

**Synergistic Association of House Endotoxin Exposure and Ambient  
Air Pollution with Asthma Outcomes**

**On-line Supplement**

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**Running Head:** Endotoxin, Air Pollution and Asthma Outcomes

**Table E1:** Comparison between the overall NHANES 2005-2006 sample and the participants with data on endotoxin and air pollution.

Characteristics	All Participants N (%)	Participants with data on air pollution N (%)
Age		
< 6 years	1,936 (8.3)	894 (7.0)
6 – 17 years	2,849 (17.0)	2,019 (17.1)
≥ 18 years	5,563 (74.7)	3,575 (75.9)
Gender		
Male	5,080 (48.9)	3,206 (49.0)
Female	5,268 (51.1)	3,282 (51.0)
Race/ethnicity		
Non-Hispanic Whites	3,928 (68.4)	2,269 (67.7)
Non-Hispanic Blacks	2,710 (12.3)	1,922 (13.1)
Hispanics	2,847 (9.5)	1,788 (9.4)
Other	683 (9.7)	509 (9.8)
BMI		
Underweight or normal	4,799 (42.5)	3,334 (44.2)
Overweight	2,098 (24.6)	1,415 (25.4)
Obese	2,052 (25.1)	1,425 (27.5)
Missing	1,399 (7.8)	314 (2.9)
Census Region		
Northeast	1,984 (23.3)	865 (15.9)
Midwest	1,435 (15.9)	1,406 (27.8)
South	3,912 (34.0)	2,343 (30.4)
West	3,006 (26.8)	1,874 (25.9)
Urbanicity		
Metro	6,277 (51.7)	3,988 (54.4)
Non-metro	4,060 (48.3)	2,500 (45.6)
PIR		
≤ 1.85	4,653 (30.3)	3,114 (32.7)
> 1.85	5,161 (69.7)	3,091 (67.3)
Smoker in household		
Yes	1,759 (18.1)	1,261 (20.6)
No	8,477 (81.9)	5,181 (79.4)
Sensitization to inhalant allergens		
Yes	3,560 (43.4)	2,522 (44.2)
No	3,973 (56.6)	2,705 (55.8)
Any Wheeze		
Yes	1,330 (15.4)	899 (15.9)
No	8,486 (84.6)	5,586 (84.1)
Doctor/ER visits for wheeze		
Yes	652 (7.0)	438 (7.1)
No	9,164 (93.0)	6,047 (92.9)
Current asthma		
Yes	873 (8.7)	602 (8.8)
No	8,912 (91.3)	5,861 (91.2)
ER visits for asthma in past 12 months		
Yes	162 (1.5)	114 (1.7)
No	8,734 (98.5)	5,740 (98.3)
Current asthma or wheeze		
Yes	1,402 (16.2)	940 (16.5)
No	8,392 (83.8)	5,530 (83.5)

Abbreviations: EU, endotoxin unit; mg, milligrams; µg, micrograms; m<sup>3</sup> cubic meters; ppb, parts-per-billion; PM<sub>2.5</sub>, particulate matter ≤ 2.5 µm; O<sub>3</sub>, ozone; NO<sub>2</sub>, nitrogen dioxide; CMAQ, Community Multiscale Air Quality; DS, Downscaler, GM, geometric mean, SE, Standard Error; BMI, Body Mass Index; PIR, Poverty Income ratio.

P-values indicate significance in difference in endotoxin and air pollutant levels by characteristics of participants.

**Table E2:** Odds ratios and 95% confidence intervals for the association of co-exposure to house dust endotoxin and air pollutants with emergency room visits for asthma in the past 12 months in all participants, NHANES 2005-2006

