Supplemental Material:
Short-Term Effects of Air Pollution on Wheeze in Asthmatic Children in Fresno, California

Table 1. Asthma Symptom/Disability Severity Algorithm.

Based on answers to symptom questions (wheeze and cough) on the baseline questionnaire, each child was assigned an asthma severity score of 1 to 3 corresponding with Global Initiative for Asthma Symptom/Disability Steps (2002). Three aspects of asthma morbidity (daily symptoms, exacerbation of symptoms and nighttime symptoms), as characterized by reports of wheeze, cough and limitations of activities were used to create the asthma severity score.

Part 1: Daily symptom frequency step
If the number of days of wheeze in the past 2 weeks =

0-2: step = 1.
3-13: step = 2.
14: step = 3.

Number of days of cough in the past 2 weeks

0-2: step = 1.
3-13: step = 2.
14: step = 3.

Daytime symptom score is the maximum of step for wheeze and cough.

Part 2: Exacerbation step
In the past 2 weeks, if the child has *not* had any wheezing severe enough to limit activities and has not had a persistent cough: step = 1.

In the past 12 months, if a child has had limitations to activities or persistent cough: step = 2.

If in the past 2 weeks, a child has had any limitations to activities or persistent cough: step = 3.

Exacerbation step score is the maximum of these three values.

Part 3: Nighttime symptom step
In the past 12 months, if the child has nighttime wheeze

less than 1x per month: step = 1
about 1x per week: step = 2
more than 1-2 x per week: step = 3

In the past 12 months, if the child has had nighttime cough

once a month or less: step = 1
more than once a month: step = 2
once a week or more: step = 3

The nighttime symptom score is the maximum of these two values.

The final step assignment is the average of "DAILY SYMPTOM STEP", "EXACERBATION STEP" and "NIGHTTIME SYMPTOM STEP".

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Description of ARIMA Methodology

We used the strategies devised by Dickey and Fuller as well as Box and Jenkins to identify and model temporal patterns in the daily proportion of wheeze. The augmented Dickey-Fuller test detects non-stationarity and/or seasonal unit roots exhibited by daily wheeze. Box and Jenkins routines model these patterns and the tendency of a series to remain elevated or depressed, or to oscillate, after high or low values. Box-Jenkins methods model trends by differencing a series (i.e., subtract the values of each day from those of the next day). The Box and Jenkins approach uses "autoregressive" and "moving average" parameters to model the tendency to remain elevated or depressed or to oscillate. Autoregressive parameters best describe patterns that persist for relatively long periods, while moving average parameters parsimoniously describe less persistent patterns.

We proceeded through the following steps. First, we examined the stationarity of the series using the Dickey-Fuller test and, if necessary, differenced the series. Second, we inspected the residual values of wheeze for autocorrelation. If any were found, we iteratively added autoregressive and moving average parameters to the model until the expected value of the residuals was 0. Third, we used as a control variable in the final analyses the fitted daily values of wheeze from the best fitting ARIMA model. We estimated ARIMA models formed by removing statistically non-significant parameters (i.e., $p>.05$). For the ARIMA model, we fitted daily wheeze as AR(1) I(0) MA(1), which suggests that high or low values of wheeze were remembered, albeit in geometrically declining proportions, one and two days later.

Dickey, D., Fuller, W. (1979) Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association,* 74, 427.

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Table 2. Percent skin-test positive for each antigen tested (N=242)*

Antigen	N	%
Alternaria	79	32.4
Cat	49	20.2
Cedar	15	6.20
Cladosporium	35	20.2
Dog	13	5.37
Grass	73	30.2
Juniper	5	2.07
House Dust Mite	56	23.1
Mugwort	51	21.1
Oak	27	11.2
Olive	76	21.4
Penicillin	23	38.3
Privet	22	9.48
German Cockroach	28	11.6
Rye	76	31.4

Cladosporium (n=173); Penicillin (n=60); Privet (n=232)

Fourteen antigens, and a histamine and saline control were tested (7 antigens/arm), usually at baseline. After the first year of the study, we replaced penicllin with *cladosporium*.

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Table 3. Correlation Between Pollutants and Weather Conditions Monitored at the Central Site, Fresno, CA from November, 2000 to March, 2005 [a].

	$PM_{2.5}$	***NO_3***	***EC***	***$PM_{10-2.5}$***	***O_3***	***Temp***	***Relative Humidity***
NO_2 (ppb)	0.63	0.63	0.68	0.12	-0.31	-0.33	0.28
$PM_{2.5}$ ($\mu g/m^3$)	----	0.88	0.76	-0.23	-0.45	-0.43	0.46
NO_3 (ppb)	----	----	0.62	-0.28	-0.56	-0.53	0.55
EC ($\mu g/m^3$)	----	----	----	-0.05	-0.36	-0.34	0.33
$PM_{10-2.5}$ ($\mu g/m^3$)	----	----	----	----	0.64	-0.64	-0.62
O_3 (8-hour averages)	----	----	----	----	----	0.90	-0.86
Temperature (C^o)	----	----	----	----	----	----	0.86

[a] All metrics are 24-hour averages unless otherwise noted.

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Table 4: 90th Percentile of Absolute Value of Daily Differences*

	All	# Days of Moving Average												
	Lags	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
24-hr Ave NO_2 (ppb)	8.7	5.6	3.2	2.6	2.2	2.1	1.8	1.8	1.6	1.4	1.4	1.3	1.2	1.0
24-hr Ave $PM_{2.5}$ ($\mu g/m^3$)	36.2	21.7	16.6	14.2	10.6	10.2	8.0	7.8	6.2	5.3	4.7	4.1	3.4	3.4
24-hr Ave NO3 ($\mu g/m^3$)	5.6	4.2	3.2	2.7	2.0	1.8	1.6	1.5	1.1	1.0	1.0	0.9	0.9	0.7
24-hr Ave EC ($\mu g/m^3$)	3.7	2.2	1.3	1.3	1.1	0.9	0.7	0.6	0.5	0.5	0.5	0.5	0.5	0.4
24-hr Ave $PM_{10-2.5}$ ($\mu g/m^3$)	14.7	13.9	10.9	8.7	7.2	5.8	5.0	4.2	3.9	3.4	3.1	2.8	2.7	2.5
8-hr Ave O_3 (ppb)	20.0	9.9	7.6	5.7	4.7	3.8	3.1	2.9	2.6	2.3	2.2	2.0	1.8	1.7

*Used for calculation of odds ratios. All lags for a given pollutant use the same increase, the 90th percentile of |lag 0 poll –lag 1 poll| during the peak season. Moving averages use the 90th percentile of | lag 0 (X-day moving average)-lag1(X-day moving average) during the peak season. NO_2, $PM_{2.5}$, NO_3 and EC all peak in the months of October to February. $PM_{10-2.5}$ and O_3 peak in the months of April to October.

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Table 5A FULL GROUP: 0- to 14-Day Lags [a]

	NO_2 (ppb)			$PM_{2.5}$ (μg/m^3)			$PM_{10-2.5}$ (μg/m^3)			EC (μg/m^3)			NO_3 (μg/m^3)			8-hour Ave O_3 (ppb)		
Lag	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper
0	1.06	0.97	1.15	1.01	0.86	1.18	1.09	0.99	1.19	1.03	0.89	1.19	1.00	0.91	1.10	1.00	0.89	1.12
1	1.10	1.00	1.20	1.06	0.90	1.23	1.08	0.99	1.19	1.07	0.92	1.23	1.03	0.94	1.13	1.01	0.92	1.12
2	1.10	1.02	1.20	1.04	0.89	1.21	1.08	0.99	1.18	1.05	0.92	1.20	1.01	0.92	1.11	1.01	0.92	1.11
3	1.09	1.01	1.18	1.07	0.92	1.25	1.11	1.01	1.22	1.05	0.92	1.20	1.04	0.94	1.14	1.01	0.93	1.11
4	1.06	0.97	1.16	1.07	0.91	1.26	1.10	1.00	1.20	1.07	0.92	1.23	1.00	0.91	1.10	1.01	0.92	1.10
5	1.08	0.99	1.17	1.09	0.93	1.27	1.09	1.00	1.18	1.10	0.95	1.27	1.05	0.95	1.16	0.98	0.90	1.06
6	1.10	1.01	1.19	1.08	0.92	1.27	1.07	0.98	1.16	1.12	0.97	1.30	1.02	0.93	1.13	0.98	0.90	1.06
7	1.10	1.01	1.20	1.04	0.88	1.22	1.08	0.99	1.18	1.09	0.93	1.27	1.00	0.91	1.11	0.99	0.91	1.07
8	1.06	0.97	1.15	1.01	0.87	1.19	1.06	0.97	1.16	1.06	0.92	1.23	1.02	0.93	1.13	0.99	0.91	1.07
9	1.07	0.98	1.16	1.03	0.89	1.19	1.05	0.96	1.15	1.04	0.90	1.21	1.02	0.92	1.12	0.97	0.90	1.06
10	1.05	0.97	1.15	1.00	0.86	1.17	1.04	0.95	1.14	1.02	0.89	1.18	1.03	0.92	1.14	0.98	0.90	1.07
11	1.05	0.96	1.14	1.02	0.88	1.19	1.07	0.98	1.16	1.05	0.90	1.22	1.00	0.90	1.12	0.98	0.90	1.07
12	1.06	0.97	1.15	1.03	0.88	1.21	1.07	0.98	1.16	1.11	0.96	1.29	1.02	0.91	1.14	1.02	0.93	1.11
13	1.05	0.96	1.14	1.08	0.91	1.27	1.09	1.00	1.18	1.10	0.96	1.27	1.02	0.91	1.14	1.02	0.94	1.12
14	1.06	0.97	1.16	1.14	0.97	1.34	1.09	0.99	1.19	1.14	0.99	1.33	1.01	0.90	1.13	1.05	0.96	1.15

[a]OR for 8.7 ppb increase in 24-hour average NO_2 , 14.7 μg/m^3 increase in 24-hour average $PM_{10-2.5}$ lag 3, 5.6 μg/m^3 increase in 24-hour average NO_3, 3.7 μg/m^3 increase in 24-hour average EC, 36.2 μg/m^3 increase in 24-hour average $PM_{2.5}$, and 20.0 ppb increase in 8-hour aveage O_3 lag 14. Models adjusted for fitted daily mean wheeze, home ownership, smoking in the home, white non-Hispanic ethnicity, moderate-severe asthma severity at baseline, male sex, minimum temperature, home visit group, and 6-month interval of entry into cohort. Standard errors consider repeated measures. Lower=lower 95% CI; Upper=upper 95% CI.

