APPENDIX AVAILABLE ON THE HEI WEB SITE

Research Report 177

National Particle Component Toxicity (NPACT) Initiative: Integrated Epidemiologic and Toxicologic Studies of the Health Effects of Particulate Matter Components

Morton Lippmann et al.

Study 3. Time-Series Analysis of Mortality, Hospitalizations, and Ambient $PM_{2.5}$ and Its Components

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Appendix F. Seattle and Detroit

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Although this document was produced with partial funding by the United States Environmental Protection Agency under Assistance Award CR–83234701 to the Health Effects Institute, it has not been subjected to the Agency's peer and administrative review and therefore may not necessarily reflect the views of the Agency, and no official endorsement by it should be inferred. For the research funded under the National Particle Component Toxicity Initiative, HEI received additional funds from the American Forest & Paper Association, American Iron and Steel Institute, American Petroleum Institute, ExxonMobil, and Public Service Electric and Gas. The contents of this document have not been reviewed by private party institutions, including those that support the Health Effects Institute; therefore, it may not reflect the views or policies of these parties, and no endorsement by them should be inferred.

This document was reviewed by the HEI Health Review Committee but did not undergo the HEI scientific editing and production process.

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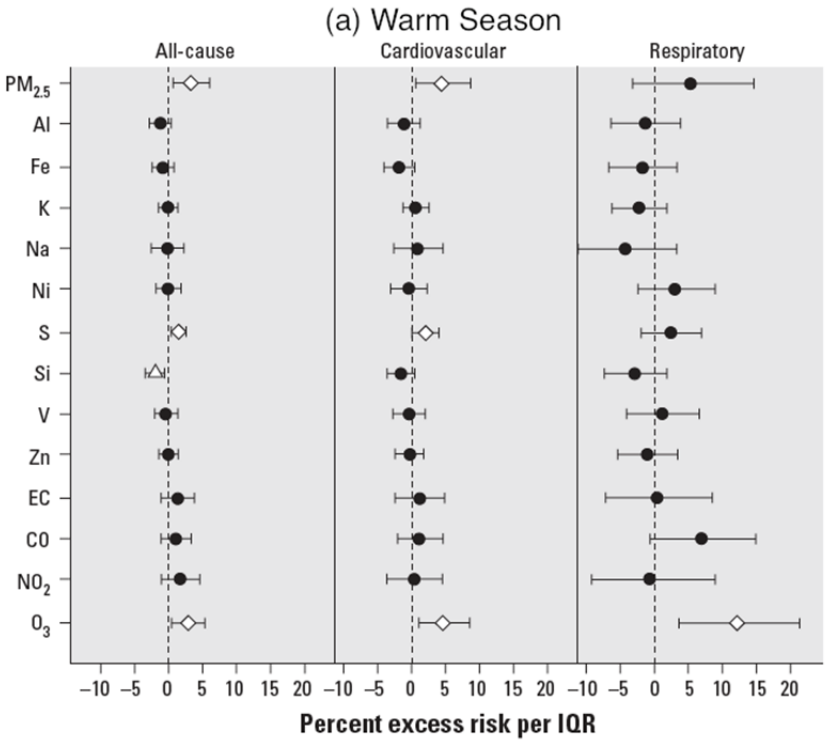
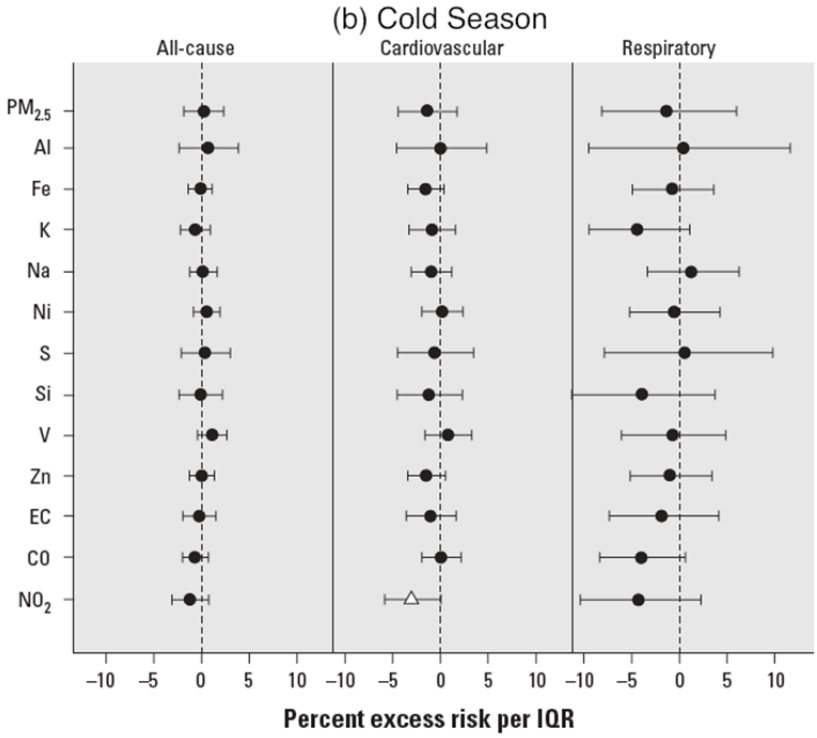
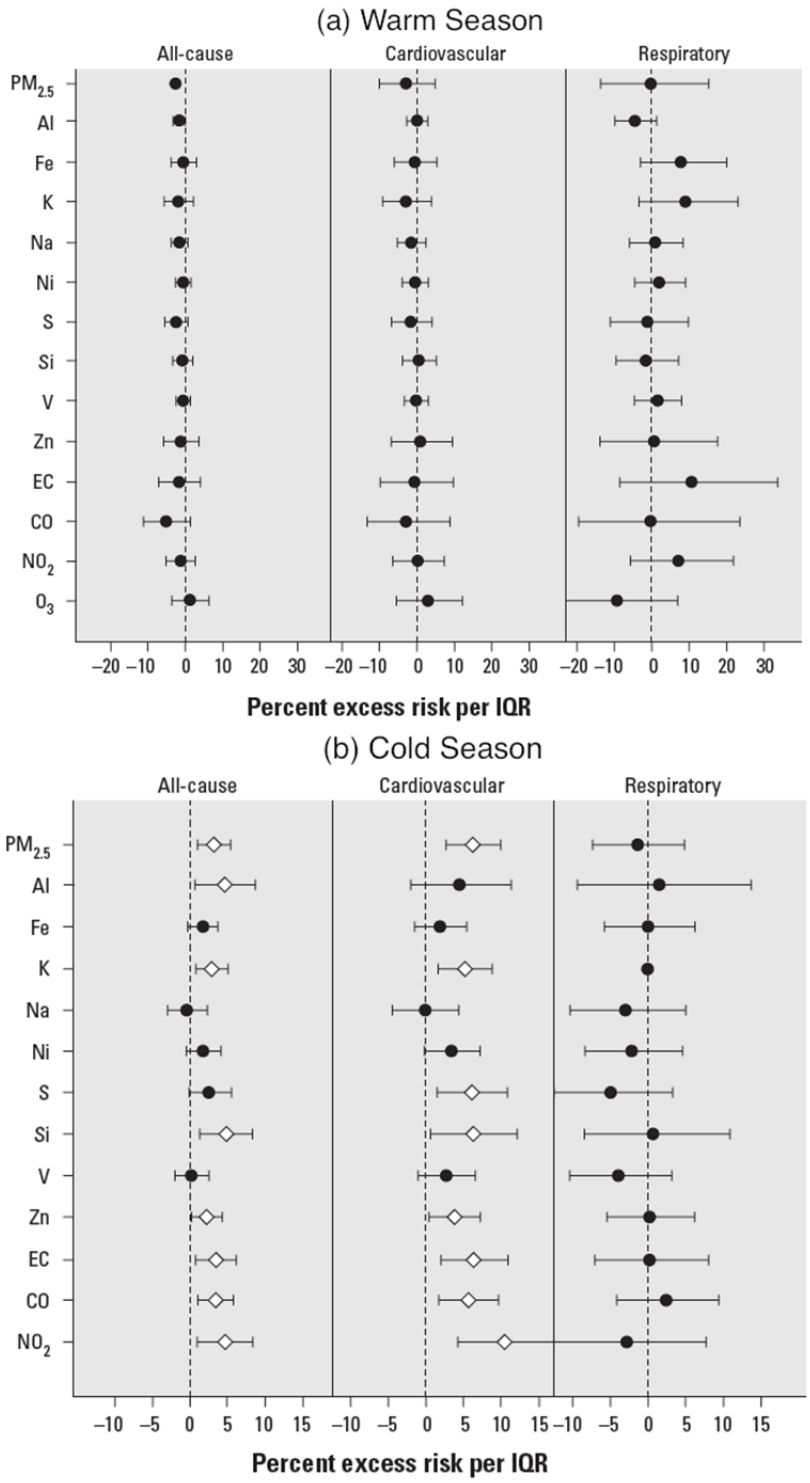
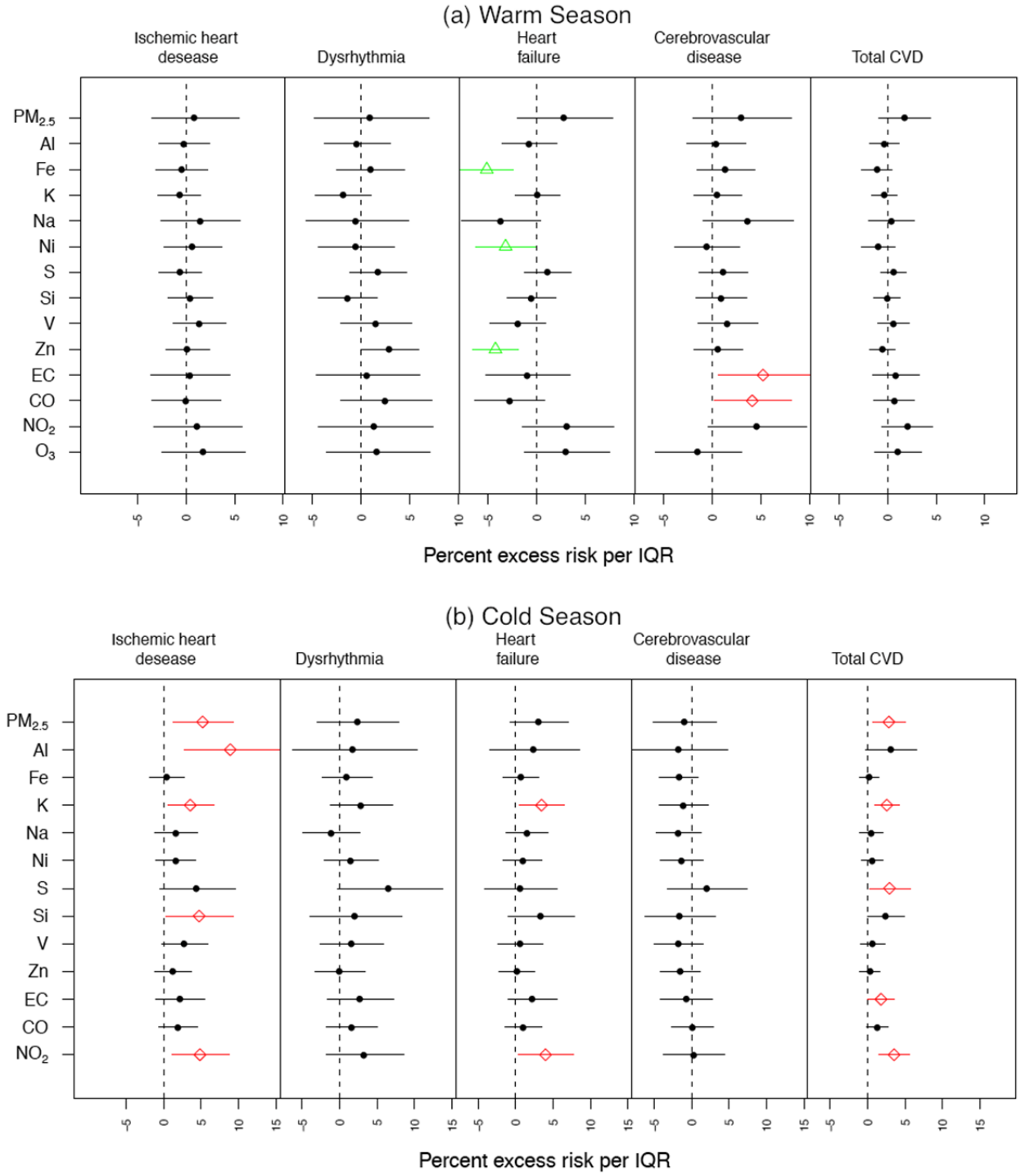