Exposure Contrast	OR (95% CI)	AP	
		Estimate	P-value
<b>Dust endotoxin / PM<sub>2.5</sub> (CMAQ)</b>			
Lower / Lower	1.00 (reference)		
Lower / Higher	1.29 (0.67-2.50)	<b>0.55</b>	<b>0.0055</b>
Higher / Lower	<b>1.98 (1.00-3.91) *</b>		
Higher / Higher	<b>5.01 (2.54-9.87) ****</b>		
<b>Dust endotoxin / PM<sub>2.5</sub> (DS)</b>			
Lower / Lower	1.00 (reference)		
Lower / Higher	1.19 (0.51-2.74)	-0.03	0.95
Higher / Lower	<b>2.65 (1.59-4.42) ***</b>		
Higher / Higher	<b>2.75 (1.03-7.33) *</b>		
<b>Dust endotoxin / O<sub>3</sub> (CMAQ)</b>			
Lower / Lower	1.00 (reference)		
Lower / Higher	1.44 (0.66-3.13)	0.11	0.83
Higher / Lower	<b>2.65 (1.75-4.01) ****</b>		
Higher / Higher	<b>3.45 (1.17-10.19) *</b>		
<b>Dust endotoxin / O<sub>3</sub> (DS)</b>			
Lower / Lower	1.00 (reference)		
Lower / Higher	0.99 (0.30-3.21)	-0.16	0.83
Higher / Lower	<b>2.62 (1.76-3.91) ****</b>		
Higher / Higher	2.26 (0.88-5.82)		
<b>Dust endotoxin / NO<sub>2</sub> (CMAQ)</b>			
Lower / Lower	1.00 (reference)		
Lower / Higher	1.08 (0.45-2.59)	0.07	0.72
Higher / Lower	<b>2.54 (1.50-4.29) ****</b>		
Higher / Higher	<b>2.81 (1.25-6.31) *</b>		

\*P < 0.05

\*\*P < 0.01

\*\*\*P < 0.001

\*\*\*\*P < 0.0001

Abbreviations: OR, odds ratio; CI, confidence interval; AP, attributable proportion due to interaction; PM<sub>2.5</sub>, particulate matter ≤ 2.5 μm; O<sub>3</sub>, ozone; NO<sub>2</sub>, nitrogen dioxide; CMAQ, Community Multiscale Air Quality; DS, Downscaler.

Models adjusted for age, gender, race/ethnicity, smoker in household, and PIR, BMI, Census Region, level of urbanization

**Table E3:** Odds ratios and 95% confidence intervals for the association of co-exposure to house dust endotoxin and air pollutants with emergency room visits for asthma in the past 12 months by age groups, NHANES 2005-2006

Exposure Contrast	Children				Adults		
	OR (95% CI)	AP		OR (95% CI)	AP		
		Estimate	P-value		Estimate	P-value	
<b>Dust endotoxin / PM<sub>2.5</sub> (CMAQ)</b>							
Lower / Lower	1.00 (reference)			1.00 (reference)			
Lower / Higher	0.51 (0.24-1.10)	<b>0.80</b>	<b>&lt;0.0001</b>	1.84 (0.67-5.04)	0.45	0.16	
Higher / Lower	1.23 (0.55-2.77)			2.39 (0.97-5.89)			
Higher / Higher	<b>3.75 (1.27-11.07) *</b>			<b>5.91 (1.86-18.77) **</b>			
<b>Dust endotoxin / PM<sub>2.5</sub> (DS)</b>							
Lower / Lower	1.00 (reference)			1.00 (reference)			
Lower / Higher	1.14 (0.41-3.18)	0.39	0.27	1.27 (0.36-4.50)	-0.71	0.54	
Higher / Lower	1.99 (0.86-4.59)			<b>3.07 (1.53-6.16) **</b>			
Higher / Higher	<b>3.50 (1.64-7.50) **</b>			1.96 (0.43-9.02)			
<b>Dust endotoxin / O<sub>3</sub> (CMAQ)</b>							
Lower / Lower	1.00 (reference)			1.00 (reference)			
Lower / Higher	1.60 (0.72-3.59)	0.01	0.89	1.47 (0.44-4.91)	0.19	0.80	
Higher / Lower	<b>2.52 (1.07-5.94) *</b>			<b>2.72 (1.55-4.78) ***</b>			
Higher / Higher	<b>3.14 (1.15-8.54) *</b>			3.95 (0.69-22.7)			
<b>Dust endotoxin / O<sub>3</sub> (DS)</b>							
Lower / Lower	1.00 (reference)			1.00 (reference)			
Lower / Higher	1.42 (0.64-3.12)	0.06	0.90	0.85 (0.14-5.12)	-0.14	0.90	
Higher / Lower	<b>2.46 (1.14-5.29) *</b>			<b>2.68 (1.44-5.00) **</b>			
Higher / Higher	<b>2.71 (1.24-5.93) *</b>			2.21 (0.46-10.7)			
<b>Dust endotoxin / NO<sub>2</sub> (CMAQ)</b>							
Lower / Lower	1.00 (reference)			1.00 (reference)			
Lower / Higher	0.72 (0.25-2.03)	<b>0.62</b>	<b>0.011</b>	1.36 (0.37-5.08)	-0.87	0.46	
Higher / Lower	1.60 (0.56-4.58)			<b>3.19 (1.55-6.58) **</b>			
Higher / Higher	<b>3.45 (1.65-7.18) **</b>			1.90 (0.40-9.07)			