Table 5B FULL GROUP, 2- to 14-Day Moving Averages [a]

	NO_2 (ppb)			$PM_{2.5}$ (µg/m^3)			$PM_{10-2.5}$ (µg/m^3)			EC (µg/m^3)			NO_3 (µg/m^3)			8-hour Ave O_3 (ppb)		
Ave	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper
2	1.06	0.99	1.13	1.02	0.92	1.14	1.07	0.99	1.15	1.03	0.94	1.14	1.01	0.94	1.10	1.01	0.93	1.09
3	1.04	1.00	1.08	1.02	0.93	1.11	1.06	1.00	1.12	1.02	0.97	1.08	1.01	0.95	1.08	1.01	0.94	1.07
4	1.04	1.00	1.07	1.02	0.95	1.11	1.05	1.00	1.10	1.02	0.96	1.08	1.01	0.95	1.07	1.01	0.95	1.06
5	1.03	1.00	1.06	1.02	0.96	1.09	1.04	1.00	1.08	1.02	0.97	1.07	1.01	0.96	1.06	1.00	0.96	1.05
6	1.03	1.00	1.06	1.02	0.96	1.09	1.03	1.00	1.07	1.02	0.97	1.07	1.01	0.97	1.05	1.00	0.97	1.04
7	1.03	1.00	1.06	1.02	0.97	1.07	1.02	0.99	1.06	1.02	0.98	1.06	1.01	0.96	1.05	1.00	0.97	1.03
8	1.03	1.00	1.06	1.02	0.97	1.07	1.03	1.00	1.06	1.02	0.98	1.05	1.01	0.96	1.05	1.00	0.97	1.03
9	1.03	1.00	1.05	1.01	0.97	1.06	1.02	0.99	1.05	1.01	0.99	1.04	1.00	0.97	1.03	1.00	0.97	1.02
10	1.02	1.00	1.05	1.01	0.98	1.05	1.02	0.99	1.04	1.01	0.99	1.04	1.00	0.97	1.03	1.00	0.98	1.02
11	1.02	1.00	1.05	1.01	0.98	1.04	1.02	0.99	1.04	1.01	0.99	1.04	1.00	0.97	1.03	1.00	0.98	1.02
12	1.02	1.00	1.05	1.01	0.98	1.04	1.02	0.99	1.04	1.01	0.98	1.04	1.00	0.97	1.03	1.00	0.98	1.02
13	1.02	1.00	1.04	1.01	0.98	1.03	1.01	0.99	1.03	1.01	0.99	1.04	1.00	0.97	1.03	1.00	0.98	1.02
14	1.02	1.00	1.03	1.01	0.98	1.03	1.01	0.99	1.03	1.01	0.99	1.04	1.00	0.98	1.03	1.00	0.98	1.02

[a]See Table 4 for increases used for moving averages. Odds ratio calculated for 90th percentile increase in absolute daily differences for a given moving average; Models adjusted for fitted daily mean wheeze, home ownership, smoking in the home, white non-Hispanic ethnicity, moderate-severe asthma severity at baseline, male sex, minimum temperature, home visit group and 6-month interval of entry into cohort.,Standard errors consider repeated measures. Lower=lower 95% CI; Upper=upper 95% CI.

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Table 6A: CHILDREN WHO ARE SKIN-TEST POSITIVE TO *ALTERNARIA* OR *CLADOSPORIUM*, 0- to 14-Day Lags

	NO_2 (ppb)			$PM_{10-2.5}$ (μg/m^3)			$PM_{2.5}$ (μg/m^3)			EC (μg/m^3)			NO_3 (μg/m^3)			8-hour Ave O_3 (ppb)		
Lag	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper
0	1.22	1.08	1.37	1.17	1.04	1.32	1.07	0.88	1.30	1.21	0.99	1.47	1.04	0.91	1.18	1.04	0.89	1.22
1	1.25	1.11	1.41	1.14	1.01	1.29	1.08	0.90	1.30	1.30	1.06	1.59	1.00	0.88	1.13	1.06	0.92	1.23
2	1.23	1.10	1.39	1.15	1.03	1.28	0.97	0.80	1.17	1.17	0.98	1.40	0.96	0.84	1.09	1.07	0.93	1.22
3	1.24	1.12	1.38	1.16	1.02	1.33	1.05	0.87	1.27	1.25	1.05	1.49	1.03	0.91	1.16	1.06	0.92	1.21
4	1.21	1.10	1.34	1.13	1.01	1.28	1.12	0.93	1.35	1.25	1.05	1.48	1.05	0.94	1.18	1.01	0.89	1.15
5	1.18	1.06	1.32	1.12	0.99	1.26	1.16	0.94	1.44	1.30	1.08	1.56	1.12	0.97	1.29	0.91	0.80	1.03
6	1.18	1.06	1.32	1.05	0.93	1.19	1.16	0.91	1.47	1.30	1.06	1.59	1.11	0.96	1.28	0.88	0.78	1.00
7	1.17	1.05	1.32	1.14	1.02	1.28	1.14	0.89	1.47	1.26	1.01	1.56	1.11	0.96	1.29	0.89	0.79	0.99
8	1.13	1.01	1.26	1.13	1.00	1.27	1.13	0.89	1.42	1.27	1.03	1.56	1.11	0.97	1.27	0.93	0.83	1.04
9	1.13	1.01	1.28	1.05	0.92	1.21	1.19	0.94	1.49	1.30	1.06	1.59	1.14	1.00	1.30	0.90	0.81	1.01
10	1.09	0.97	1.23	1.04	0.92	1.18	1.16	0.93	1.44	1.26	1.03	1.54	1.09	0.95	1.25	0.94	0.83	1.06
11	1.07	0.94	1.20	1.06	0.93	1.20	1.15	0.93	1.42	1.26	1.02	1.56	1.13	0.98	1.29	0.97	0.84	1.12
12	1.14	1.00	1.30	1.04	0.92	1.18	1.19	0.96	1.49	1.35	1.09	1.66	1.10	0.95	1.26	1.00	0.85	1.16
13	1.16	1.02	1.33	1.08	0.94	1.24	1.26	0.99	1.59	1.35	1.10	1.65	1.14	0.98	1.32	1.03	0.89	1.20
14	1.21	1.06	1.38	1.09	0.96	1.24	1.38	1.09	1.74	1.40	1.14	1.72	1.16	0.99	1.35	1.04	0.89	1.21

See footnote for Table 5A.

Table 6B: CHILDREN WHO ARE SKIN-TEST POSITIVE TO *ALTERNARIA* OR *CLADOSPORIUM*, 2- to 14-Day Moving Averages

	NO_2 (ppb)			$PM_{2.5}$ (µg/m^3)			EC (µg/m^3)			$PM_{10-2.5}$ (µg/m^3)			NO_3 (µg/m^3)			8-hour Ave O_3 (ppb)		
Ave	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper
2	1.17	1.07	1.28	1.05	0.93	1.19	1.17	1.02	1.33	1.13	1.02	1.24	1.02	0.92	1.14	1.04	0.92	1.18
3	1.11	1.05	1.17	1.02	0.92	1.13	1.09	1.01	1.18	1.10	1.02	1.19	1.00	0.91	1.09	1.04	0.94	1.14
4	1.09	1.04	1.14	1.02	0.93	1.12	1.10	1.01	1.19	1.08	1.01	1.15	1.00	0.92	1.08	1.03	0.95	1.12
5	1.08	1.04	1.12	1.02	0.95	1.10	1.09	1.01	1.16	1.07	1.01	1.13	1.00	0.94	1.07	1.02	0.96	1.10
6	1.08	1.04	1.13	1.03	0.96	1.11	1.08	1.01	1.15	1.05	1.00	1.11	1.02	0.96	1.08	1.01	0.96	1.06
7	1.07	1.04	1.11	1.03	0.97	1.09	1.06	1.01	1.12	1.04	1.00	1.08	1.02	0.96	1.08	1.00	0.95	1.05
8	1.07	1.04	1.11	1.03	0.97	1.10	1.05	1.01	1.10	1.05	1.00	1.09	1.02	0.96	1.08	0.99	0.96	1.03
9	1.06	1.03	1.10	1.03	0.97	1.08	1.05	1.01	1.09	1.04	1.00	1.08	1.02	0.98	1.06	0.99	0.96	1.03
10	1.06	1.03	1.09	1.03	0.98	1.07	1.04	1.01	1.08	1.04	1.00	1.07	1.02	0.98	1.06	0.99	0.96	1.02
11	1.05	1.03	1.09	1.02	0.98	1.07	1.04	1.01	1.08	1.03	1.00	1.07	1.02	0.98	1.06	0.99	0.96	1.02
12	1.05	1.02	1.08	1.02	0.98	1.06	1.05	1.01	1.09	1.03	1.00	1.06	1.02	0.98	1.06	0.99	0.97	1.02
13	1.05	1.02	1.08	1.02	0.99	1.05	1.05	1.01	1.09	1.03	1.00	1.05	1.02	0.99	1.06	0.99	0.97	1.02
14	1.04	1.02	1.06	1.02	0.99	1.05	1.05	1.01	1.08	1.02	1.00	1.05	1.02	0.99	1.06	0.99	0.97	1.02

See Table 4 and footnote Table 5B.

