screen door, season (autumn).

Table S3. Subway characteristics influencing the level of PM₁₀ in Daegu metro lines

Variable ^a		Univariate analysis				Multiple analysis			
		Estimate	Lower 95% CI	Upper 95% CI	p-value	Estimate	Lower 95% CI	Upper 95% CI	p-value
Route	Line 2	-6.41	-11.68	-1.14	0.094	-1.62	-6.53	3.27	0.516
Year	2009-2011	-28.35	-35.36	-21.33		-27.28	-34.27	-20.27	
	2012-2014	-17.06	-20.29	-13.83	<0.001	-15.87	-19.11	-12.62	<0.001
	2015-2017	-30.11	-33.33	-26.89		-28.95	-32.21	-25.70	
Season	Winter	9.02	-31.15	49.20		10.14	-29.81	50.14	
	Spring	-10.01	-16.83	-3.19	0.004	-4.53	-11.60	2.58	<0.001
	Summer	-8.57	-13.97	-3.16		-8.26	-13.65	-2.86	
	Spring from 2009 to 2011		-			16.49	7.22	25.72	
	Spring from 2012 to 2014		-			14.52	8.07	20.91	<0.001
	Summer from 2009 to 2011		-			8.93	0.91	16.92	
	Other	Transfer station	-11.33	-21.31	-1.36	0.145	3.64	-5.16	12.43
	Screen door	-24.64	-28.90	-20.38	<0.001	-12.16	-16.77	-7.59	<0.001

^a Reference group: Line 1, non-transfer station, year (from 2005 to 2008), no screen door, season (autumn).

Table S4. Subway characteristics influencing the level of PM₁₀ in Gwangju metro lines

Variable ^a	Univariate analysis				Multiple analysis			
	Estimate	Lower 95% CI	Upper 95% CI	p-value	Estimate	Lower 95% CI	Upper 95% CI	p-value
Year	2009-2011	-6.50	-9.96	-3.06	-4.10	-7.68	-0.52	
	2012-2014	-9.13	-12.58	-5.71	-7.00	-11.07	-2.93	0.002
	2015-2017	-11.49	-14.93	-8.10	-8.13	-12.35	-3.89	
Season	Spring	-6.78	-10.96	-2.63	2.66	-2.36	7.69	0.006
	Summer	-6.79	-10.06	-3.53	-2.62	-6.17	0.92	
Other	Screen door	-10.98	-14.27	-7.71	-8.57	-12.32	-4.79	<0.001

^a Reference group: Year (from 2005 to 2008), no screen door.

Table S5. Subway characteristics influencing the level of PM₁₀ in Daejeon metro lines

Variable ^a	Univariate analysis				Multiple analysis				
	Estimate	Lower 95% CI	Upper 95% CI	p-value	Estimate	Lower 95% CI	Upper 95% CI	p-value	
Year	2009-2011	6.96	2.59	11.29	5.84	0.85	10.82		
	2012-2014	10.72	6.37	15.04	<0.001	9.34	4.07	14.61	0.006
	2015-2017	8.68	4.34	13.00		8.06	2.46	13.67	
Season	Spring	-1.25	-6.23	3.74	0.001	-2.28	-7.97	3.42	0.495
	Summer	-8.36	-12.80	-3.87		-2.53	-8.05	3.03	

^a Reference group: Year (from 2005 to 2008), season (autumn); screen doors were installed in all stations in 2005 and 2006, so the effect of screen doors was not analyzed.