\*P < 0.05      \*\*P < 0.01      \*\*\*P < 0.001      \*\*\*\*P < 0.0001

Abbreviations: OR, odds ratio; AP; CI, confidence interval; attributable proportion due to interaction; PM<sub>2.5</sub>, particulate matter ≤ 2.5 μm; O<sub>3</sub>, ozone; NO<sub>2</sub>, nitrogen dioxide; CMAQ, Community Multiscale Air Quality; DS, Downscaler. Models adjusted for age, gender, race/ethnicity, smoker in household, and PIR, BMI, Census Region, level of urbanization

**Table E4:** Odds ratios and 95% confidence intervals for the association of co-exposure to house dust endotoxin and air pollutants with emergency room visits for asthma in the past 12 months by sensitization to inhalant allergens, NHANES 2005-2006

Exposure Contrast	Sensitized				Not sensitized		
	OR (95% CI)	AP		OR (95% CI)	AP		
		Estimate	P-value		Estimate	P-value	
<b>Dust endotoxin / PM<sub>2.5</sub> (CMAQ)</b>							
Lower / Lower	1.00 (reference)			1.00 (reference)			
Lower / Higher	1.25 (0.48-3.22)	<b>0.56</b>	<b>0.022</b>	0.91 (0.26-3.26)	-0.41	0.65	
Higher / Lower	1.90 (0.77-4.67)			2.79 (0.87-8.94)			
Higher / Higher	<b>4.88 (2.07-11.49) ***</b>			1.91 (0.57-6.39)			
<b>Dust endotoxin / PM<sub>2.5</sub> (DS)</b>							
Lower / Lower	1.00 (reference)			1.00 (reference)			
Lower / Higher	1.15 (0.37-3.55)	-0.63	0.41	1.60 (0.56-4.56)	0.08	0.90	
Higher / Lower	<b>2.90 (1.43-5.85) **</b>			2.74 (0.86-8.73)			
Higher / Higher	1.87 (0.55-6.43)			<b>3.62 (1.26-10.46) *</b>			
<b>Dust endotoxin / O<sub>3</sub> (CMAQ)</b>							
Lower / Lower	1.00 (reference)			1.00 (reference)			
Lower / Higher	1.90 (0.63-5.70)	0.43	0.25	0.18 (0.02-1.75)	-0.93	0.69	
Higher / Lower	<b>2.47 (1.20-5.08) *</b>			2.51 (1.10-5.73)			
Higher / Higher	<b>5.93 (1.46-24.09) *</b>			0.88 (0.13-5.90)			
<b>Dust endotoxin / O<sub>3</sub> (DS)</b>							
Lower / Lower	1.00 (reference)			1.00 (reference)			
Lower / Higher	1.10 (0.34-3.52)	-0.15	0.87	0.27 (0.03-2.55)	0.50	0.36	
Higher / Lower	<b>2.68 (1.33-5.40) **</b>			2.26 (1.00-5.12)			
Higher / Higher	2.43 (0.73-8.07)			3.08 (0.58-16.3)			
<b>Dust endotoxin / NO<sub>2</sub> (CMAQ)</b>							
Lower / Lower	1.00 (reference)			1.00 (reference)			
Lower / Higher	1.11 (0.34-3.63)	-0.20	0.64	0.62 (0.29-1.35)	-1.09	0.53	
Higher / Lower	<b>2.72 (1.33-5.54) **</b>			2.79 (0.86-9.00)			
Higher / Higher	2.36 (0.99-5.59)			1.31 (0.58-2.94)			