Table 7A: CHILDREN WHO ARE SKIN-TEST POSITIVE TO CAT DANDER, 0- to 14-Day Lags[a]

	NO_2 (ppb)			$PM_{2.5}$ (μg/m^3)			EC (μg/m^3)			$PM_{10-2.5}$ (μg/m^3)			NO_3 (μg/m^3)			8-hour Ave O_3 (ppb)		
Lag	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper
0	1.26	1.08	1.47	1.13	0.82	1.54	1.22	1.00	1.50	1.19	1.02	1.39	1.15	0.94	1.40	0.90	0.72	1.12
1	1.33	1.11	1.58	1.22	0.89	1.66	1.39	1.08	1.78	1.11	0.92	1.36	1.13	0.95	1.35	0.93	0.73	1.19
2	1.27	1.06	1.51	0.99	0.72	1.36	1.20	0.97	1.49	1.15	0.98	1.36	1.00	0.82	1.21	0.95	0.75	1.19
3	1.25	1.07	1.47	1.02	0.77	1.36	1.21	0.95	1.54	1.28	1.09	1.51	1.08	0.91	1.28	0.89	0.69	1.15
4	1.19	1.01	1.41	1.10	0.85	1.43	1.25	0.99	1.57	1.26	1.06	1.50	1.10	0.95	1.28	0.88	0.68	1.13
5	1.24	1.05	1.46	1.23	0.94	1.62	1.29	1.03	1.61	1.27	1.06	1.52	1.21	1.01	1.45	0.87	0.70	1.10
6	1.23	1.02	1.48	1.19	0.82	1.73	1.33	1.04	1.71	1.17	0.98	1.39	1.12	0.88	1.42	0.84	0.68	1.04
7	1.15	0.95	1.40	1.14	0.80	1.63	1.22	0.91	1.63	1.21	1.02	1.43	1.17	0.94	1.45	0.89	0.73	1.08
8	1.20	1.01	1.43	1.21	0.88	1.67	1.31	0.99	1.75	1.19	0.99	1.42	1.18	0.96	1.45	0.98	0.78	1.22
9	1.24	1.04	1.48	1.20	0.87	1.66	1.35	1.02	1.78	1.12	0.93	1.35	1.15	0.95	1.39	0.96	0.79	1.17
10	1.21	1.02	1.43	1.19	0.86	1.65	1.29	0.98	1.69	1.15	0.98	1.35	1.13	0.93	1.37	1.03	0.84	1.27
11	1.23	1.03	1.47	1.21	0.90	1.63	1.26	0.96	1.66	1.19	1.02	1.40	1.18	0.97	1.43	1.03	0.83	1.28
12	1.23	1.02	1.47	1.17	0.89	1.53	1.26	0.97	1.63	1.18	1.00	1.39	1.07	0.88	1.30	1.07	0.84	1.35
13	1.20	1.02	1.42	1.19	0.89	1.59	1.23	0.96	1.58	1.26	1.08	1.48	1.06	0.87	1.28	1.10	0.88	1.38
14	1.22	1.02	1.45	1.27	0.95	1.70	1.26	0.99	1.61	1.23	1.05	1.44	1.08	0.89	1.31	1.16	0.93	1.46

[a]See footnote of Table 5A

Table 7B: CHILDREN WHO ARE SKIN-TEST POSITIVE TO CAT DANDER, 2- to 14-Day Moving Averages

	NO2 (ppb)			$PM_{2.5}$ (μg/m^3)			EC (μg/m^3)			$PM_{10-2.5}$ (μg/m^3)			NO_3 (μg/m^3)			8-hour Ave O_3 (ppb)		
Ave	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper
2	1.21	1.07	1.37	1.12	0.90	1.38	1.20	1.03	1.40	1.13	0.99	1.30	1.12	0.96	1.32	0.93	0.78	1.12
3	1.13	1.04	1.22	1.06	0.89	1.26	1.11	1.01	1.22	1.10	0.99	1.23	1.07	0.94	1.22	0.95	0.82	1.10
4	1.11	1.04	1.18	1.04	0.89	1.22	1.11	1.00	1.23	1.09	1.00	1.20	1.06	0.94	1.18	0.95	0.84	1.08
5	1.09	1.03	1.16	1.04	0.92	1.17	1.10	1.01	1.20	1.08	1.00	1.17	1.05	0.96	1.15	0.95	0.85	1.07
6	1.09	1.03	1.16	1.05	0.93	1.18	1.09	1.01	1.17	1.07	1.01	1.14	1.06	0.98	1.15	0.96	0.87	1.05
7	1.08	1.03	1.14	1.04	0.95	1.15	1.07	1.01	1.14	1.06	1.01	1.12	1.06	0.97	1.15	0.96	0.88	1.04
8	1.08	1.02	1.14	1.05	0.95	1.15	1.06	1.00	1.12	1.06	1.00	1.11	1.06	0.97	1.14	0.96	0.90	1.03
9	1.07	1.02	1.13	1.04	0.96	1.13	1.05	1.00	1.11	1.05	1.00	1.10	1.05	0.98	1.11	0.97	0.91	1.03
10	1.07	1.02	1.12	1.04	0.96	1.11	1.05	1.00	1.10	1.04	1.00	1.09	1.04	0.99	1.10	0.97	0.92	1.03
11	1.07	1.02	1.12	1.03	0.97	1.11	1.05	1.00	1.10	1.04	0.99	1.08	1.04	0.98	1.11	0.98	0.93	1.03
12	1.07	1.02	1.12	1.03	0.97	1.09	1.05	1.00	1.11	1.03	0.99	1.07	1.04	0.99	1.10	0.98	0.94	1.03
13	1.06	1.02	1.11	1.03	0.98	1.08	1.05	1.02	1.09	1.03	0.99	1.06	1.04	0.99	1.10	0.99	0.94	1.03
14	1.05	1.01	1.09	1.03	0.98	1.08	1.05	1.01	1.09	1.03	0.99	1.06	1.04	0.99	1.09	0.99	0.95	1.03

*See footnote of Table 5B.

Table 8A: BOYS WITH MILD INTERMITTENT ASTHMA, 0- to 14-Day Lags[a]

	NO_2 (ppb)			$PM_{2.5}$ (μg/m^3)			EC (μg/m^3)			$PM_{10-2.5}$ (μg/m^3)			NO_3 (μg/m^3)			8-hour Ave O_3 (ppb)		
Lag	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper
0	1.39	1.09	1.76	1.49	1.14	1.95	1.54	1.23	1.92	1.27	0.99	1.63	1.29	1.07	1.55	0.83	0.61	1.12
1	1.46	1.14	1.86	1.53	1.17	1.99	1.66	1.32	2.08	1.24	0.99	1.54	1.25	1.06	1.46	0.86	0.65	1.13
2	1.51	1.23	1.85	1.44	1.10	1.88	1.63	1.37	1.93	1.28	1.05	1.57	1.23	1.05	1.45	0.88	0.69	1.11
3	1.45	1.18	1.78	1.39	1.11	1.74	1.62	1.36	1.93	1.35	1.10	1.65	1.24	1.05	1.46	0.84	0.65	1.07
4	1.40	1.11	1.76	1.45	1.14	1.83	1.67	1.40	1.99	1.35	1.10	1.65	1.15	0.96	1.38	0.84	0.65	1.10
5	1.40	1.13	1.73	1.41	1.12	1.77	1.64	1.34	2.01	1.28	1.06	1.53	1.25	1.03	1.52	0.81	0.64	1.03
6	1.44	1.17	1.78	1.49	1.14	1.95	1.70	1.37	2.12	1.22	1.01	1.48	1.26	1.01	1.57	0.81	0.63	1.03
7	1.49	1.19	1.86	1.62	1.26	2.10	1.66	1.32	2.09	1.26	1.02	1.55	1.40	1.14	1.72	0.83	0.65	1.06
8	1.41	1.13	1.75	1.59	1.21	2.08	1.70	1.35	2.13	1.21	0.95	1.54	1.26	1.05	1.52	0.82	0.64	1.05
9	1.35	1.11	1.63	1.55	1.16	2.07	1.60	1.28	2.01	1.19	0.94	1.49	1.25	1.02	1.52	0.81	0.64	1.02
10	1.39	1.18	1.65	1.61	1.25	2.06	1.58	1.26	1.98	1.20	0.97	1.48	1.32	1.07	1.62	0.85	0.67	1.08
11	1.33	1.09	1.62	1.47	1.19	1.80	1.57	1.23	2.00	1.17	0.94	1.45	1.30	1.03	1.65	0.85	0.66	1.10
12	1.32	1.09	1.58	1.53	1.23	1.91	1.70	1.37	2.11	1.21	0.97	1.50	1.26	0.95	1.68	0.89	0.68	1.17
13	1.23	1.03	1.47	1.53	1.21	1.93	1.50	1.21	1.86	1.19	0.97	1.46	1.37	1.04	1.80	0.89	0.67	1.17
14	1.24	1.01	1.53	1.68	1.28	2.22	1.54	1.21	1.95	1.17	0.93	1.48	1.37	1.04	1.80	0.93	0.70	1.24

