

Supplementary Online Content

Zhang C, Guo Y, Xiao X, et al. Association of breastfeeding and air pollution exposure with lung function in Chinese children. *JAMA Netw Open*. 2019;2(5):e194186. doi:10.1001/jamanetworkopen.2019.4186

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eFigure 1. Associations of the Prevalence of Impaired Lung Function With Ambient Pollutants Stratified by Breastfed Status.

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This supplementary material has been provided by the authors to give readers additional information about their work.

eMethods 1. Description of the Study Design and Random Sampling Strategy

The Seven Northeastern Cities (SNEC) study is a cross-sectional study of children's health outcomes based on exposure to ambient air pollutants. This region encompasses more than 20 million people residing in 14 cities in Liaoning province in Northeastern China. To maximize the inter- and intra-city gradients of the pollutants of interest and also to minimize the correlation between district-specific ambient pollutants, in April 2012 the seven cities of Shenyang, Dalian, Anshan, Fushun, Benxi, Liaoyang, and Dandong in Liaoning province were selected as study sites, based on air pollution measurements taken between 2009 and 2011 (Map 1). In each of the seven cities, we selected all urban districts for the study. There are five districts in Shenyang, four districts in Dalian and Fushun, three districts in Anshan, Benxi, and Dandong, and two districts in Liaoyang, respectively.



Map 1. Locations of the study cities in Liaoning province, northeast of China

In each of the 24 study districts, there was only one available municipal air monitoring station. To generate a representative sample, we randomly selected one or two elementary schools and one or two middle schools, located within 2 km of a municipal monitoring station. If the number of students in the first selected school was below 500, we included a second school. The resulting 62 schools were included. Within each school, we randomly selected one or two classrooms depending on the class size from each grade level to enroll study participants.

The Map 2 below shows an area including up to a 2 km radius around one of our monitoring stations,

as indicated by a small, brown circle in the center of the map. As shown in the map, 9 elementary schools (marked 1-9) were within a 2 km radius of that particular station. We randomly selected one or two elementary schools from those 9 by using a random number table.



Map 2. The area including a 2 km radius around a monitoring station, as indicated by a small, blue circle in the center of the map. Elementary schools, marked 1-9, fell within this radius. We randomly selected school 1 and 9.

In China, each district of a city has an administrative code. We selected the last two non-zero valid digits of the administrative code as the number of the district and randomly selected two schools based on a random number table. For example, the administrative code of the Heping district in Shenyang is “210102000000.” We identified “02” as the number of the Heping district. According to a random number table, as shown below, the random numbers “1” and “9” were selected in this survey. So, schools with label 1 and 9 in the figure were included. These randomization procedures ensure that the schools selected are representative of the region.

随机数字表		Random Number Table			
编号	1~10	11~20	21~30	31~40	41~50
1	22 17 68 65 81	68 95 23 92 35	87 02 22 57 51	61 09 43 95 06	58 24 82 03 47
2	19 36 27 59 46	13 79 93 37 55	39 77 32 77 09	85 52 05 30 62	47 83 51 62 74
3	16 77 23 02 77	09 61 84 25 21	28 06 24 25 93	16 71 13 59 78	23 05 47 47 25
4	78 43 76 71 61	20 44 90 32 64	97 67 63 99 61	46 38 03 93 22	69 81 21 99 21
5	03 28 28 26 08	73 37 32 04 05	69 30 16 09 05	88 69 58 28 99	35 07 44 75 47

In China, primary schools admit students restrictively basing the criteria on geographical boundaries, and the policy forbids selecting trans-regionally schools for children. Therefore, the monitoring station, which was the only station in the selected child’s school district, was the nearest station to the child’s home. Furthermore, in the present study, the average time walking from home to school was only 11.9 minutes for the study school children, indicating the children’s PM exposure assessment may represent both school and home exposure levels. For these reasons, our results may have reduced exposure uncertainty.

eMethods 2. Description of the Anthropometry and Questionnaire Data Collection

The study questionnaire included queries about demographics, lifestyle factors in the home, family medical history, health-related behaviors in the home, and household environmental factors such as home coal use, house pet, home renovation in the past 2 years, area of residence per person. The trainees and investigators in the study were required to complete a training program on a standardized protocol for the physical examination. Following training, each trainee had to take a mandatory qualifying examination to ensure proper administration of the study questionnaire and adherence to the standardized protocol, and those who passed were awarded a Physical Observer Certificate. Each of the participating children completed a physical examination in school from April 2012 to May 2013. Trained nurses followed the standardized World Health Organization protocol for measuring children's height (at 0.1cm) and weight (at 0.1kg) and used them to calculate the body mass index (BMI) in kg/m². We dichotomized parent's education as having a high school education or not, and categorized annual family income as: < 5000 Chinese Yuan (RMB), 5000-9,999 RMB, 10,000-29,999 RMB, 30,000-99,999 RMB, or >100,000 RMB. Preterm birth was defined as a gestational age < 37 weeks at delivery. Low birth weight was characterized as a birth weight < 2500 g. Children's passive tobacco smoke exposure was defined as cohabitation with a daily cigarette smoker, and home coal use was assessed as household use for cooking or space heating. Area of residence per person (m²) was calculated by dividing the housing area by the number of household residents. We also queried the 'ever' presence of a house pet (i.e., dog, cat, bird, farm animals, and others). We defined family history of atopy as a clinical diagnosis of allergies (e.g., allergic dermatitis): hay fever, asthma, or bronchial asthma in a biologic parent or grandparent. Doctor-diagnosed asthma was defined as an affirmative answer to the question "Has a doctor ever diagnosed asthma in this child?" Current asthma among previously asthma-diagnosed children was defined by an affirmative answer to the question "Has this child had an asthma attack in the last two years?" or an affirmative answer to the question "Does this child take medicine or treatment for asthma or asthmatic bronchitis?" We determined home renovation as a positive response to the question "Have you made any renovations in your home within the past 2 years?"