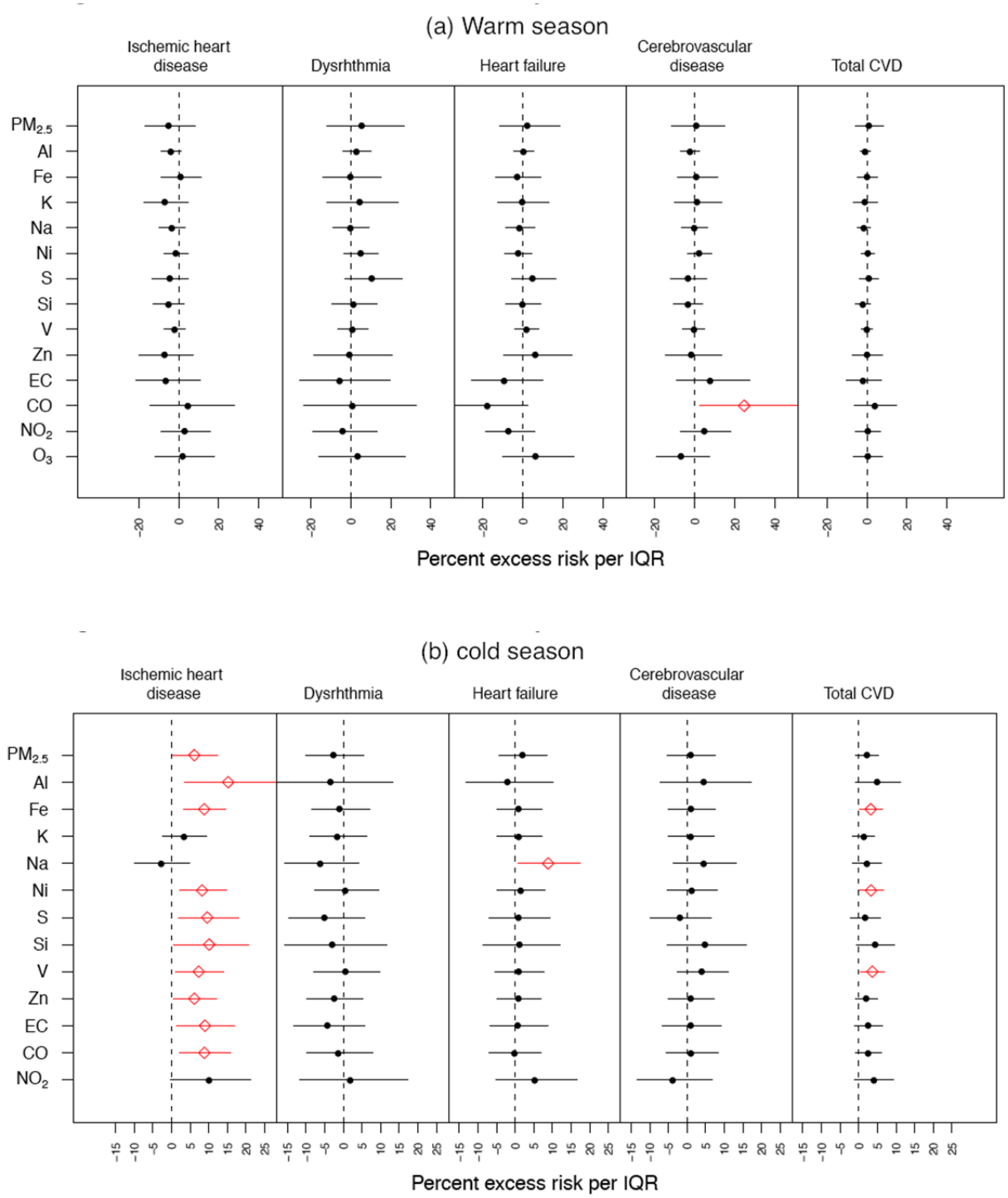
Appendix Figure F.1. Estimated percent excess risk of mortality in Detroit, MI, from a constrained distributed lag model (sum of lag 0 through 2 days) per inter-quartile-range of corresponding air pollutants for (a) warm season and (b) cold season. The diamonds and triangle represent significantly ($p < 0.05$) positive and negative associations, respectively. The From Zhou et al. (2010).