*See footnote of Table 5A

Table 8B: **BOYS WITH MILD INTERMITTENT ASTHMA, 2- to 14-Day Moving Averages***

	NO2 (ppb)			$PM_{2.5}$ (µg/m^3)			EC (µg/m^3)			$PM_{10-2.5}$ (µg/m^3)			NO_3 (µg/m^3)			8-hour Ave O_3 (ppb)		
	24-hour Ave NO2			24-hour Ave PM2.5			24 hour Ave PM10-2.5			24-hour Ave EC			24-hr Ave NO3			8-hour Ave O3		
Ave	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper
2	1.30	1.09	1.55	1.33	1.11	1.59	1.38	1.21	1.58	1.20	1.00	1.44	1.23	1.05	1.45	0.88	0.69	1.11
3	1.19	1.07	1.33	1.26	1.08	1.46	1.22	1.12	1.34	1.17	1.00	1.36	1.24	1.05	1.46	0.84	0.65	1.07
4	1.16	1.06	1.27	1.23	1.08	1.40	1.24	1.13	1.36	1.14	1.01	1.29	1.15	0.96	1.38	0.84	0.65	1.10
5	1.14	1.06	1.23	1.18	1.07	1.31	1.21	1.12	1.31	1.13	1.01	1.25	1.25	1.03	1.52	0.81	0.64	1.03
6	1.15	1.06	1.24	1.18	1.07	1.30	1.19	1.11	1.27	1.10	1.01	1.20	1.26	1.01	1.57	0.81	0.63	1.03
7	1.13	1.05	1.21	1.15	1.06	1.24	1.15	1.09	1.22	1.08	1.00	1.16	1.40	1.14	1.72	0.83	0.65	1.06
8	1.14	1.06	1.22	1.15	1.07	1.25	1.13	1.08	1.18	1.08	1.00	1.16	1.26	1.05	1.52	0.82	0.64	1.05
9	1.12	1.05	1.20	1.13	1.06	1.20	1.11	1.07	1.16	1.06	1.00	1.13	1.25	1.02	1.52	0.81	0.64	1.02
10	1.11	1.05	1.17	1.11	1.05	1.17	1.10	1.06	1.15	1.06	0.99	1.12	1.32	1.07	1.62	0.85	0.67	1.08
11	1.11	1.05	1.17	1.10	1.05	1.16	1.10	1.06	1.15	1.05	0.99	1.12	1.30	1.03	1.65	0.85	0.66	1.10
12	1.11	1.05	1.17	1.09	1.04	1.14	1.11	1.06	1.16	1.05	0.99	1.10	1.26	0.95	1.68	0.89	0.68	1.17
13	1.10	1.04	1.16	1.08	1.04	1.11	1.11	1.06	1.15	1.04	0.99	1.09	1.37	1.04	1.80	0.89	0.67	1.17
14	1.08	1.03	1.13	1.08	1.04	1.11	1.10	1.06	1.14	1.03	0.99	1.08	1.37	1.04	1.80	0.93	0.70	1.24

[a]See footnote of Table 5B.

Supplemental Material:
Short-Term Effects of Air Pollution on Wheeze in Asthmatic Children in Fresno, California

Table 9A: FULL GROUP WITH FIRST YEAR OF DATA REMOVED[a], 0- to 14-Day Lags[b]

	NO_2 (ppb)			$PM_{2.5}$ ($\mu g/m^3$)			EC ($\mu g/m^3$)			$PM_{10-2.5}$ ($\mu g/m^3$)			NO_3 ($\mu g/m^3$)			8-hour Ave O_3 (ppb)		
Lag	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper
0	1.06	0.96	1.16	0.98	0.83	1.16	1.02	0.88	1.19	1.09	0.98	1.20	1.02	0.92	1.13	1.02	0.91	1.14
1	1.09	1.00	1.20	1.00	0.84	1.19	1.04	0.89	1.21	1.09	0.99	1.20	1.04	0.94	1.14	1.03	0.94	1.14
2	1.09	1.00	1.20	0.98	0.82	1.17	1.02	0.88	1.17	1.08	0.98	1.19	1.01	0.92	1.11	1.01	0.93	1.10
3	1.08	0.99	1.18	1.03	0.86	1.22	1.03	0.89	1.20	1.10	0.99	1.22	1.03	0.93	1.14	1.01	0.92	1.11
4	1.06	0.96	1.17	1.02	0.85	1.23	1.04	0.90	1.22	1.10	1.00	1.21	1.00	0.90	1.11	1.01	0.92	1.11
5	1.08	0.99	1.18	1.03	0.86	1.23	1.07	0.92	1.25	1.09	1.00	1.20	1.04	0.94	1.16	1.01	0.93	1.10
6	1.11	1.01	1.21	1.06	0.87	1.28	1.11	0.95	1.30	1.08	0.99	1.18	1.03	0.93	1.15	1.01	0.92	1.10
7	1.12	1.02	1.24	1.02	0.83	1.24	1.09	0.92	1.28	1.09	0.99	1.19	1.02	0.92	1.14	1.01	0.93	1.09
8	1.07	0.98	1.17	0.93	0.77	1.14	1.05	0.89	1.23	1.06	0.97	1.17	0.98	0.88	1.10	1.01	0.93	1.09
9	1.07	0.98	1.17	0.97	0.81	1.17	1.01	0.86	1.19	1.06	0.96	1.16	0.98	0.88	1.10	1.01	0.93	1.10
10	1.05	0.96	1.15	0.93	0.77	1.12	0.99	0.84	1.16	1.03	0.93	1.13	0.97	0.86	1.09	1.02	0.93	1.11
11	1.04	0.95	1.14	0.96	0.80	1.16	1.02	0.86	1.21	1.07	0.97	1.17	1.01	0.90	1.13	1.02	0.93	1.12
12	1.05	0.96	1.15	0.96	0.80	1.17	1.08	0.91	1.27	1.06	0.98	1.16	0.97	0.86	1.10	1.02	0.93	1.12
13	1.03	0.95	1.13	1.00	0.82	1.22	1.06	0.91	1.23	1.07	0.98	1.18	1.01	0.89	1.15	1.02	0.93	1.12
14	1.04	0.95	1.14	1.07	0.88	1.30	1.10	0.94	1.29	1.08	0.98	1.18	1.01	0.89	1.14	1.04	0.95	1.15

[a]Child-days from November 2000 to November 2001 were removed. [b]See Table 4 for increases used for wheeze odds ratios. Models adjusted for fitted daily mean wheeze, home ownership, smoking in the home, white non-Hispanic ethnicity, moderate-severe asthma severity at baseline, male sex, minimum temperature, home visit group and 6-month interval of entry into cohort. Standard errors consider repeated measures.

Table 9B: FULL GROUP WITH FIRST YEAR OF DATA REMOVED[a], 2- to 14-Day Moving Averages[b]

	NO_2 (ppb)			$PM_{2.5}$ (μg/m^3)			EC (μg/m^3)			$PM_{10-2.5}$ (μg/m^3)			NO_3 (μg/m^3)			8-hour Ave O_3 (ppb)		
Ave	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper
2	1.06	0.99	1.13	0.99	0.89	1.11	1.02	0.92	1.13	1.07	0.99	1.15	1.02	0.94	1.11	1.02	0.94	1.11
3	1.04	0.99	1.08	0.99	0.90	1.09	1.01	0.95	1.07	1.06	1.00	1.12	1.02	0.95	1.09	1.01	0.95	1.08
4	1.03	1.00	1.07	1.00	0.92	1.09	1.01	0.95	1.08	1.05	0.99	1.10	1.01	0.95	1.08	1.01	0.96	1.06
5	1.03	1.00	1.06	1.00	0.93	1.07	1.01	0.96	1.07	1.04	1.00	1.08	1.01	0.96	1.06	1.01	0.96	1.05
6	1.03	1.00	1.06	1.00	0.94	1.08	1.01	0.96	1.06	1.03	1.00	1.07	1.01	0.96	1.06	1.00	0.97	1.04
7	1.03	1.00	1.06	1.00	0.95	1.06	1.01	0.97	1.05	1.02	0.99	1.06	1.01	0.96	1.06	1.00	0.97	1.04
8	1.03	1.00	1.06	1.00	0.95	1.07	1.01	0.98	1.05	1.03	1.00	1.06	1.01	0.97	1.06	1.00	0.98	1.03
9	1.03	1.00	1.06	1.00	0.95	1.05	1.01	0.98	1.04	1.02	0.99	1.05	1.01	0.97	1.04	1.00	0.98	1.03
10	1.02	1.00	1.05	1.00	0.96	1.04	1.01	0.98	1.04	1.02	0.99	1.05	1.00	0.97	1.04	1.00	0.98	1.02
11	1.02	1.00	1.05	1.00	0.96	1.04	1.01	0.98	1.04	1.02	0.99	1.04	1.00	0.97	1.04	1.00	0.98	1.02
12	1.02	1.00	1.05	1.00	0.96	1.03	1.01	0.98	1.04	1.02	0.99	1.04	1.00	0.97	1.04	1.00	0.98	1.02
13	1.02	1.00	1.04	1.00	0.97	1.03	1.01	0.98	1.04	1.01	0.99	1.03	1.00	0.98	1.04	1.00	0.98	1.02
14	1.02	1.00	1.04	1.00	0.97	1.03	1.01	0.98	1.04	1.01	0.99	1.03	1.00	0.98	1.03	1.00	0.98	1.02

[a]Child-days from November 2000 to November 2001 were removed. [b]See Table 4 for increases used for wheeze odds ratios. Models adjusted for fitted daily mean wheeze, home ownership, smoking in the home, white non-Hispanic ethnicity, moderate-severe asthma severity at baseline, male sex, minimum temperature, home visit group, 6-month interval of entry into cohort. Standard errors consider repeated measures.