We defined breastfeeding as having been mainly breastfed for more than three months. In present study, new mothers had a 3-month pregnancy leave after delivery. After 3 months, most of the new mothers had to return to work and many of them discontinued breastfeeding at that time. Thus, we designed the question to assess only 3-month breastfeeding information. Mainly breastfed means that the child was fed mainly by breast milk, and occasionally fed by others. The early diet of children not breastfed includes animal milk, juice, and soups made from egg, rice, chicken, pork, beef, fish, or vegetables. During investigation, we use the following two questions to collect the information of breastfeeding status: the first questions, "Which of the following breastfeeding methods is used within 3 months after birth (multiple options): A. Breast milk; B. animal milk (mainly from cow); C, others (including: juice, and soups made from egg, rice, chicken, pork, beef, fish, or vegetables)". The second question, "if you select more than one option, sort by importance". In present study, a total of 4,751 (70.5%) parents reported breastfeeding including 302 mixed feeding (select [A and B], or [A and C]).

eMethods 3. Description of the Ground-Monitored PM₁, PM_{2.5}, PM₁₀, and NO₂ Data

Ground-monitored airborne particulate matter with a diameter of 1 µm or less (PM₁), airborne particulate matter with a diameter of 2.5 µm or less (PM_{2.5}) and airborne particulate matter with a diameter of 10 µm or less (PM₁₀) were obtained from the China Atmosphere Watch Network (CAWNET) of the China Meteorological Administration (CMA). The network consisted of 96 stations across mainland China. Concentrations of PM₁, PM_{2.5} and PM₁₀ at all stations were measured with GRIMM 180 Environmental dust monitors (Model 1.108, Grimm Aerosol Technik GmbH, Ainring, Germany). Daily concentration of NO₂ was estimated with satellite-derived OMI data (Daily Level-3 Nitrogen Dioxide Product) and other predictors. Two quality-control procedures were applied to all PM measurements: a "limit check" and "climatological check". For the limit check, we evaluated each valid PM measurement to determine whether it fell within its possible limits, otherwise, they were removed. In the climatological check, the median and standard deviation (SD) of hourly PM measurements were calculated at each PM observational site. Any PM values lying outside of more than three SDs from the median PM have been removed. Daily PM₁, PM_{2.5}, PM₁₀, and NO₂ concentrations were estimated by using a spatial statistical model with a machine learning method matched to the children's geocoded home addresses. Briefly, each participant's home address was geocoded as a geographical longitude and latitude, and superimposed over the predicted daily PM₁, PM_{2.5}, PM₁₀, and NO₂ concentrations' grids, and then the exposure parameters were calculated by averaging the daily concentrations for PM₁, PM_{2.5}, PM₁₀, and NO₂ over the four-year period of 2009–2012.

This method is user-friendly, as there is no need to define the complex relationships between predictors (e.g., linear or nonlinear relationships and interactions). Also, the variable importance measures provided by random forests help the user to identify important variables and noise variables. The final model is shown as following:

$$PM_{ij} = AOD_{ij} + TEMP_{ij} + RH_{ij} + BP_{ij} + WS_{ij} + NDVI + Urban_cover + doy + \log(elev)$$

$$NO_{2ij} = OMI_{ij} + TEMP_{ij} + BP_{ij} + RH_{ij} + WS_{ij} + NDVI_{ij} + Urban_cover_{ij} + doy_i + \log(elev_j)$$

where $PM_{2.5ij}$ is the PM_{2.5} or PM₁₀ concentration on day i at station j ; NO_{2ij} is the NO₂ concentration on day i at station j ; AOD_{ij} is the combined AOD; OMI_{ij} is the satellite-derived OMI value; $TEMP$, RH , BP , and WS are mean temperature, relative humidity, barometric pressure, and wind speed on day i , respectively; $NDVI$ is the monthly average NDVI value; $Urban_cover$ is the percentage of urban cover with a buffer radius of 10 km; doy is day of the year; and $\log(elev)$ is the log transformed elevation. To evaluate the predictive ability of the final model, a 10-fold cross-validation (CV) was performed.

The results of a 10-fold cross-validation showed R^2 values for daily and annual predictions were 55% and 75% for PM₁, 83% and 86% for PM_{2.5}, 78% and 81% for PM₁₀, and 64% and 72% for NO₂, respectively. The Root Mean Squared Error (RMSE) values for daily and annual predictions were 20.5 µg/m³ and 8.8 µg/m³ for PM₁, 18.1 µg/m³ and 6.9 µg/m³ for PM_{2.5}, 31.5 µg/m³ and 14.4 µg/m³ for PM₁₀, and 12.4 µg/m³ and 6.5 µg/m³ for NO₂, respectively.

eMethods 4. Description of the PM₁₀, SO₂, NO₂, and O₃ Data

The operation of the monitoring stations has strictly followed the quality assurance/quality control (QA/QC) procedure set by the State Environmental Protection Administration of China (SEPA, 1992). The environmental monitoring centers in each of the three cities conducted regularly performance audits and precision checks on the air-monitoring equipment. Quarterly performance audits are conducted to assess data accuracy on airborne particulate matter with a diameter of 10 µm or less (PM₁₀), sulfur dioxide (SO₂), nitrogen dioxide (NO₂), and ozone (O₃) monitoring systems.

1) The calculation method

The calculation method is performed according to Chinese National standards (GB8170-87). The unit of monitored pollutants is mg/m³ accurate to the third decimal. The units can also be expressed as µg/m³, depending on the pollutant's concentration. For concentrations that were too low to be measured, half of the lowest checking limit of the equipment will be used as the measured value.