\*P < 0.05    \*\*P < 0.01    \*\*\*P < 0.001    \*\*\*\*P < 0.0001

Abbreviations: OR, odds ratio; AP; CI, confidence interval; attributable proportion due to interaction; PM<sub>2.5</sub>, particulate matter ≤ 2.5 μm; O<sub>3</sub>, ozone; NO<sub>2</sub>, nitrogen dioxide; CMAQ, Community Multiscale Air Quality; DS, Downscaler. Models adjusted for age, gender, race/ethnicity, smoker in household, and PIR, BMI, Census Region, level of urbanization.

**Table E5:** Odds ratios and 95% confidence intervals for the association of co-exposure to house dust endotoxin and air pollutants with any wheeze in the past 12 months, NHANES 2005-2006

	All participants	Age groups		Sensitization to inhalant allergens	
		Children	Adults	Sensitized	Not sensitized
<b>Dust endotoxin / PM<sub>2.5</sub> (CMAQ)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	0.99 (0.74-1.32)	0.74 (0.54-1.01)	1.05 (0.74-1.48)	0.93 (0.57-1.53)	1.03 (0.75-1.40)
Higher / Lower	1.09 (0.81-1.47)	1.18 (0.76-1.83)	1.07 (0.76-1.51)	0.87 (0.47-1.59)	1.43 (0.94-2.19)
Higher / Higher	1.13 (0.81-1.57)	1.21 (0.64-2.30)	1.08 (0.80-1.46)	1.36 (0.86-2.17)	0.67 (0.33-1.36)
<b>Dust endotoxin / PM<sub>2.5</sub> (DS)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	1.03 (0.76-1.40)	1.18 (0.68-2.04)	1.00 (0.73-1.38)	0.86 (0.45-1.62)	1.09 (0.79-1.49)
Higher / Lower	1.12 (0.84-1.48)	1.22 (0.76-1.95)	1.12 (0.82-1.52)	0.94 (0.55-1.62)	1.36 (0.92-2.01)
Higher / Higher	1.08 (0.67-1.73)	<b>1.76 (1.04-2.97)</b>	0.83 (0.46-1.51)	1.04 (0.51-2.12)	0.97 (0.47-1.98)
<b>Dust endotoxin / O<sub>3</sub> (CMAQ)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	0.94 (0.64-1.37)	1.11 (0.68-1.82)	0.90 (0.59-1.37)	0.84 (0.46-1.54)	1.10 (0.74-1.64)
Higher / Lower	1.15 (0.93-1.42)	1.30 (0.88-1.92)	1.13 (0.89-1.43)	1.06 (0.56-2.00)	1.31 (0.90-1.91)
Higher / Higher	0.91 (0.50-1.64)	1.36 (0.76-2.43)	0.78 (0.38-1.61)	0.70 (0.38-1.29)	1.27 (0.51-3.15)
<b>Dust endotoxin / O<sub>3</sub> (DS)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	0.96 (0.70-1.30)	0.64 (0.29-1.41)	1.04 (0.75-1.45)	0.77 (0.40-1.48)	1.13 (0.74-1.72)
Higher / Lower	1.16 (0.93-1.43)	1.23 (0.85-1.78)	1.13 (0.87-1.46)	0.92 (0.50-1.69)	<b>1.48 (1.05-2.10)</b>
Higher / Higher	0.90 (0.45-1.81)	0.92 (0.53-1.58)	0.91 (0.40-2.06)	0.96 (0.37-2.49)	0.76 (0.31-1.83)
<b>Dust endotoxin / NO<sub>2</sub> (CMAQ)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	0.97 (0.65-1.46)	1.04 (0.58-1.88)	0.95 (0.62-1.47)	0.92 (0.49-1.71)	0.96 (0.59-1.57)
Higher / Lower	1.13 (0.87-1.48)	1.23 (0.78-1.94)	1.13 (0.83-1.54)	0.95 (0.58-1.57)	1.43 (0.97-2.11)
Higher / Higher	0.97 (0.66-1.44)	1.44 (0.75-2.74)	0.79 (0.50-1.24)	1.05 (0.59-1.87)	0.66 (0.38-1.13)