Table 10: ANALYSES AT REPRESENTATIVE LAGS WITH SIBLINGS REMOVED

Group	*Pollutant*	*Lag*	*OR*	*Lower*	*Upper*
Full Group	NO_2 (ppb)	2	1.11	1.02	1.21
	$PM_{10-2.5}$ (μg/m^3)	3	1.10	0.99	1.22
	NO_3 (μg/m^3)	5	1.05	0.95	1.17
	EC (μg/m^3)	6	1.14	0.97	1.34
	$PM_{2.5}$ (μg/m^3)	5	1.09	0.93	1.28
	O_3 (ppb)	1	1.02	0.91	1.13
Allergy to Fungi	NO_2 (ppb)	2	1.19	0.99	1.06
	$PM_{10-2.5}$ (μg/m^3)	3	1.24	0.99	1.55
	NO_3 (μg/m^3)	5	1.08	0.84	1.39
	EC (μg/m^3)	6	1.37	0.90	2.07
	$PM_{2.5}$ (μg/m^3)	5	1.11	0.71	1.72
	O_3 (ppb)	1	1.28	0.98	1.66
Allergy to Cat Dander	NO_2 (ppb)	2	1.31	1.01	1.07
	$PM_{10-2.5}$ (μg/m^3)	3	1.29	1.07	1.55
	NO_3 (μg/m^3)	5	1.17	0.97	1.40
	EC (μg/m^3)	6	1.32	1.01	1.72
	$PM_{2.5}$ (μg/m^3)	5	1.18	0.89	1.55
	O_3 (ppb)	1	0.94	0.72	1.21
Boys with Mild Asthma	NO_2 (ppb)	2	1.60	1.28	2.00
	$PM_{10-2.5}$ (μg/m^3)	3	1.37	1.09	1.72
	NO_3 (μg/m^3)	5	1.24	0.98	1.57
	EC (μg/m^3)	6	1.80	1.44	2.25
	$PM_{2.5}$ (μg/m^3)	5	1.36	1.05	1.77
	O_3 (ppb)	1	0.90	0.63	1.27

[a]All metrics are 24-hour averages unless otherwise noted. [b]"Representative lag" is the one associated with the largest coefficient in the first 7 days. [c]Models adjusted for fitted daily mean wheeze, home ownership, smoking in the home, white non-Hispanic ethnicity, moderate or severe asthma severity at baseline, male sex, minimum temperature, home visit group, 6-month interval of entry into cohort, and standard errors account for repeated measures. [d]Increase used for OR, 90th percentile of the absolute value of daily differences (lag 0-lag 1) across the study period (see table 4). *p<.05

Table 11A: FULL GROUP -- TWO POLLUTANT MODELS, 0- to 14-Day Lags[a]

	NO_2 (ppb) adjusted for $PM_{10-2.5}$ (μg/m^3)			$PM_{10-2.5}$ (μg/m^3) adjusted for NO_2 (ppb			$PM_{2.5}$ (μg/m^3) adjusted for $PM_{10-2.5}$ (μg/m^3)			$PM_{10-2.5}$ (μg/m^3) adjusted for $PM_{2.5}$ (μg/m^3)		
Lag	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper
0	1.04	0.96	1.13	1.07	0.97	1.17	1.00	0.93	1.06	1.08	0.99	1.19
1	1.06	0.97	1.16	1.06	0.97	1.16	1.02	0.95	1.08	1.08	0.99	1.18
2	1.06	0.98	1.16	1.05	0.96	1.15	1.02	0.87	1.19	1.11	1.00	1.22
3	1.06	0.98	1.15	1.08	0.98	1.20	1.09	0.93	1.27	1.10	1.00	1.20
4	1.04	0.95	1.13	1.08	0.99	1.18	1.09	0.92	1.28	1.09	1.00	1.19
5	1.03	0.94	1.12	1.08	0.99	1.18	1.06	0.90	1.25	1.07	0.98	1.16
6	1.06	0.97	1.16	1.05	0.96	1.14	1.06	0.89	1.26	1.08	0.99	1.18
7	1.06	0.97	1.16	1.06	0.97	1.16	1.04	0.88	1.23	1.06	0.96	1.17
8	1.04	0.96	1.13	1.07	0.97	1.17	0.99	0.84	1.16	1.05	0.96	1.15
9	1.06	0.97	1.16	1.06	0.97	1.16	1.03	0.88	1.20	1.04	0.95	1.14
10	1.06	0.98	1.16	1.05	0.96	1.15	1.00	0.85	1.19	1.07	0.98	1.16
11	1.06	0.98	1.15	1.08	0.98	1.20	1.03	0.87	1.21	1.07	0.98	1.16
12	1.04	0.95	1.13	1.08	0.99	1.18	1.05	0.88	1.24	1.08	0.99	1.18
13	1.03	0.94	1.12	1.08	0.99	1.18	1.08	0.91	1.29	1.09	0.99	1.19
14	1.06	0.97	1.16	1.05	0.96	1.14	1.11	0.94	1.32	1.08	0.99	1.19

[a]See Table 4 for increases used for wheeze odds ratios. Models adjusted for fitted daily mean wheeze, home ownership, smoking in the home, white non-Hispanic ethnicity, moderate-severe asthma severity at baseline, male sex, minimum temperature, home visit group, 6-month interval of entry into cohort. Standard errors consider repeated measures.

Table 11B: TWO POLLUTANT MODELS: CHILDREN WHO ARE SKIN-TEST POSITIVE TO *ALTERNARIA* OR *CLADOSPORIUM*, 0- to 14-Day Lags[a]

	NO_2 (ppb) adjusted for $PM_{10-2.5}$ (μg/m^3)			$PM_{10-2.5}$ (μg/m^3) adjusted for NO_2 (ppb			$PM_{2.5}$ (μg/m^3) adjusted for $PM_{10-2.5}$ (μg/m^3)			$PM_{10-2.5}$ (μg/m^3) adjusted for $PM_{2.5}$ (μg/m^3)		
Lag	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper
0	1.04	0.96	1.13	0	1.07	0.97	1.17	0.86	1.25	1.17	1.04	1.32
1	1.06	0.97	1.16	1	1.06	0.97	1.16	0.89	1.27	1.14	1.01	1.29
2	1.06	0.98	1.16	2	1.05	0.96	1.15	0.80	1.17	1.15	1.03	1.28
3	1.06	0.98	1.15	3	1.08	0.98	1.20	0.90	1.31	1.16	1.02	1.33
4	1.04	0.95	1.13	4	1.08	0.99	1.18	0.92	1.35	1.13	1.01	1.28
5	1.03	0.94	1.12	5	1.08	0.99	1.18	0.94	1.46	1.12	0.99	1.26
6	1.06	0.97	1.16	6	1.05	0.96	1.14	0.90	1.49	1.05	0.93	1.19
7	1.06	0.97	1.16	7	1.06	0.97	1.16	0.92	1.55	1.14	1.02	1.28
8	1.04	0.96	1.13	8	1.07	0.97	1.17	0.90	1.47	1.12	1.00	1.27
9	1.06	0.97	1.16	9	1.06	0.97	1.16	0.93	1.50	1.05	0.92	1.21
10	1.06	0.98	1.16	10	1.05	0.96	1.15	0.91	1.47	1.04	0.91	1.18
11	1.06	0.98	1.15	11	1.08	0.98	1.20	0.90	1.42	1.06	0.93	1.20
12	1.04	0.95	1.13	12	1.08	0.99	1.18	0.91	1.50	1.04	0.92	1.18
13	1.03	0.94	1.12	13	1.08	0.99	1.18	0.96	1.62	1.08	0.94	1.24
14	1.06	0.97	1.16	14	1.05	0.96	1.14	0.83	1.37	1.09	0.96	1.24

[a]See Table 4 for increases used for wheeze odds ratios. Models adjusted for fitted daily mean wheeze, home ownership, smoking in the home, white non-Hispanic ethnicity, moderate-severe asthma severity at baseline, male sex, minimum temperature, home visit group, 6-month interval of entry into cohort. Standard errors consider repeated measures.

Table 11C: : TWO POLLUTANT MODELS: CHILDREN WHO ARE SKIN-TEST POSITIVE TO CAT DANDER, 0- to 14-Day Lags[a]

	NO_2 (ppb) adjusted for $PM_{10-2.5}$ (μg/m^3)			$PM_{10-2.5}$ (μg/m^3) adjusted for NO_2 (ppb			$PM_{2.5}$ (μg/m^3) adjusted for $PM_{10-2.5}$ (μg/m^3)			$PM_{10-2.5}$ (μg/m^3) adjusted for $PM_{2.5}$ (μg/m^3)		
Lag	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper
0	1.20	1.02	1.42	1.11	0.94	1.30	1.12	0.81	1.54	1.19	1.01	1.40
1	1.54	1.11	2.14	1.01	0.88	1.15	1.24	0.90	1.70	1.11	0.91	1.36
2	1.19	0.98	1.46	1.08	0.90	1.30	1.01	0.72	1.41	1.15	0.97	1.36
3	1.28	0.96	1.70	1.12	1.01	1.25	1.11	0.84	1.46	1.28	1.09	1.52
4	1.08	0.91	1.28	1.23	1.03	1.48	1.14	0.86	1.50	1.27	1.06	1.51
5	1.19	0.89	1.60	1.13	1.01	1.26	1.27	0.95	1.69	1.27	1.06	1.53
6	1.16	0.97	1.39	1.11	0.93	1.32	1.26	0.86	1.84	1.17	0.98	1.39
7	1.10	0.77	1.58	1.11	0.99	1.24	1.26	0.87	1.82	1.21	1.02	1.43
8	1.11	0.90	1.37	1.14	0.93	1.40	1.27	0.89	1.83	1.18	1.07	1.31
9	1.37	0.97	1.93	1.02	0.90	1.16	1.20	0.86	1.69	1.11	0.92	1.34
10	1.15	0.91	1.44	1.09	0.88	1.34	1.19	0.83	1.70	1.15	0.97	1.35
11	1.31	0.93	1.84	1.07	0.96	1.19	1.23	0.90	1.68	1.19	1.01	1.40
12	1.15	0.85	1.56	1.12	0.92	1.36	1.14	0.85	1.54	1.18	0.99	1.39
13	1.18	0.83	1.69	1.12	1.07	1.18	1.22	0.88	1.69	1.26	1.08	1.47
14	1.09	0.89	1.34	1.19	0.99	1.42	1.21	0.88	1.65	1.22	1.05	1.43

[a]See Table 4 for increases used for wheeze odds ratios. Models adjusted for fitted daily mean wheeze, home ownership, smoking in the home, white non-Hispanic ethnicity, moderate-severe asthma severity at baseline, male sex, minimum temperature, home visit group, 6-month interval of entry into cohort. Standard errors consider repeated measures.