2) Outliers

When the measured concentration is too low (e.g. background value), a negative value can be obtained because of the zero drift of the monitor. There is no physical meaning to this value. This negative value can be regarded as a value of "unable to measure."

For the monitoring station with an automatic calibration system, if equipment zero drift/span drift exceeds the control range during the period of zero/span calibration, the data from the time it becomes out of control until the equipment is recovered should be regarded as invalid data. The data cannot be used statistically.

The data during the period of zero calibration/span calibration should be regarded as invalid data. It cannot be used statistically, but a flag should be made on these data and the records stored as evidence.

When values are missing because of a loss of power, any data received by the central control station during the period of the loss of power should be regarded as invalid data. The period of loss of power should be counted at the start of power outage until complete warm-up of equipment. The data cannot be used statistically.

Because pollutant concentrations change over time and change slowly, there should be no swift change in pollutant concentration in the results of normal monitoring. Either a swift change or no change indicates that there is an equipment problem. The problem should be identified, and the data between the start of problem to recovery should be regarded as outliers. These data cannot be used statistically.

3) Statistics of monitoring data

One time value

The central control station uses an average of 15 minutes of pollutant concentrations measured at the branch station as a one-time value. The central control modifies this value and judge whether this value is an outlier using the report software.

One hour mean value

At least 75% of the one-time values should be used to calculate the one-hour average mean value. One-hour average mean value is calculated by averaging all the valid one-time values within one hour.

Daily average mean

For PM_{10} at least 12 valid hourly mean values are needed to calculate the daily mean value (using the calendar as the valid time frame), using all available valid hourly mean values. For SO_2 and NO_2 at least 18 hourly mean values everyday are needed to calculate valid daily mean value (using the calendar as the valid time frame). For O_3 , at least six hourly concentrations of O_3 per day are needed for calculating the 8-hour average concentration of O_3 . All of the valid hourly mean values are used to calculate the daily mean. (National Environmental Air Quality Standard GB3095-2012)

Monthly mean values are the arithmetic means of all valid daily mean values within the month.

Seasonal mean values are the arithmetic means of all valid daily mean values within the season.

Yearly mean values are the arithmetic means of all valid daily mean values within the year. District daily mean values are calculated using the monthly mean value, the seasonal mean value, and the yearly mean value from the available stations in the district.

eMethods 5. Description of the 2-Level Binary Logistic Regression Model

We assessed normality and described distributions for continuous variables as the mean \pm standard deviation (SD), and categorical variables as n (%), comparing breastfed to non-breastfed children by Student's *t*-test or χ^2 -test as appropriate. To investigate the relationship between the pulmonary function tests (PFT) and ambient air pollution, we considered a two-level logistic regression model in which children were the first-level units and the districts were the second-level units. At the child level, we predicted the logit of the prevalence rate for a given impaired lung function outcome by breastfeeding (BF) and *k* covariates ($X_1 \dots X_k$) as follows:

$$\text{logit}[P(\text{symptom}_{ij})] = \alpha_j + \lambda_j \text{BF}_{ij} + \beta_1 X_{1ij} + \dots + \beta_k X_{kij} + e_{ij} \quad (1)$$

where the subscript *j* is for districts ($j=1, \dots, 25$), the subscript *i* is for children ($i=1, \dots, n_j$), α_j are the intercepts at the district level, λ_j are the regression coefficients for breastfeeding, $\beta_1 \dots \beta_k$ are the regression coefficients of covariates, and e_{ij} are the random errors, assumed to have mean of zero and constant variance. The α_j and λ_j are random coefficients as they are assumed to vary across districts. In general, a district with a high α_j is predicted to have higher prevalence rates than a district with a low α_j . Similarly, differences in λ_j indicate that the relationship between breastfeeding and prevalence rates is not the same in all districts. In districts with a high (low) λ_j , breastfeeding has a large (small) effect on prevalence rates (i.e., the difference between breastfed children and non-breastfed children is relatively large (small)). At the district level, we regressed the district-specific intercepts α_j and coefficients λ_j on the district-specific pollutant level (Z_j) to explain the variations of α_j and λ_j , as follows:

$$\alpha_j = \alpha + \gamma_1 Z_j + u_{1j} \quad (2)$$

$$\lambda_j = \lambda + \gamma_2 Z_j + u_{2j} \quad (3)$$

Equation (2) predicts the prevalence rates in a district by Z_j . If γ_1 is positive, then adjusting for covariates, the prevalence rates are higher in districts with a higher pollutant level. Conversely, if γ_1 is negative, then adjusting for covariates, the prevalence rates are lower in districts with a higher pollutant level. Equation (3) states that, adjusting for covariates, the relationship between prevalence rates and breastfeeding in a district depends on the district's pollutant level Z_j . If γ_2 is positive, then adjusting for covariates, the breastfeeding effect on prevalence rates is larger with a higher pollutant level. Conversely, if γ_2 is negative, then adjusting for covariates, the breastfeeding effect on prevalence rates is smaller with a higher pollutant level. The u_{1j} and u_{2j} are random errors at the district level, assumed to be independent and have mean of zero and constant variance. These random errors characterize the between-district variation and are assumed to be independent from e_{ij} at the child level. Note that α , λ , β_1, \dots, β_k , γ_1 , and γ_2 are fixed effects and so do not vary across districts (they therefore have no subscript *j* to indicate district). The above models can be written as a single regression equation by substituting equations (2) and (3) into equation (1):

$$\text{logit}[P(\text{symptom}_{ij})] = (\alpha + \gamma_1 Z_j + \lambda \text{BF}_{ij} + \beta_1 X_{1ij} + \dots + \beta_k X_{kij} + \gamma_2 Z_j \text{BF}_{ij}) + (u_{2j} \text{BF}_{ij} + u_{1j} + e_{ij}) \quad (4)$$