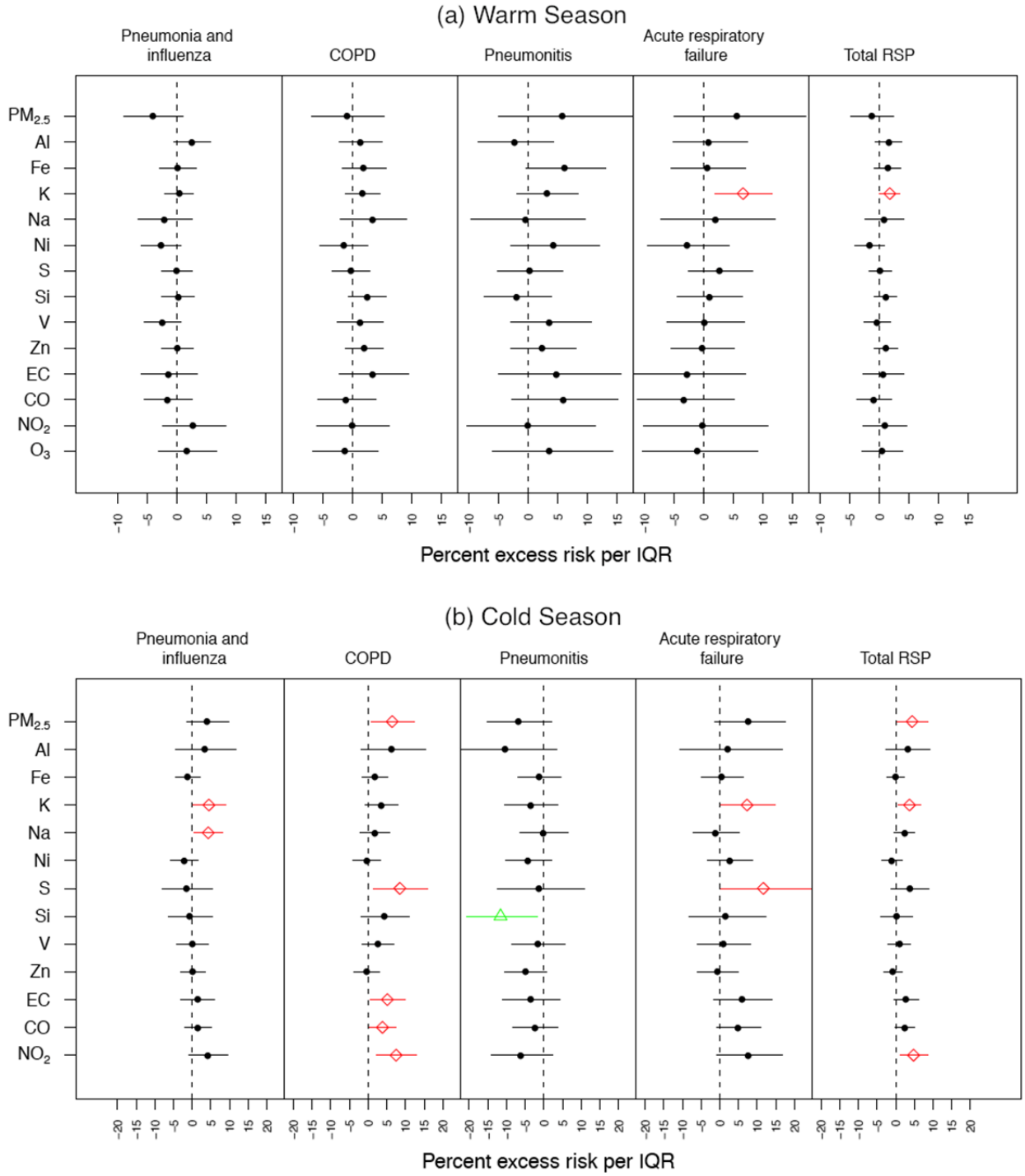
Appendix Figure F.2. Estimated percent excess risk of Mortality in Seattle, WA, from a constrained distributed lag model (sum of lag 0 through 2 days) per inter-quartile-range of corresponding air pollutants for (a) warm season and (b) cold season. The diamonds and triangle represent significantly ($p < 0.05$) positive and negative associations, respectively. From Zhou et al. (2010).