Table 11D: TWO POLLUTANT MODELS: BOYS WITH MILD INTERMITTENT ASTHMA, 0- to 14-Day Lags[a]

	NO_2 (ppb) adjusted for $PM_{10-2.5}$ (μg/m^3)			$PM_{10-2.5}$ (μg/m^3) adjusted for NO_2 (ppb			$PM_{2.5}$ (μg/m^3) adjusted for $PM_{10-2.5}$ (μg/m^3)			$PM_{10-2.5}$ (μg/m^3) adjusted for $PM_{2.5}$ (μg/m^3)		
Lag	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper
0	1.35	1.12	1.62	1.11	0.89	1.39	1.42	1.07	1.89	1.26	0.98	1.63
1	1.43	1.15	1.79	1.06	0.87	1.30	1.50	1.14	1.98	1.23	0.98	1.54
2	1.41	1.17	1.70	1.12	0.93	1.33	1.32	0.97	1.79	1.28	1.05	1.56
3	1.35	1.12	1.64	1.20	0.99	1.46	1.38	1.10	1.73	1.35	1.10	1.65
4	1.30	1.03	1.64	1.22	1.02	1.48	1.43	1.12	1.81	1.35	1.10	1.65
5	1.29	1.04	1.59	1.17	0.99	1.38	1.33	1.05	1.68	1.27	1.06	1.53
6	1.37	1.11	1.70	1.09	0.90	1.33	1.44	1.07	1.92	1.22	1.00	1.48
7	1.41	1.12	1.77	1.11	0.90	1.36	1.63	1.20	2.21	1.25	1.01	1.55
8	1.33	1.07	1.65	1.09	0.86	1.38	1.64	1.21	2.20	1.20	0.94	1.54
9	1.23	1.04	1.46	1.10	0.87	1.38	1.55	1.17	2.06	1.17	0.92	1.49
10	1.31	1.07	1.62	1.08	0.85	1.37	1.70	1.31	2.21	1.19	0.95	1.48
11	1.26	1.05	1.51	1.08	0.86	1.35	1.51	1.23	1.84	1.16	0.93	1.46
12	1.22	1.00	1.48	1.12	0.89	1.41	1.52	1.19	1.95	1.20	0.96	1.50
13	1.15	0.94	1.41	1.13	0.90	1.42	1.53	1.18	1.99	1.18	0.96	1.45
14	1.13	0.90	1.43	1.12	0.88	1.43	1.60	1.16	2.20	1.16	0.91	1.47

[a]See Table 4 for increases used for wheeze odds ratios. Models adjusted for fitted daily mean wheeze, home ownership, smoking in the home, white non-Hispanic ethnicity, moderate-severe asthma severity at baseline, male sex, minimum temperature, home visit group, 6-month interval of entry into cohort. Standard errors consider repeated measures.

Table 12: FULL GROUP – TWO POLLUTANT MODELS WITH REPRESENTATIVE LAGS

2-Pollutant Model	Pollutant	Lag	OR	Lower	Upper
NO_2 & $PM_{10-2.5}$	**NO_2 (ppb)**	2	1.06	0.98	1.15
	$PM_{10-2.5}$ (μg/m^3)	3	1.09	0.99	1.19
$PM_{10-2.5}$ & $PM_{2.5}$	**$PM_{10-2.5}$ (μg/m^3)**	3	1.11	1.01	1.23
	$PM_{2.5}$ (μg/m^3)	14	0.99	0.89	1.10

Odds ratio for 8.7 ppb increase in NO_2 lag 2, 14.7 μg/m^3 increase in $PM_{10-2.5}$, lag 3 and 36.2 μg/m^3 increase in $PM_{2.5}$ lag 14. Models adjusted for fitted daily mean wheeze, home ownership, smoking in the home, white non-Hispanic ethnicity, moderate-severe asthma severity at baseline, male sex, minimum temperature, home visit group, 6-month interval of entry into cohort. Standard error considers repeated measures.

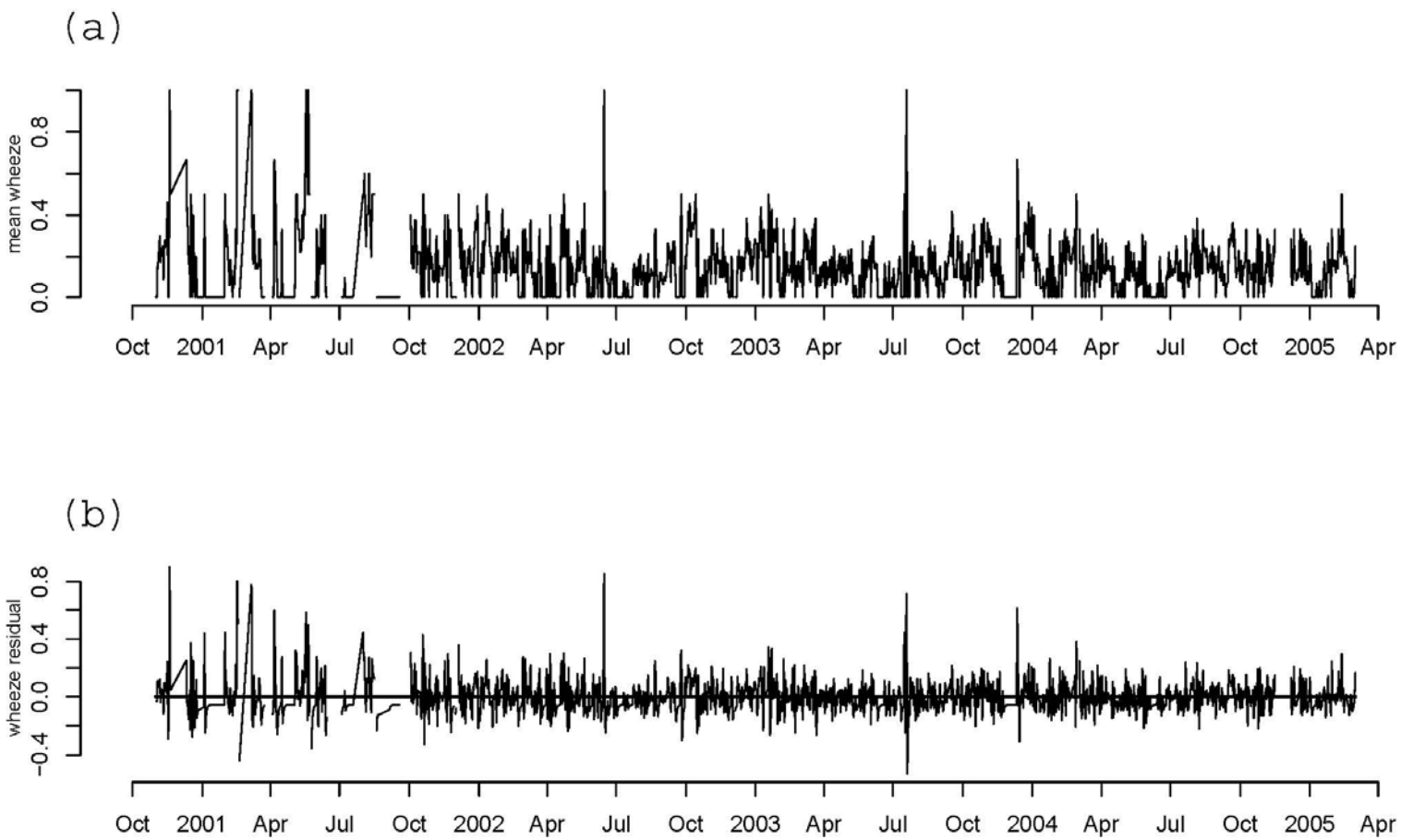
Table 13: SUBGROUPS – TWO POLLUTANT MODELS WITH REPRESENTATIVE LAGS