Abbreviations: PM<sub>2.5</sub>, particulate matter ≤ 2.5 μm; O<sub>3</sub>, ozone; NO<sub>2</sub>, nitrogen dioxide; CMAQ, Community Multiscale Air Quality; DS, Downscaler. Models adjusted for age, gender, race/ethnicity, smoker in household, and PIR, BMI, Census Region, level of urbanization. **Bold** indicates significant associations.

**Table E6:** Odds ratios and 95% confidence intervals for the association of co-exposure to house dust endotoxin and air pollutants with Doctor or emergency room visits for wheeze in the past 12 months, NHANES 2005-2006

	All participants	Age groups		Sensitization to inhalant allergens	
		Children	Adults	Sensitized	Not sensitized
<b>Dust endotoxin / PM<sub>2.5</sub> (CMAQ)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	1.17 (0.90-1.51)	1.06 (0.70-1.60)	1.20 (0.86-1.67)	0.78 (0.49-1.23)	1.48 (0.96-2.26)
Higher / Lower	<b>1.55 (1.13-2.12)</b>	1.34 (0.87-2.05)	<b>1.61 (1.12-2.31)</b>	1.09 (0.57-2.08)	<b>2.11 (1.30-3.42)</b>
Higher / Higher	1.55 (0.99-2.44)	1.73 (0.84-3.57)	1.29 (0.82-2.00)	1.73 (0.96-3.14)	0.64 (0.23-1.76)
<b>Dust endotoxin / PM<sub>2.5</sub> (DS)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	1.29 (0.92-1.79)	1.06 (0.61-1.83)	1.37 (0.89-2.10)	1.29 (0.75-2.19)	1.20 (0.75-1.93)
Higher / Lower	<b>1.59 (1.20-2.11)</b>	1.33 (0.83-2.14)	<b>1.66 (1.21-2.26)</b>	1.38 (0.83-2.29)	<b>1.74 (1.05-2.88)</b>
Higher / Higher	<b>1.63 (1.01-2.63)</b>	1.81 (0.84-3.91)	1.37 (0.61-3.05)	1.66 (0.77-3.58)	1.64 (0.59-4.53)
<b>Dust endotoxin / O<sub>3</sub> (CMAQ)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	0.67 (0.35-1.28)	1.14 (0.65-2.00)	0.57 (0.28-1.16)	0.76 (0.36-1.64)	0.62 (0.26-1.51)
Higher / Lower	<b>1.38 (1.10-1.73)</b>	1.40 (0.91-2.15)	<b>1.33 (1.06-1.67)</b>	1.33 (0.77-2.31)	1.39 (0.87-2.22)
Higher / Higher	1.24 (0.94-1.64)	<b>1.69 (1.01-2.86)</b>	1.09 (0.73-1.63)	1.01 (0.51-1.99)	1.68 (0.94-3.00)
<b>Dust endotoxin / O<sub>3</sub> (DS)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	0.75 (0.43-1.32)	0.94 (0.40-2.24)	0.71 (0.38-1.33)	1.08 (0.37-3.21)	0.56 (0.30-1.04)
Higher / Lower	<b>1.38 (1.11-1.70)</b>	1.43 (0.98-2.09)	<b>1.29 (1.01-1.66)</b>	1.30 (0.75-2.27)	1.40 (0.87-2.27)
Higher / Higher	1.47 (0.74-2.92)	1.31 (0.68-2.51)	1.60 (0.75-3.44)	1.59 (0.56-4.47)	1.65 (0.84-3.24)
<b>Dust endotoxin / NO<sub>2</sub> (CMAQ)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	1.14 (0.76-1.71)	1.10 (0.54-2.21)	1.16 (0.71-1.89)	0.86 (0.50-1.48)	1.28 (0.70-2.34)
Higher / Lower	1.70 (1.26-2.30)	1.33 (0.80-2.22)	<b>1.83 (1.35-2.49)</b>	1.35 (0.83-2.22)	<b>2.13 (1.19-3.82)</b>
Higher / Higher	1.10 (0.62-1.97)	1.79 (0.84-3.78)	0.64 (0.26-1.58)	1.11 (0.55-2.23)	0.59 (0.27-1.31)