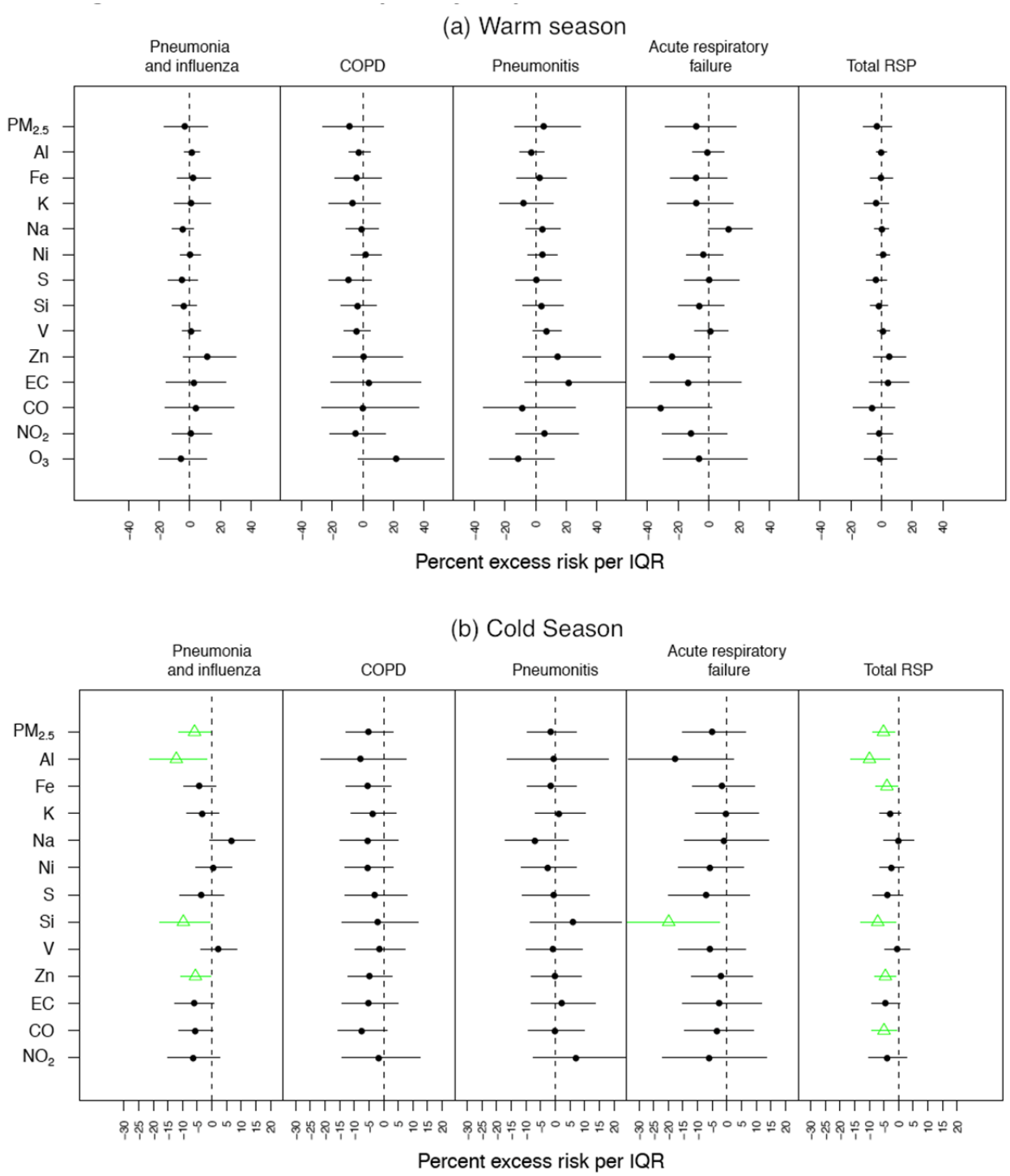
Appendix Figure F.3. Estimated percent excess risk of CVD hospitalizations in Detroit, MI, from a constrained distributed lag model (sum of lag 0 through 2 days) per inter-quartile-range of corresponding air pollutants for (a) warm season and (b) cold season. The red and green estimates represent significantly ($p < 0.05$) positive and negative associations, respectively.