The terms in the first and second parentheses in equation (4) are often called the fixed (or deterministic) and random (or stochastic) parts of the model, respectively. The product term $Z_j \text{BF}_{ij}$ is a cross-level interaction between the child-level variable BF_{ij} and the district-level variable Z_j . The random error $u_{2j} \text{BF}_{ij}$ is different for different children, a situation that in ordinary multiple regression analysis is called heteroscedasticity. To evaluate the robustness of our estimates, we conducted a

number of sensitivity analyses, including stratifying by child's age, excluding children with mixed feeding, excluding children with low birth weight or preterm birth, excluding children with doctor-diagnosed asthma, and randomly excluding one district. Analyses were also adjusted for a potential confounders selected *a priori* based on literature evidence for associations with air pollution exposure and respiratory function. These factors included age, sex, height, birth weight, preterm birth, parental education, family income per year, exercise per week, passive smoke exposure, home coal use, house pet, home renovation in the past 2 years, area of residence per person, doctor-diagnosed asthma, family history of atopy, and short-term air pollution concentrations. Short-term air pollution concentrations referred to the daily mean pollutant levels from routine air monitoring data during lung function measurement in the children. If the estimated regression effects for pollutants changed by at least 10% upon inclusion in the base model, the covariate was retained in the final model as a confounding variable. All analyses were conducted using the GLIMMIX procedure in SAS 9.4 (SAS Institute, Cary, NC USA). All statistical tests were two-tailed, and *p*-values less than 0.05 were considered statistically significant except for the interaction term where statistical significance was asserted at *p*-values less than 0.1.

eTable 1. Characteristics of the Study Participants and Nonparticipants

Characteristics	Participants (n=6,740)	Non-participants (n=279)
Age (years); mean (SD)	11.6 (2.1)	11.7 (2.3)
Height (cm); mean (SD)	153.9 (12.6)	153.9 (14.0)
Weight (kg); mean (SD)	48.4 (15.6)	47.9 (17.7)
Body mass index (kg/m ²); mean (SD)	20.0 (4.7)	20.5 (7.8)
Birth weight (kg); mean (SD)	3.4 (0.5)	3.4 (0.5)
Area of residence per person (m ²); mean (SD)	22.7 (9.8)	22.7 (9.8)
Exercise per week (hours); mean (SD)	7.6 (7.7)	7.9 (8.9)
Male	3,382 (50.2)	146 (52.3)
Preterm birth	338 (5.0)	14 (5.0)
Parental education \geq high school*	4,211 (62.5)	140 (50.2)
Family income per year		
< 5,000 RMB	758 (11.2)	41 (14.7)
5,000-9,999 RMB	876 (13.0)	43 (15.4)
10,000-29,999 RMB	2,394 (35.5)	103 (36.9)
30,000-99,999 RMB	2,437 (36.2)	85 (30.5)
> 100,000 RMB	275 (4.1)	7 (2.5)
Passive smoke exposure		
Father	2,122 (31.5)	94 (33.7)
Mother	608 (9.0)	21 (7.5)
Other	551 (8.2)	16 (5.7)
Anyone	3,281 (48.7)	131 (46.9)
Mother smoking during pregnancy	54 (0.80)	
Home coal use	676 (10.0)	38 (13.6)
Pet kept in home	1,435 (21.3)	65 (23.3)
Home renovation in past 2 years	2,416 (35.9)	114 (40.9)
Family history of atopy	1,390 (20.6)	52 (18.6)
Doctor-diagnosed asthma	460 (6.8)	17 (6.1)
Current asthma	297 (4.4)	12 (4.3)

Abbreviations: RMB, Chinese Yuan; SD, standard deviation.

Values are *n* (%) except where indicated.

*Significant difference exists between breastfed and non-breastfed children as tested by χ^2 test for categorical variables and Student's *t*-test for continuous variables, *p* value <0.05.

eTable 2. Distribution of Air Pollutants, Lung Function, and Breastfeeding Prevalence Among the 7 Study Cities in China

		Shenyang	Dalian	Fushun	Anshan	Benxi	Dandong	Liaoyang
		g	(n=510)	(n=269)	(n=649)	(n=674)	g	ng
Air pollutants estimated using a spatial statistical model								
PM ₁	Means (SD)	45.16	42.94	48.02	51.76	45.23	44.82	43.99
	(Min~Max)	(38.35-	(39.80-	(38.35-	(38.35-	(38.94-	(38.15-	(38.63-
PM _{2.5}	Means (SD)	52.63	50.24	54.93	59.54	51.65	51.38	51.84
	(Min~Max)	(46.76-	(46.83-	(46.61-	(46.42-	(46.42-	(46.04-	(47.85-
PM ₁₀	Means (SD)	94.13	90.71	97.47	104.09	90.34	91.56	93.50
	(Min~Max)	(83.17-	(82.91-	(83.17-	(75.90-	(75.90-	(82.64-	(87.29-
NO ₂	Means (SD)	32.85	32.49	34.91	36.27	30.67	31.73	32.41
	(Min~Max)	(27.77-	(27.64-	(27.77-	(20.57-	(20.57-	(27.72-	(29.68-
Air pollutants measured by local air monitoring station								
PM ₁₀	Means (SD)	107.43	81.89	81.48	86.12	94.61	87.81	70.82
	(Min~Max)	(101.00-	(56.00-	(67.75-	(76.50-	(79.50-	(50.00-	(68.75-
SO ₂	Means (SD)	68.06	44.26	50.07	49.98	51.34	40.24	30.85
	(Min~Max)	(60.00-	(43.25-	(37.75-	(30.00-	(35.50-	(14.75-	(25.25-
NO ₂	Means (SD)	35.56	46.45	36.68	26.31	41.54	41.66	25.45
	(Min~Max)	(31.75-	(31.75-	(28.00-	(10.50-	(32.25-	(34.75-	(23.50-
O ₃	Means (SD)	70.64	48.35	32.19	49.42	330.94	237.98	32.66
	(Min~Max)	(50.25-	(15.00-	(24.00-	(45.50-	(30.31-	(27.00-	(29.50-
Spirometric parameters								
FVC (L); means		2.62	2.74	2.65	2.53	2.40	2.75	2.58
FEV ₁ (L); means		2.44	2.58	2.45	2.40	2.26	2.67	2.51
PEF (L/s); means		4.65	5.09	4.78	4.69	4.56	4.98	4.79
MMEF (L/s);		3.29	3.61	3.23	3.36	3.14	3.67	3.75
Lung function status								
FVC, <85% of		13.35	9.61	9.98	11.40	13.20	13.16	7.49
FEV ₁ , <85% of		10.82	7.65	8.46	6.93	9.50	8.25	4.87
PEF, <75% of		9.47	6.27	5.86	5.55	5.64	9.57	3.37
MMEF, <75% of		11.18	7.45	10.69	6.93	8.90	8.37	3.37
Prevalence of		67.36	73.33	69.39	70.72	68.84	76.20	74.91