			Cat-allergic			**Fungi-Allergic**			**Boys w/ Mild Intermittent Asthma**		
2-Pollutant Model	Pollutant	Lag	OR	Lower	Upper	OR	Lower	Upper	OR	Lower	Upper
NO_2 & $PM_{10-2.5}$	**NO_2 (ppb)**	2	1.18	0.98	1.43	1.17	1.04	1.33	1.42	1.17	1.72
	$PM_{10-2.5}$ (μg/m^3)	3	1.22	1.03	1.45	1.11	0.97	1.27	1.21	1.00	1.46
NO_2 & EC	**NO_2 (ppb)**	2	1.21	1.01	1.44	1.19	1.06	1.33	1.38	1.10	1.73
	EC (μg/m^3)	6	1.24	0.96	1.60	1.20	0.98	1.47	1.50	1.19	1.88
NO_2 & $PM_{2.5}$	**NO_2 (ppb)**	2	1.18	0.98	1.43	1.19	1.07	1.33	1.44	1.15	1.81
	$PM_{2.5}$ (μg/m^3)	14	1.22	1.03	1.45	1.28	1.04	1.59	1.45	1.10	1.89
EC & $PM_{2.5}$	**EC (μg/m^3)**	6	1.29	1.01	1.66	1.50	0.98	2.29	1.55	1.24	1.95
	$PM_{2.5}$ (μg/m^3)	14	1.28	1.08	1.51	0.98	0.61	1.59	1.34	1.00	1.79
$PM_{10-2.5}$ & $PM_{2.5}$	**$PM_{10-2.5}$ (μg/m^3)**	3	1.19	1.01	1.40	1.15	1.02	1.28	1.29	1.09	1.53
	$PM_{2.5}$ (μg/m^3)	14	1.12	0.81	1.54	1.43	1.12	1.82	1.70	1.29	2.24

Odds ratio for 8.7 ppb increase in NO_2 lag 2, 14.7 μg/m^3 increase in $PM_{10-2.5}$ lag 3, 3.7 μg/m^3 increase in EC lag 6, and 36.2 μg/m^3 increase in $PM_{2.5}$ lag 14. Models adjusted for fitted daily mean wheeze, home ownership, smoking in the home, white non-Hispanic ethnicity, moderate-severe asthma severity at baseline, male sex, minimum temperature, home visit group, 6-month interval of entry into cohort, one other pollutant. Standard error considers repeated measures..

Supplemental Material:
Short-Term Effects of Air Pollution on Wheeze in Asthmatic Children in Fresno, California

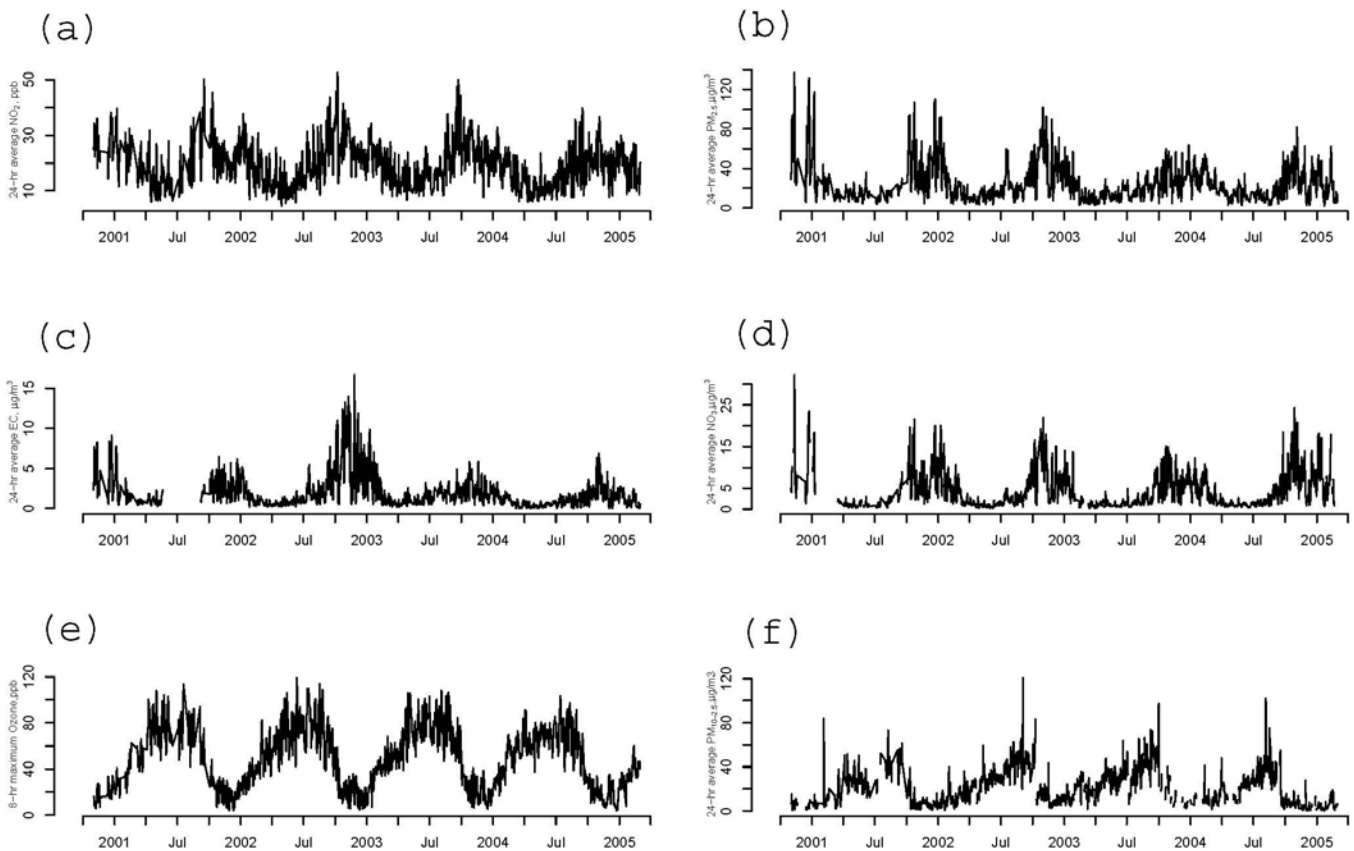
Figure 1. Time-series of mean frequency of wheeze symptoms each day (Novermber, 2000 to March, 2005)



Residuals after ARIMA and adjustment for home ownership, smokers in the home, non-Hispanic white race/ethnicity, male gender, minimum temperature, 6-month category of entry panel schedule group.

Supplemental Material:
Short-Term Effects of Air Pollution on Wheeze in Asthmatic Children in Fresno, California

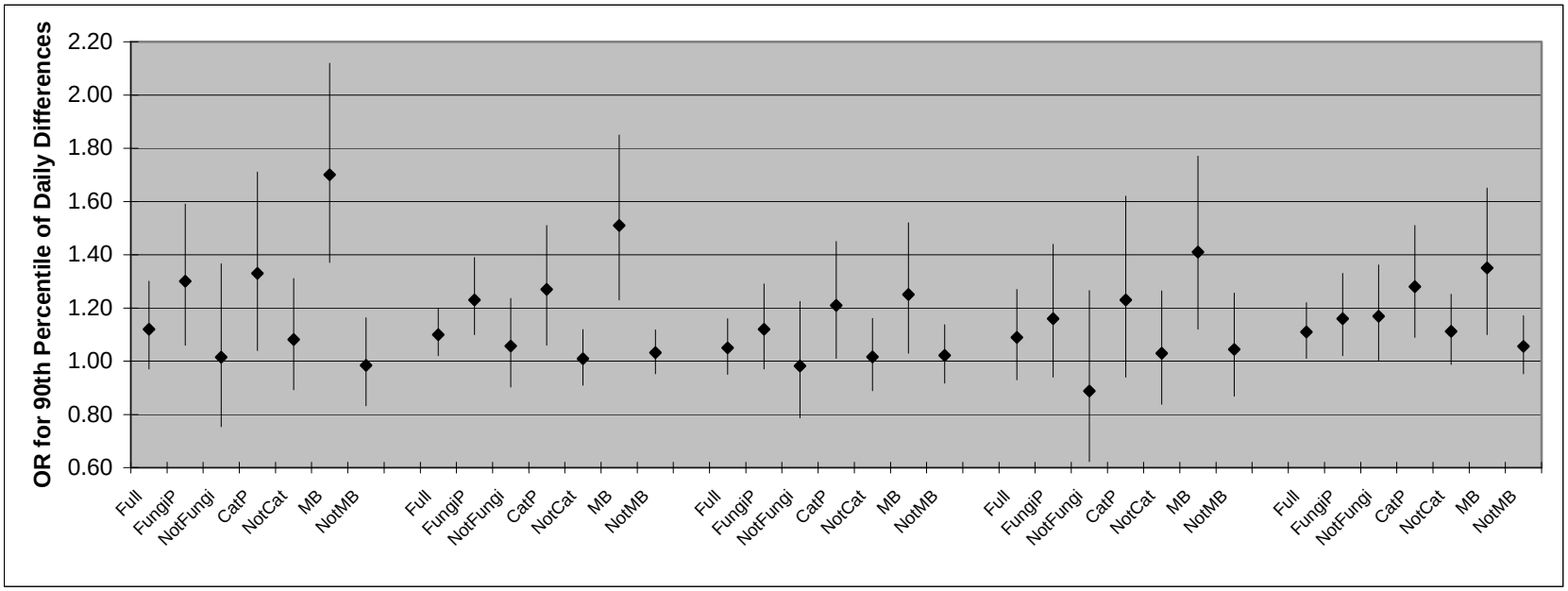
Figure 2: Time-series of Air Pollutants (November, 2000 to March, 2005)



(a) 24-hour average NO_2 (ppb), (b) 24-hour average $PM_{2.5}$ ($\mu g/m^3$), (c) 24-hour average EC ($\mu g/m^3$), (d) 24-hour average NO_3 ($\mu g/m^3$), (e) 8-hour average O_3 (ppb) , and (f) 24-hour average $PM_{10\text{-}2.5}$ ($\mu g/m^3$).