Appendix Figure F.4. Estimated percent excess risk of CVD hospitalizations in Seattle, WA, from a constrained distributed lag model (sum of lag 0 through 2 days) per inter-quartile-range of corresponding air pollutants for (a) warm season and (b) cold season. The red and green estimates represent significantly ($p < 0.05$) positive and negative associations, respectively.



Appendix Figure F.5. Estimated percent excess risk of respiratory hospitalizations in Detroit, MI, from a constrained distributed lag model (sum of lag 0 through 2 days) per inter-quartile-range of corresponding air pollutants for (a) warm season and (b) cold season. The red and green estimates represent significantly ($p < 0.05$) positive and negative associations, respectively.



Appendix Figure F.6. Estimated percent excess risk of respiratory hospitalizations in Seattle, WA, from a constrained distributed lag model (sum of lag 0 through 2 days) per inter-quartile-range of corresponding air pollutants for (a) warm season and (b) cold season. The red and green estimates represent significantly ($p < 0.05$) positive and negative associations, respectively.

Appendix Table F.1. Descriptive statistics for Detroit daily speciation and mortality data analysis 2002-2004.

Detroit.data	Minimum	Median	Maximum	IQR	Mean(Warm)	Mean(Cold)	SD
$PM_{2.5}$	2.2000	13.2000	65.8000	11.0000	15.2562	14.8750	8.7793
Al	0.0000	0.0095	0.3407	0.0203	0.0207	0.0085	0.0213
Fe	0.0129	0.0751	0.7641	0.0697	0.1090	0.0847	0.0775
K	0.0052	0.0501	0.7434	0.0337	0.0664	0.0533	0.0473
Na	0.0000	0.0421	0.4121	0.0401	0.0415	0.0615	0.0423
Ni	0.0000	0.0003	0.0096	0.0007	0.0006	0.0004	0.0007
S	0.1466	0.8786	6.9578	0.9262	1.5377	0.8904	1.0450
Si	0.0000	0.0451	0.7358	0.0382	0.0703	0.0410	0.0480
V	0.0000	0.0005	0.0172	0.0016	0.0014	0.0008	0.0016
Zn	0.0022	0.0190	0.2693	0.0192	0.0264	0.0242	0.0229
EC	0.1197	0.7090	3.2770	0.4250	0.8246	0.7210	0.3601
CO	0.0000	0.2875	1.8000	0.1875	0.3012	0.3403	0.1838
NO_2	0.0005	0.0167	0.0810	0.0099	0.0149	0.0203	0.0083
O_3	0.0023	0.0251	0.0626	0.0123	0.0259	NA	0.0100
All Cause Mortality	58.0000	93.0000	135.0000	16.0000	88.1913	97.8611	11.9840
Cardiovascular Mortality	19.0000	39.0000	67.0000	9.2500	37.5519	42.4442	7.2971
Respiratory Mortality	0.0000	8.0000	20.0000	4.0000	7.3661	8.8483	3.1271
Temperature	3.8000	50.7000	85.6000	32.4250	64.4377	35.6728	18.7186
Dew Point	-7.1000	41.6500	74.0000	29.6000	53.6987	27.7530	18.2115
Relative Humidity	31.4000	75.6000	98.9000	15.8000	70.1701	77.9995	12.0134

Unit: $\mu g/m^3$ for $PM_{2.5}$ and its species; ppm for CO, O_3 and NO_2; ºF for temperature and dew point; percent for relative humidity. Abbreviations: IQR, inter-quartile range; SD, standard deviation. Note: O_3 data for cold season were not available.