eTable 3. Daily Mean Air Pollutant Levels in the 24 Study Districts of the 7 Study Cities in China, 2012-2013

Pollutants	Mean	Median	Max	Min	Interquartile range
PM ₁₀ (μg/m ³)	108.8	108.6	189	45.2	47.4
SO ₂ (μg/m ³)	30.2	24.6	80.4	4.4	22.8
NO ₂ (μg/m ³)	26.9	25.5	64	3.6	18.6
O ₃ (μg/m ³)	69	69.4	132.4	19	51.4

Abbreviations: O₃, ozone; NO₂, nitrogen dioxides; PM₁₀, airborne particulates with aerodynamic diameter ≤10 μm; SO₂, sulfur dioxide.

eTable 4. Crude ORs for Impaired Lung Function and 4-Year Mean Ambient Air Pollutant Concentrations Stratified by Breastfed Status

Pollutant	Non-breastfed	Breastfed	Interaction
	OR (95% CI) ^a	OR (95% CI) ^a	P Value
FVC < 85% of predicted value			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , µg/m ³	3.04 (2.21-4.16)	1.25 (1.00-1.55)	<0.001
PM _{2.5} , µg/m ³	2.73 (2.09-3.57)	1.29 (1.06-1.56)	<0.001
PM ₁₀ , µg/m ³	2.23 (1.78-2.80)	1.48 (1.25-1.77)	0.004
NO ₂ , µg/m ³	2.11 (1.65-2.70)	1.68 (1.38-2.06)	0.142
Air Pollutants measured by local air monitoring station			
PM ₁₀ , µg/m ³	2.15 (1.69-2.75)	1.31 (1.09-1.56)	0.001
SO ₂ , µg/m ³	1.55 (1.13-2.12)	1.18 (0.92-1.53)	0.120
NO ₂ , µg/m ³	1.30 (1.01-1.66)	1.08 (0.88-1.34)	0.178
O ₃ , µg/m ³	1.08 (1.03-1.13)	1.03 (0.99-1.08)	0.099
FEV1 < 85% of predicted value			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , µg/m ³	3.19 (2.23-4.57)	1.47 (1.14-1.91)	0.001
PM _{2.5} , µg/m ³	3.21 (2.37-4.36)	1.51 (1.21-1.88)	<0.001
PM ₁₀ , µg/m ³	2.77 (2.15-3.58)	1.73 (1.42-2.11)	0.003
NO ₂ , µg/m ³	2.81 (2.12-3.72)	2.08 (1.65-2.61)	0.085
Air Pollutants measured by local air monitoring station			
PM ₁₀ , µg/m ³	2.08 (1.52-2.83)	1.59 (1.23-2.06)	0.183
SO ₂ , µg/m ³	1.50 (1.08-2.10)	1.25 (0.86-1.81)	0.375
NO ₂ , µg/m ³	1.27 (0.94-1.72)	1.23 (0.94-1.61)	0.841
O ₃ , µg/m ³	1.07 (1.00-1.14)	1.03 (0.96-1.09)	0.254
PEF < 75% of predicted value			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , µg/m ³	1.64 (1.17-2.30)	1.26 (0.97-1.64)	0.204
PM _{2.5} , µg/m ³	1.48 (1.12-1.96)	1.21 (0.96-1.52)	0.246
PM ₁₀ , µg/m ³	1.37 (1.08-1.75)	1.21 (0.98-1.50)	0.404
NO ₂ , µg/m ³	1.42 (1.09-1.86)	1.32 (1.05-1.67)	0.669
Air Pollutants measured by local air monitoring station			
PM ₁₀ , µg/m ³	1.82 (1.33-2.49)	1.67 (1.29-2.17)	0.598
SO ₂ , µg/m ³	1.47 (1.05-2.06)	1.24 (0.84-1.85)	0.369
NO ₂ , µg/m ³	1.64 (1.20-2.23)	1.27 (0.98-1.65)	0.082
O ₃ , µg/m ³	1.06 (1.00-1.13)	1.05 (0.98-1.11)	0.551
MMEF < 75% of predicted value			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , µg/m ³	1.50 (1.09-2.04)	1.23 (0.98-1.55)	0.314
PM _{2.5} , µg/m ³	1.41 (1.09-1.83)	1.24 (1.02-1.51)	0.427
PM ₁₀ , µg/m ³	1.36 (1.09-1.70)	1.30 (1.08-1.55)	0.729
NO ₂ , µg/m ³	1.36 (1.06-1.74)	1.39 (1.13-1.70)	0.896
Air Pollutants measured by local air monitoring station			
PM ₁₀ , µg/m ³	1.75 (1.30-2.35)	1.67 (1.31-2.13)	0.782
SO ₂ , µg/m ³	1.71 (1.28-2.28)	1.19 (0.84-1.68)	0.029
NO ₂ , µg/m ³	1.44 (1.09-1.90)	1.31 (1.04-1.66)	0.482
O ₃ , µg/m ³	1.05 (0.98-1.11)	1.04 (0.99-1.10)	0.934

Abbreviations: CI, confidence interval; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; MMEF, maximum mid expiratory flow rate; O₃, ozone; OR, odds ratio; NO₂, nitrogen dioxide; PEF, peak expiratory flow rate; PM₁, airborne particulates with aerodynamic diameter ≤1 μm; PM_{2.5}, ≤2.5 μm, PM₁₀, ≤10 μm; SO₂, sulfur dioxide.