Supplemental Material:
Short-Term Effects of Air Pollution on Wheeze in Asthmatic Children in Fresno, California

Figure 3. Comparison of Wheeze Odds Ratios for Each Subgroup Stratum at 'Representative Lag'

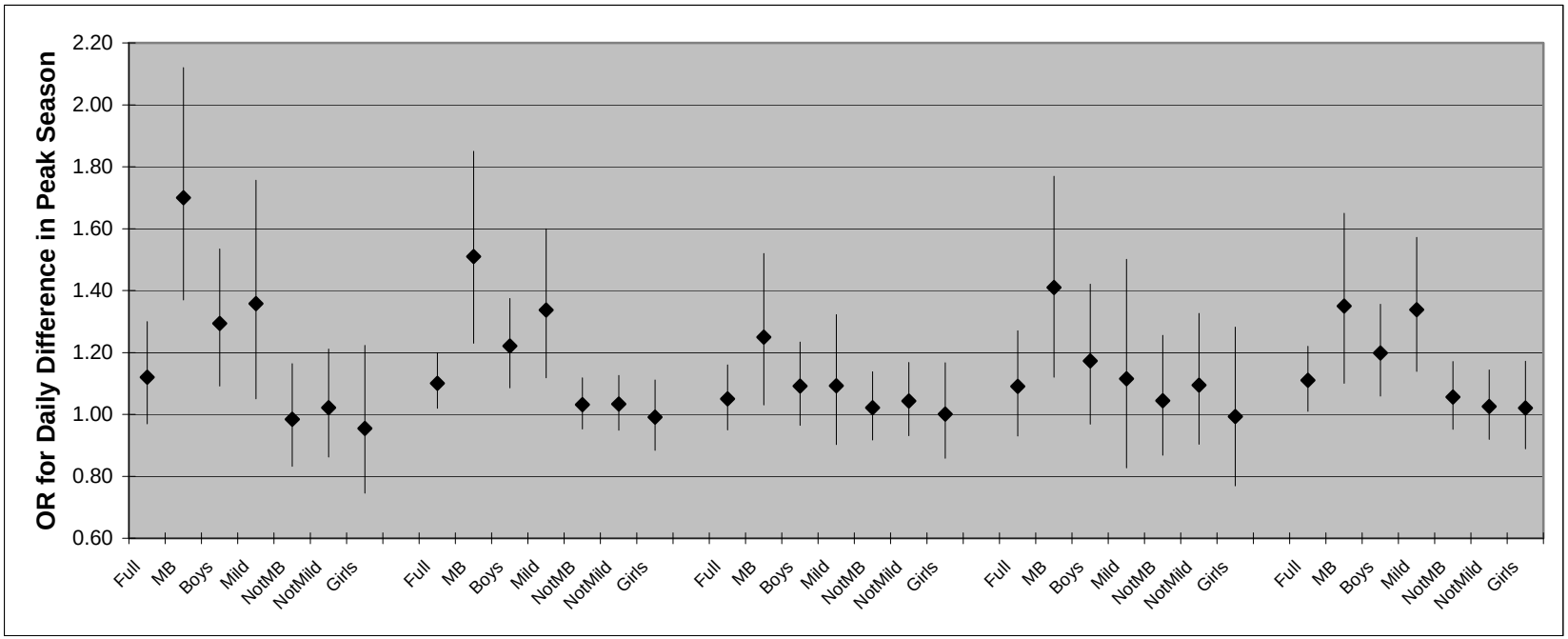


EC **NO_2** **NO_3** **$PM_{2.5}$** **$PM_{10-2.5}$**

[a]OR for 3.7 μg/m^3 increase in 24-hour average EC lag 6, 8.7 ppb increase in 24-hour average NO_2 lag 2, 5.6 μg/m^3 increase in 24-hour average NO_3 lag 5, 36.2 μg/m^3 increase in 24-hour average $PM_{2.5}$ lag 5, and 14.7 μg/m^3 increase in 24-hour average $PM_{10-2.5}$ lag 3.
Models adjusted for fitted daily mean wheeze, home ownership, smoking in the home, white non-Hispanic ethnicity, moderate-severe asthma severity at baseline, male sex, minimum temperature, home visit group, and 6-month interval of entry into cohort. Standard errors consider repeated measures
Full=Everyone; **FungiP**=Children who are skin-test positive to *Alternaria* or *Cladosporium*; **NotFungi**=Children who are not skin-test positive to *Alternaria* or *Cladosporium*; **CatP:** Children who are skin-test positive to cat dander; **NotCat=** children who are not skin-test positive to cat dander; **Mild Boys**=Boys with mild intermittent asthma; **NotMB**=All girls regardless of severity and boys with mild persistent or mod/severe asthma.

Supplemental Material:
Short-Term Effects of Air Pollution on Wheeze in Asthmatic Children in Fresno, California

Figure 4. Comparison of Wheeze Odds Ratios for Boys with Mild Intermittent Asthma and Related Subgroups at 'Representative Lag'.



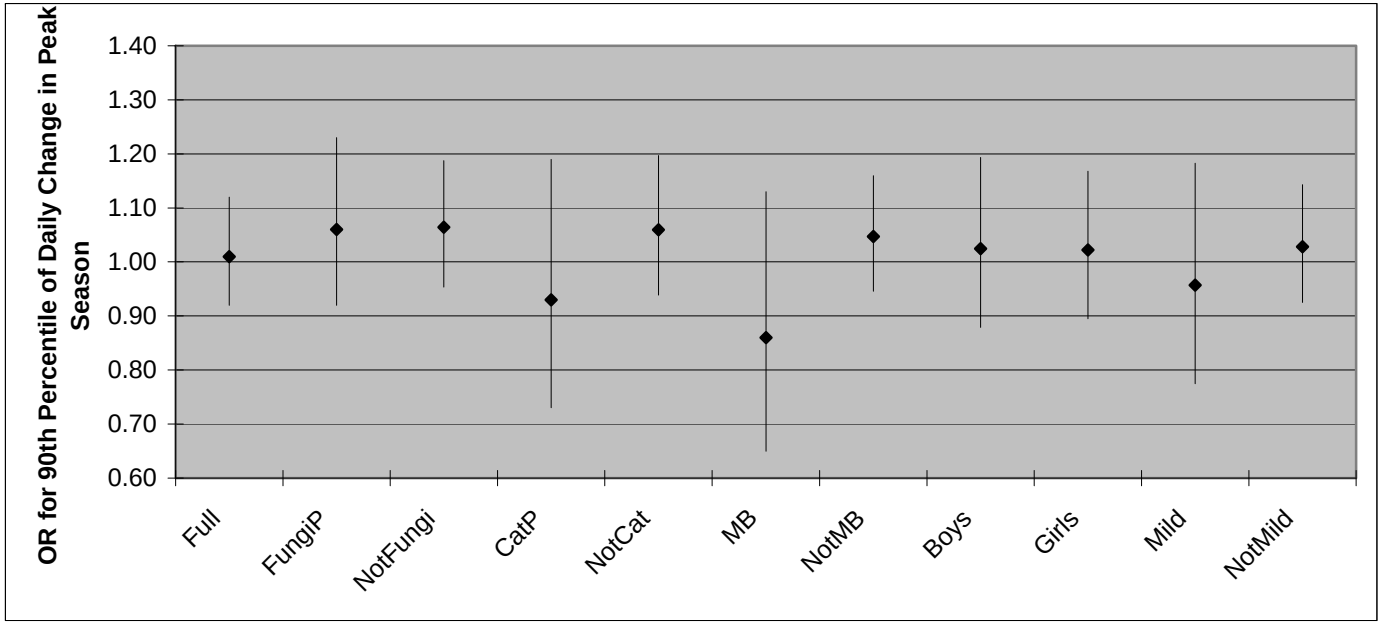
EC **NO_2** **NO_3** **$PM_{2.5}$** **$PM_{10-2.5}$**

[a]OR for 3.7 μg/m^3 increase in 24-hour average EC lag 6, 8.7 ppb increase in 24-hour average NO_2 lag 2, 5.6 μg/m^3 increase in 24-hour average NO_3 lag 5, 36.2 μg/m^3 increase in 24-hour average $PM_{2.5}$ lag 5, and 14.7 μg/m^3 increase in 24-hour average $PM_{10-2.5}$ lag 3.
Models adjusted for fitted daily mean wheeze, home ownership, smoking in the home, white non-Hispanic ethnicity, moderate-severe asthma severity at baseline, male sex, minimum temperature, home visit group, and 6-month interval of entry into cohort. Standard errors consider repeated measures

Full=Everyone; **MB**=Boys with mild intermittent asthma; **Mild**=Children with mild intermittent asthma; **NotMB**=All girls regardless of severity and boys with mild persistent or mod/severe asthma; **NotMild**=Children with mild persistent or mod/severe asthma; **Boys** and **Girls** are boys and girls, respectively..
Models adjusted for

Supplemental Material:
Short-Term Effects of Air Pollution on Wheeze in Asthmatic Children in Fresno, California

Figure 5: Ozone Effects for Selected Subgroups[a]



[a]OR for 20 ppb increase in 24-hour average EC lag 6. **Full**=Everyone; **FungiP**=Children who are skin-test positive to *Alternaria* or *Cladosporium*; **NotFungi**=Children who are not skin-test positive to *Alternaria* or *Cladosporium*; **CatP:** Children who are skin-test positive to cat dander; **NotCat=** children who are not skin-test positive to cat dander; **Mild Boys**=Boys with mild intermittent asthma; **NotMB**=All girls regardless of severity and boys with mild persistent or mod/severe asthma.