Appendix Table F.2. Descriptive statistics for Seattle daily speciation and mortality data analysis 2002-2004.

	Minimum	Median	Maximum	IQR	Mean(Warm)	Mean(Cold)	SD
$PM_{2.5}$	0.8000	7.9000	41.3000	7.4000	7.9877	11.4144	6.3684
Al	0.0000	0.0064	0.2445	0.0163	0.0159	0.0067	0.0185
Fe	0.0035	0.0473	0.4043	0.0462	0.0608	0.0615	0.0466
K	0.0072	0.0388	0.2253	0.0300	0.0388	0.0546	0.0287
Na	0.0000	0.1011	0.9914	0.1241	0.1580	0.1132	0.1227
Ni	0.0000	0.0013	0.0313	0.0023	0.0028	0.0019	0.0029
S	0.0431	0.3967	1.9252	0.3443	0.5122	0.3714	0.2794
Si	0.0000	0.0281	0.6552	0.0364	0.0507	0.0278	0.0425
V	0.0000	0.0019	0.0581	0.0051	0.0054	0.0031	0.0065
Zn	0.0006	0.0088	0.0530	0.0081	0.0088	0.0133	0.0076
EC	0.0260	0.5251	2.3368	0.5072	0.4958	0.7767	0.3918
CO	0.1000	1.1000	4.8000	0.7000	0.9042	1.5121	0.5958
NO_2	0.0030	0.0189	0.0452	0.0105	0.0178	0.0210	0.0074
O_3	0.0027	0.0199	0.0400	0.0097	0.0202	NA	0.0072
All Cause Mortality	20.0000	38.0000	61.0000	9.0000	36.1985	39.8940	6.6830
Cardiovascular Mortality	5.0000	14.0000	31.0000	6.0000	13.2587	14.7075	3.9741
Respiratory Mortality	0.0000	4.0000	12.0000	3.0000	3.4572	4.3821	2.0862
Temperature	22.9000	51.2000	82.7000	15.6000	59.5860	45.0408	10.0539
Dew Point	4.2000	44.2000	62.8000	12.2000	49.0308	39.2920	8.4259
Relative Humidity	7.5000	80.6000	100.0000	18.9000	70.6807	84.0314	15.1027

Unit: $\mu g/m^3$ for $PM_{2.5}$ and its species; ppm for CO, O_3 and NO_2; ºF for temperature and dew point; percent for relative humidity. Abbreviations: IQR, inter-quartile range; SD, standard deviation. Note: O_3 data for cold season were not available.

Appendix Table F.3. Descriptive statistics for Detroit daily speciation and hospitalizations data analysis 2002-2004.

Variable	Minimum	Median	Maximum	IQR	Mean (Warm)	Mean (Cold)	SD
$PM_{2.5}$	2.2000	13.2000	65.8000	11.0000	15.2562	14.8750	8.7793
Al	0.0000	0.0095	0.3407	0.0203	0.0207	0.0085	0.0213
As	0.0000	0.0010	0.0161	0.0015	0.0017	0.0010	0.0015
Fe	0.0129	0.0751	0.7641	0.0697	0.1090	0.0847	0.0775
K	0.0052	0.0501	0.7434	0.0337	0.0664	0.0533	0.0473
Na	0.0000	0.0421	0.4121	0.0401	0.0415	0.0615	0.0423
Ni	0.0000	0.0003	0.0096	0.0007	0.0006	0.0004	0.0007
S	0.1466	0.8786	6.9578	0.9262	1.5377	0.8904	1.0450
Se	0.0000	0.0005	0.0083	0.0015	0.0012	0.0009	0.0013
Si	0.0000	0.0451	0.7358	0.0382	0.0703	0.0410	0.0480
V	0.0000	0.0005	0.0172	0.0016	0.0014	0.0008	0.0016
Zn	0.0022	0.0190	0.2693	0.0192	0.0264	0.0242	0.0229
EC	0.1197	0.7090	3.2770	0.4250	0.8246	0.7210	0.3601
CO	0.0000	0.2875	1.8000	0.1917	0.2937	0.3431	0.1885
NO_2	0.0005	0.0167	0.0810	0.0099	0.0148	0.0202	0.0083
O_3	0.0023	0.0251	0.0626	0.0123	0.0259		0.0100
Total cardiovascular hospitalization	57.0000	100.0000	150.0000	19.0000	98.8944	101.9433	14.3054
Total respiratory hospitalization	23.0000	50.0000	164.0000	15.0000	47.0383	57.6088	14.8446
Hypertension	0.0000	3.0000	11.0000	2.0000	3.1129	3.2687	1.8469
Ischemic heart disease	3.0000	13.0000	26.0000	6.0000	13.1475	12.7331	3.9765
Dysrhythmia	5.0000	15.0000	33.0000	6.0000	15.4973	15.2541	4.4104
Heart failure	13.0000	30.0000	56.0000	9.0000	29.4791	31.6325	7.1143
Cerebrovascular disease	8.0000	23.0000	42.0000	6.0000	23.1475	23.4369	5.1034
acute respiratory infection	0.0000	1.0000	8.0000	2.0000	0.8124	1.3547	1.1369
Pneumonia and influenza	8.0000	22.0000	82.0000	9.0000	20.3770	26.0091	8.1742
COPD	5.0000	18.0000	84.0000	7.0000	16.6976	19.6636	6.4538
Pneumonitis	0.0000	5.0000	15.0000	3.2500	4.6776	5.3601	2.3959
acute respiratory failure	0.0000	5.0000	15.0000	3.0000	4.4736	5.2212	2.3181
Temperature	3.8000	50.7000	85.6000	32.4500	64.4377	35.6993	18.7068
Dew Point	−7.1000	41.7000	74.0000	29.5500	53.6987	27.7835	18.1977
Relative Humidity	31.3834	75.5536	98.8888	15.8346	70.1671	78.0100	12.0213