^aEffect expressed for a 1 interquartile range (i.e., 75th %tile - 25th %tile) change in ambient concentration for each pollutant (when air pollutants were estimated using a spatial statistical model: 13.1 μg/m³ for PM₁, 10.0 μg/m³ for PM_{2.5}, 13.8 μg/m³ for PM₁₀, and 7.3 μg/m³ for NO₂; when air pollutants were measured by local air monitoring stations: 30.6 μg/m³ for PM₁₀, 23.4 μg/m³ for SO₂, 13.0 μg/m³ for NO₂, and 46.3 μg/m³ for O₃).

eTable 5. Crude Estimated Absolute Change in Lung Function Test Measurements Associated With 4-Year Mean Ambient Air Pollutant Concentrations Stratified by Breastfed Status

Pollutant	Non-breastfed	Breastfed	Interaction
	β (95% CI) ^a	β (95% CI) ^a	<i>P</i> Value
FVC (mL)			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , $\mu\text{g}/\text{m}^3$	-198.47 (-261.51, -135.43)	-30.27 (-70.43, 9.90)	<0.001
PM _{2.5} , $\mu\text{g}/\text{m}^3$	-167.70 (-222.36, -113.04)	-35.03 (-69.87, -0.18)	0.003
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-141.14 (-190.55, -91.72)	-57.68 (-90.31, -25.05)	0.156
NO ₂ , $\mu\text{g}/\text{m}^3$	-140.43 (-194.85, -86.01)	-101.01 (-137.87, -64.16)	0.716
Air Pollutants measured by local air monitoring station			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-106.35 (-213.54, 0.84)	-44.29 (-123.37, 34.79)	<0.001
SO ₂ , $\mu\text{g}/\text{m}^3$	-42.97 (-159.78, 73.85)	-5.74 (-87.67, 76.18)	0.070
NO ₂ , $\mu\text{g}/\text{m}^3$	-38.58 (-131.55, 54.40)	-2.19 (-68.20, 63.82)	0.033
O ₃ , $\mu\text{g}/\text{m}^3$	-23.09 (-42.88, -3.30)	-8.00 (-23.24, 7.23)	0.001
FEV₁ (mL)			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , $\mu\text{g}/\text{m}^3$	-160.49 (-216.50, -104.48)	-20.91 (-56.29, 14.47)	<0.001
PM _{2.5} , $\mu\text{g}/\text{m}^3$	-136.05 (-184.54, -87.57)	-26.39 (-57.08, 4.31)	0.002
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-114.16 (-157.93, -70.39)	-44.96 (-73.72, -16.19)	0.066
NO ₂ , $\mu\text{g}/\text{m}^3$	-113.96 (-162.19, -65.72)	-82.77 (-115.26, -50.29)	0.945
Air Pollutants measured by local air monitoring station			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-97.78 (-186.61, -8.95)	-73.69 (-142.12, -5.27)	0.003
SO ₂ , $\mu\text{g}/\text{m}^3$	-55.68 (-127.60, 16.23)	-33.52 (-132.00, 64.97)	0.904
NO ₂ , $\mu\text{g}/\text{m}^3$	-25.56 (-104.16, 53.04)	-25.87 (-85.66, 33.93)	0.257
O ₃ , $\mu\text{g}/\text{m}^3$	-17.92 (-34.84, -0.99)	-8.60 (-22.48, 5.29)	0.002
PEF (mL/s)			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , $\mu\text{g}/\text{m}^3$	-260.88 (-384.86, -136.91)	-45.56 (-123.47, 32.36)	0.008
PM _{2.5} , $\mu\text{g}/\text{m}^3$	-190.75 (-297.89, -83.62)	-54.97 (-122.49, 12.55)	0.036
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-139.64 (-235.89, -43.39)	-76.63 (-139.71, -13.55)	0.169
NO ₂ , $\mu\text{g}/\text{m}^3$	-132.98 (-238.79, -27.17)	-104.26 (-175.38, -33.14)	0.460
Air Pollutants measured by local air monitoring station			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-234.11 (-410.48, -57.73)	-228.41 (-342.41, -114.41)	0.202
SO ₂ , $\mu\text{g}/\text{m}^3$	-142.49 (-339.85, 54.87)	-115.75 (-254.71, 23.21)	0.351
NO ₂ , $\mu\text{g}/\text{m}^3$	-90.63 (-249.92, 68.65)	-60.83 (-176.16, 54.49)	0.253
O ₃ , $\mu\text{g}/\text{m}^3$	-32.07 (-67.69, 3.55)	-25.23 (-50.90, 0.43)	0.283
MMEF (mL/s)			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , $\mu\text{g}/\text{m}^3$	-73.29 (-161.66, 15.08)	-4.94 (-61.39, 51.50)	0.196
PM _{2.5} , $\mu\text{g}/\text{m}^3$	-45.42 (-121.61, 30.76)	-17.05 (-66.01, 31.92)	0.327
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-27.22 (-95.50, 41.05)	-32.81 (-78.64, 13.03)	0.561
NO ₂ , $\mu\text{g}/\text{m}^3$	-15.37 (-90.19, 59.45)	-51.84 (-103.51, -0.17)	0.947
Air Pollutants measured by local air monitoring station			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-223.40 (-324.95, -121.86)	-200.07 (-280.93, -119.22)	0.303
SO ₂ , $\mu\text{g}/\text{m}^3$	-177.86 (-269.14, -86.57)	-164.52 (-289.00, -40.03)	0.914
NO ₂ , $\mu\text{g}/\text{m}^3$	-101.62 (-206.32, 3.08)	-72.70 (-162.83, 17.43)	0.192