Abbreviations: PM<sub>2.5</sub>, particulate matter ≤ 2.5 μm; O<sub>3</sub>, ozone; NO<sub>2</sub>, nitrogen dioxide; CMAQ, Community Multiscale Air Quality; DS, Downscaler. Models adjusted for age, gender, race/ethnicity, smoker in household, and PIR, BMI, Census Region, level of urbanization. **Bold** indicates significant associations.

**Table E7:** Odds ratios and 95% confidence intervals for the association of co-exposure to house dust endotoxin and air pollutants with current asthma, NHANES 2005-2006

	All participants	Age groups		Sensitization to inhalant allergens	
		Children	Adults	Sensitized	Not sensitized
<b>Dust endotoxin / PM<sub>2.5</sub> (CMAQ)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	1.07 (0.72-1.59)	0.86 (0.65-1.14)	1.16 (0.71-1.89)	1.03 (0.58-1.83)	1.12 (0.75-1.69)
Higher / Lower	1.16 (0.81-1.66)	1.26 (0.71-2.25)	1.09 (0.79-1.49)	1.51 (0.84-2.73)	1.02 (0.68-1.52)
Higher / Higher	1.66 (0.97-2.86)	1.67 (0.91-3.04)	1.66 (0.81-3.41)	1.86 (0.96-3.61)	1.06 (0.39-2.86)
<b>Dust endotoxin / PM<sub>2.5</sub> (DS)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	1.09 (0.80-1.48)	1.04 (0.65-1.68)	1.10 (0.83-1.47)	1.39 (0.81-2.38)	0.69 (0.41-1.17)
Higher / Lower	1.33 (0.94-1.89)	1.47 (0.83-2.59)	1.26 (0.90-1.76)	1.73 (0.97-3.10)	1.05 (0.70-1.59)
Higher / Higher	1.07 (0.80-1.43)	1.28 (0.72-2.28)	0.96 (0.75-1.23)	<b>1.73 (1.22-2.45)</b>	<b>0.46 (0.29-0.73)</b>
<b>Dust endotoxin / O<sub>3</sub> (CMAQ)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	0.88 (0.45-1.71)	1.06 (0.60-1.87)	0.84 (0.40-1.76)	1.02 (0.41-2.52)	0.73 (0.38-1.39)
Higher / Lower	1.16 (0.84-1.60)	1.54 (0.87-2.71)	0.98 (0.71-1.34)	1.35 (0.86-2.12)	1.00 (0.61-1.65)
Higher / Higher	1.34 (0.76-2.37)	1.18 (0.57-2.45)	1.47 (0.68-3.16)	<b>2.34 (1.18-4.65)</b>	0.69 (0.31-1.54)
<b>Dust endotoxin / O<sub>3</sub> (DS)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	0.63 (0.43-0.91)	0.84 (0.41-1.73)	<b>0.58 (0.36-0.94)</b>	<b>0.41 (0.19-0.86)</b>	0.88 (0.51-1.49)
Higher / Lower	1.17 (0.86-1.59)	1.43 (0.84-2.44)	1.04 (0.77-1.40)	1.20 (0.80-1.78)	1.22 (0.79-1.90)
Higher / Higher	1.00 (0.60-1.68)	1.14 (0.61-2.12)	0.99 (0.52-1.85)	1.50 (0.88-2.54)	0.31 (0.09-1.14)
<b>Dust endotoxin / NO<sub>2</sub> (CMAQ)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	1.04 (0.69-1.57)	1.15 (0.74-1.80)	1.05 (0.64-1.73)	1.14 (0.58-2.25)	0.90 (0.52-1.54)
Higher / Lower	1.22 (0.87-1.73)	1.47 (0.80-2.70)	1.10 (0.80-1.51)	1.57 (0.96-2.58)	1.05 (0.66-1.67)
Higher / Higher	1.42 (0.98-2.05)	1.45 (0.94-2.25)	1.46 (0.85-2.52)	<b>1.86 (1.17-2.97)</b>	0.75 (0.35-1.58)