Appendix Table F.4. Descriptive statistics for Seattle daily speciation and hospitalizations data analysis 2002-2004.

Variable	Minimum	Median	Maximum	IQR	Mean (Warm)	Mean (Cold)	SD
$PM_{2.5}$	0.8000	7.9000	41.3000	7.4000	7.9877	11.4144	6.3684
Al	0.0000	0.0064	0.2445	0.0163	0.0159	0.0067	0.0185
As	0.0000	0.0009	0.0074	0.0011	0.0008	0.0014	0.0010
Fe	0.0035	0.0473	0.4043	0.0462	0.0608	0.0615	0.0466
K	0.0072	0.0388	0.2253	0.0300	0.0388	0.0546	0.0287
Na	0.0000	0.1011	0.9914	0.1241	0.1580	0.1132	0.1227
Ni	0.0000	0.0013	0.0313	0.0023	0.0028	0.0019	0.0029
S	0.0431	0.3967	1.9252	0.3443	0.5122	0.3714	0.2794
Se	0.0000	0.0000	0.0048	0.0000	0.0001	0.0001	0.0004
Si	0.0000	0.0281	0.6552	0.0364	0.0507	0.0278	0.0425
V	0.0000	0.0019	0.0581	0.0051	0.0054	0.0031	0.0065
Zn	0.0006	0.0088	0.0530	0.0081	0.0088	0.0133	0.0076
EC	0.0260	0.5251	2.3368	0.5072	0.4958	0.7767	0.3918
CO	0.1000	1.1000	4.8000	0.7000	0.9042	1.5121	0.5958
NO_2	3.0000	18.9000	45.2000	10.5000	17.7691	21.0357	7.3880
O_3	0.0027	0.0198	0.0400	0.0096	0.0202		0.0072
Total cardiovascular hospitalization	4.0000	15.0000	31.0000	5.0000	14.8525	16.3912	4.1998
Total respiratory hospitalization	1.0000	9.0000	28.0000	5.0000	8.3024	10.9963	3.9419
Hypertension	0.0000	0.0000	3.0000	0.0000	0.1676	0.2249	0.4571
Ischemic heart disease	0.0000	2.0000	7.0000	2.0000	1.7067	1.7806	1.3639
Dysrhythmia	0.0000	2.0000	10.0000	2.0000	2.4044	2.3949	1.5764
Heart failure	0.0000	4.0000	12.0000	3.0000	3.6794	4.4040	2.1907
Cerebrovascular disease	0.0000	4.0000	14.0000	3.0000	4.1967	4.4918	2.1499
acute respiratory infection	0.0000	0.0000	2.0000	0.0000	0.1111	0.2102	0.4249
Pneumonia and influenza	0.0000	4.0000	17.0000	3.0000	3.5574	5.0018	2.4297
COPD	0.0000	2.0000	10.0000	2.0000	1.8233	2.3455	1.5634
Pneumonitis	0.0000	2.0000	8.0000	2.0000	1.6721	2.0658	1.4139
acute respiratory failure	0.0000	1.0000	6.0000	2.0000	1.1384	1.3729	1.1737
Temperature	22.9000	51.2000	82.7000	15.6000	59.5860	45.0408	10.0539
Dew Point	4.2000	44.2000	62.8000	12.2000	49.0308	39.2920	8.4259
Relative Humidity	7.4926	80.5540	100.0000	18.8904	70.6777	84.0298	15.1039