O ₃ , µg/m ³	-28.45 (-51.53, -5.37)	-24.19 (-44.16, -4.23)	0.426
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Abbreviations: CI, confidence interval; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; MMEF, maximum mid expiratory flow rate; O₃, ozone; NO₂, nitrogen dioxide; PEF, peak expiratory flow rate; PM₁, airborne particulates with aerodynamic diameter ≤1 µm; PM_{2.5}, ≤2.5 µm, PM₁₀, ≤10 µm; SO₂, sulfur dioxide.

^aEffect expressed for a 1 interquartile range (i.e., 75th %tile - 25th %tile) change in ambient concentration for each pollutant (when air pollutants were estimated using a spatial statistical model: 13.1 µg/m³ for PM₁, 10.0 µg/m³ for PM_{2.5}, 13.8 µg/m³ for PM₁₀, and 7.3 µg/m³ for NO₂; when air pollutants were measured by local air monitoring stations: 30.6 µg/m³ for PM₁₀, 23.4 µg/m³ for SO₂, 13.0 µg/m³ for NO₂, and 46.3 µg/m³ for O₃).

eTable 6. Adjusted Odds Ratios (AORs) for Impaired Lung Function and 4-Year Mean Ambient Air Pollutant Concentrations Measured by Local Air Monitoring Stations Stratified by Breastfed Status

Pollutant	Non-breastfed	Breastfed	Interaction
	AOR (95% CI) ^{ab}	AOR (95% CI) ^{ab}	P-Value
FVC < 85% of predicted value			
PM ₁₀ , µg/m ³	2.17 (1.69-2.79)	1.32 (1.09-1.60)	<0.001
SO ₂ , µg/m ³	1.59 (1.17-2.17)	1.24 (0.97-1.60)	0.096
NO ₂ , µg/m ³	1.33 (1.04-1.71)	1.07 (0.87-1.31)	0.050
O ₃ , µg/m ³	1.09 (1.03-1.14)	1.03 (0.98-1.07)	0.007
FEV ₁ < 85% of predicted value			
PM ₁₀ , µg/m ³	2.25 (1.65-3.07)	1.59 (1.23-2.05)	0.022
SO ₂ , µg/m ³	1.56 (1.14-2.15)	1.34 (0.92-1.95)	0.355
NO ₂ , µg/m ³	1.32 (0.97-1.80)	1.19 (0.91-1.55)	0.385
O ₃ , µg/m ³	1.08 (1.01-1.15)	1.01 (0.95-1.08)	0.013
PEF < 75% of predicted value			
PM ₁₀ , µg/m ³	1.80 (1.30-2.47)	1.69 (1.30-2.20)	0.705
SO ₂ , µg/m ³	1.51 (1.08-2.13)	1.25 (0.84-1.87)	0.314
NO ₂ , µg/m ³	1.63 (1.19-2.23)	1.26 (0.97-1.64)	0.079
O ₃ , µg/m ³	1.07 (1.00-1.14)	1.04 (0.98-1.11)	0.421
MMEF < 75% of predicted value			
PM ₁₀ , µg/m ³	1.74 (1.29-2.35)	1.68 (1.32-2.16)	0.824
SO ₂ , µg/m ³	1.73 (1.28-2.33)	1.17 (0.82-1.67)	0.021
NO ₂ , µg/m ³	1.44 (1.09-1.92)	1.30 (1.02-1.65)	0.406
O ₃ , µg/m ³	1.05 (0.98-1.12)	1.04 (0.98-1.10)	0.642

Abbreviations: CI, confidence interval; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; MMEF, maximum mid expiratory flow rate; O₃, ozone; NO₂, nitrogen dioxide; PEF, peak expiratory flow rate; PM₁₀, airborne particulates with aerodynamic diameter <10 µm; SO₂, sulfur dioxide.

^aAdjusted for age, sex, height, birth weight, preterm birth, parental education, family income per year, exercise per week, passive smoke exposure, home coal use, house pet, home renovation in the past 2 years, area of residence per person, doctor-diagnosed asthma, family history of atopy, and short-term air pollution concentrations.

^bEffect expressed for a 1 interquartile range (i.e., 75th %tile - 25th %tile) change in ambient concentration for each pollutant (30.6 µg/m³ for PM₁₀, 23.4 µg/m³ for SO₂, 13.0 µg/m³ for NO₂, and 46.3 µg/m³ for O₃).

eTable 7. Estimated Absolute Change in Lung Function Test Measurements Associated With 4-Year Mean Ambient Air Pollutant Concentrations Measured by Local Air Monitoring Station Stratified by Breastfed Status