Abbreviations: PM<sub>2.5</sub>, particulate matter ≤ 2.5 μm; O<sub>3</sub>, ozone; NO<sub>2</sub>, nitrogen dioxide; CMAQ, Community Multiscale Air Quality; DS, Downscaler. Models adjusted for age, gender, race/ethnicity, smoker in household, and PIR, BMI, Census Region, level of urbanization. **Bold** indicates significant associations.



**Table E8:** Odds ratios and 95% confidence intervals for the association of co-exposure to house dust endotoxin and air pollutants with current asthma or wheeze, NHANES 2005-2006

	All participants	Age groups		Sensitization to inhalant allergens	
		Children	Adults	Sensitized	Not sensitized
<b>Dust endotoxin / PM<sub>2.5</sub> (CMAQ)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	1.01 (0.77-1.33)	0.77 (0.54-1.10)	1.07 (0.77-1.50)	1.02 (0.64-1.61)	0.98 (0.71-1.36)
Higher / Lower	1.09 (0.83-1.42)	1.12 (0.73-1.73)	1.08 (0.80-1.46)	0.92 (0.51-1.66)	1.35 (0.91-1.98)
Higher / Higher	1.21 (0.89-1.64)	1.28 (0.74-2.22)	1.16 (0.84-1.61)	<b>1.60 (1.05-2.45)</b>	0.64 (0.33-1.26)
<b>Dust endotoxin / PM<sub>2.5</sub> (DS)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	1.05 (0.79-1.41)	1.26 (0.73-2.19)	1.02 (0.75-1.37)	0.90 (0.49-1.63)	1.08 (0.81-1.45)
Higher / Lower	1.14 (0.89-1.45)	1.20 (0.77-1.88)	1.15 (0.88-1.49)	1.04 (0.62-1.72)	1.29 (0.90-1.85)
Higher / Higher	1.07 (0.68-1.68)	<b>1.72 (1.07-2.76)</b>	0.82 (0.46-1.49)	1.05 (0.53-2.10)	0.93 (0.45-1.88)
<b>Dust endotoxin / O<sub>3</sub> (CMAQ)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	0.93 (0.64-1.35)	1.02 (0.61-1.70)	0.91 (0.61-1.35)	0.85 (0.46-1.57)	1.08 (0.74-1.58)
Higher / Lower	1.14 (0.92-1.40)	1.23 (0.83-1.83)	1.12 (0.89-1.41)	1.10 (0.59-2.03)	1.25 (0.88-1.77)
Higher / Higher	0.95 (0.59-1.54)	1.25 (0.72-2.18)	0.87 (0.51-1.47)	0.83 (0.50-1.39)	1.19 (0.50-2.86)
<b>Dust endotoxin / O<sub>3</sub> (DS)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	0.96 (0.68-1.33)	0.66 (0.33-1.34)	1.04 (0.73-1.48)	0.76 (0.39-1.51)	1.16 (0.78-1.74)
Higher / Lower	1.15 (0.92-1.43)	1.20 (0.82-1.77)	1.12 (0.87-1.45)	0.95 (0.52-1.73)	<b>1.42 (1.02-1.97)</b>
Higher / Higher	0.95 (0.53-1.70)	0.87 (0.49-1.52)	1.01 (0.52-1.96)	1.10 (0.53-2.29)	0.73 (0.32-1.69)
<b>Dust endotoxin / NO<sub>2</sub> (CMAQ)</b>					
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	0.99 (0.68-1.45)	1.14 (0.68-1.92)	0.96 (0.63-1.47)	0.98 (0.54-1.77)	0.93 (0.59-1.46)
Higher / Lower	1.14 (0.90-1.44)	1.21 (0.78-1.89)	1.14 (0.87-1.51)	1.03 (0.64-1.68)	1.35 (0.95-1.93)
Higher / Higher	1.01 (0.69-1.47)	1.45 (0.81-2.58)	0.83 (0.52-1.35)	1.15 (0.66-1.97)	0.61 (0.37-1.03)

Abbreviations: PM<sub>2.5</sub>, particulate matter ≤ 2.5 μm; O<sub>3</sub>, ozone; NO<sub>2</sub>, nitrogen dioxide; CMAQ, Community Multiscale Air Quality; DS, Downscaler. Models adjusted for age, gender, race/ethnicity, smoker in household, and PIR, BMI, Census Region, level of urbanization. **Bold** indicates significant associations.

**Table E9:** Odds ratios and 95% confidence intervals for the association of co-exposure to house dust endotoxin and air pollutants with sensitization to inhalant allergens, NHANES 2005-2006

	All participants	Age groups	
		Children	Adults
<b><u>Dust endotoxin / PM<sub>2.5</sub> (CMAQ)</u></b>			
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	<b>1.18 (1.05-1.34)</b>	1.04 (0.63-1.72)	<b>1.19 (1.02 (1.38))</b>
Higher / Lower	0.90 (0.74-1.09)	0.92 (0.64-1.31)	0.94 (0.74-1.20)
Higher / Higher	1.27 (0.94-1.71)	1.02 (0.65-1.59)	1.40 (0.93-2.10)
<b><u>Dust endotoxin / PM<sub>2.5</sub> (DS)</u></b>			
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	1.09 (0.93-1.28)	0.92 (0.64-1.33)	1.11 (0.93-1.33)
Higher / Lower	0.99 (0.85-1.16)	1.00 (0.76-1.31)	1.04 (0.84-1.30)
Higher / Higher	0.84 (0.57-1.26)	0.64 (0.40-1.04)	0.95 (0.60-1.50)
<b><u>Dust endotoxin / O<sub>3</sub> (CMAQ)</u></b>			
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	0.83 (0.75-0.91)	0.80 (0.61-1.05)	<b>0.82 (0.73-0.93)</b>
Higher / Lower	0.89 (0.76-1.04)	0.97 (0.71-1.32)	0.91 (0.74-1.13)
Higher / Higher	0.88 (0.65-1.19)	0.67 (0.44-1.01)	1.02 (0.74-1.40)
<b><u>Dust endotoxin / O<sub>3</sub> (DS)</u></b>			
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	0.98 (0.78-1.23)	0.88 (0.56-1.39)	1.01 (0.79-1.29)
Higher / Lower	0.93 (0.79-1.09)	0.99 (0.71-1.39)	0.95 (0.78-1.17)
Higher / Higher	0.95 (0.73-1.23)	0.68 (0.36-1.28)	1.15 (0.89-1.49)
<b><u>Dust endotoxin / NO<sub>2</sub> (CMAQ)</u></b>			
Lower / Lower	1.00 (reference)	1.00 (reference)	1.00 (reference)
Lower / Higher	1.28 (0.99-1.65)	1.00 (0.65-1.55)	1.31 (1.00-1.71)
Higher / Lower	0.95 (0.80-1.14)	0.91 (0.68-1.21)	1.02 (0.81-1.28)
Higher / Higher	1.15 (0.79-1.66)	1.00 (0.57-1.74)	1.22 (0.80-1.87)

Abbreviations: PM<sub>2.5</sub>, particulate matter ≤ 2.5 μm; O<sub>3</sub>, ozone; NO<sub>2</sub>, nitrogen dioxide; CMAQ, Community Multiscale Air Quality; DS, Downscaler. Models adjusted for age, gender, race/ethnicity, smoker in household, and PIR, BMI, Census Region, level of urbanization. **Bold** indicates significant associations.