Pollutant	Non-breastfed	Breastfed	Interaction
	β (95% CI) ^{ab}	β (95% CI) ^{ab}	<i>P</i> -Value
FVC (mL)			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-90.53 (-141.17, -39.88)	-19.15 (-57.02, 18.73)	<0.001
SO ₂ , $\mu\text{g}/\text{m}^3$	-41.87 (-104.28, 20.54)	-4.18 (-43.24, 34.89)	0.064
NO ₂ , $\mu\text{g}/\text{m}^3$	-25.51 (-75.17, 24.16)	4.21 (-26.76, 35.18)	0.072
O ₃ , $\mu\text{g}/\text{m}^3$	-14.44 (-24.23, -4.64)	-0.51 (-7.74, 6.73)	<0.001
FEV₁ (mL)			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-77.50 (-116.16, -38.84)	-48.20 (-96.13, -0.27)	0.001
SO ₂ , $\mu\text{g}/\text{m}^3$	-48.18 (-96.46, 0.11)	-31.04 (-80.61, 18.53)	0.854
NO ₂ , $\mu\text{g}/\text{m}^3$	-10.86 (-50.57, 28.85)	-18.03 (-59.38, 23.32)	0.658
O ₃ , $\mu\text{g}/\text{m}^3$	-9.59 (-17.73, -1.44)	-0.01 (-9.91, 9.88)	<0.001
PEF (mL/s)			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-203.83 (-310.55, -97.12)	-195.24 (-269.21, -121.27)	0.307
SO ₂ , $\mu\text{g}/\text{m}^3$	-138.63 (-269.56, -7.71)	-120.31 (-220.16, -20.45)	0.480
NO ₂ , $\mu\text{g}/\text{m}^3$	-72.39 (-179.16, 34.38)	-51.17 (-137.97, 35.63)	0.552
O ₃ , $\mu\text{g}/\text{m}^3$	-18.53 (-42.77, 5.72)	-13.40 (-33.66, 6.86)	0.216
MMEF (mL/s)			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-179.59 (-274.03, -85.14)	-167.59 (-253.60, -81.59)	0.370
SO ₂ , $\mu\text{g}/\text{m}^3$	-159.29 (-249.46, -69.13)	-142.09 (-251.48, -32.71)	0.803
NO ₂ , $\mu\text{g}/\text{m}^3$	-82.92 (-174.32, 8.48)	-64.66 (-150.60, 21.27)	0.411
O ₃ , $\mu\text{g}/\text{m}^3$	-18.39 (-39.72, 2.93)	-15.50 (-35.78, 4.79)	0.422

Abbreviations: CI, confidence interval; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; MMEF, maximum mid expiratory flow rate; O₃, ozone; NO₂, nitrogen dioxide; PEF, peak expiratory flow rate; PM₁₀, airborne particulates with aerodynamic diameter $\leq 10 \mu\text{m}$; SO₂, sulfur dioxide.

^aAdjusted for age, sex, height, birth weight, preterm birth, parental education, family income per year, exercise per week, passive smoke exposure, home coal use, house pet, home renovation in the past 2 years, area of residence per person, doctor-diagnosed asthma, family history of atopy, and short-term air pollution concentrations.

^bEffect expressed for a 1 interquartile range (i.e., 75th %tile - 25th %tile) change in ambient concentration for each pollutant (30.6 $\mu\text{g}/\text{m}^3$ for PM₁₀, 23.4 $\mu\text{g}/\text{m}^3$ for SO₂, 13.0 $\mu\text{g}/\text{m}^3$ for NO₂, and 46.3 $\mu\text{g}/\text{m}^3$ for O₃).

eTable 8. Adjusted Odds Ratios (AORs) for Decreased Lung Function and 4-Year Mean Ambient Air Pollutant Concentrations Stratified by Breastfed Status and Excluding Children With Mixed Feeding

Pollutant	Non-breastfed	Breastfed	Interaction
	AOR (95% CI) ^{ab}	AOR (95% CI) ^{ab}	P-Value
FVC < 85% of predicted value			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , µg/m ³	2.76 (2.06-3.70)	1.20 (0.97-1.50)	<0.001
PM _{2.5} , µg/m ³	2.32 (1.82-2.94)	1.26 (1.04-1.53)	<0.001
PM ₁₀ , µg/m ³	1.97 (1.61-2.42)	1.47 (1.23-1.75)	0.018
NO ₂ , µg/m ³	1.91 (1.51-2.40)	1.69 (1.38-2.06)	0.380
Air Pollutants measured by local air monitoring station			
PM ₁₀ , µg/m ³	2.16 (1.69-2.76)	1.30 (1.07-1.57)	<0.001
SO ₂ , µg/m ³	1.59 (1.18-2.16)	1.22 (0.96-1.57)	0.080
NO ₂ , µg/m ³	1.33 (1.04-1.69)	1.06 (0.87-1.30)	0.049
O ₃ , µg/m ³	1.08 (1.03-1.14)	1.02 (0.98-1.07)	0.006
FEV1 < 85% of predicted value			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , µg/m ³	2.85 (2.05-3.97)	1.49 (1.15-1.93)	0.001
PM _{2.5} , µg/m ³	2.71 (2.06-3.57)	1.58 (1.27-1.98)	0.001
PM ₁₀ , µg/m ³	2.49 (1.97-3.15)	1.85 (1.51-2.26)	0.033
NO ₂ , µg/m ³	2.66 (2.04-3.46)	2.24 (1.78-2.82)	0.285
Air Pollutants measured by local air monitoring station			
PM ₁₀ , µg/m ³	2.22 (1.63-3.01)	1.56 (1.21-2.02)	0.022
SO ₂ , µg/m ³	1.54 (1.12-2.12)	1.32 (0.91-1.91)	0.340
NO ₂ , µg/m ³	1.31 (0.97-1.77)	1.17 (0.89-1.52)	0.362
O ₃ , µg/m ³	1.08 (1.01-1.15)	1.01 (0.95-1.08)	0.012
PEF < 75% of predicted value			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , µg/m ³	1.76 (1.25-2.47)	1.30 (0.99-1.72)	0.156
PM _{2.5} , µg/m ³	1.57 (1.18-2.09)	1.23 (0.97-1.57)	0.172
PM ₁₀ , µg/m ³	1.43 (1.12-1.84)	1.24 (0.99-1.54)	0.330
NO ₂ , µg/m ³	1.48 (1.12-1.95)	1.35 (1.06-1.72)	0.593
Air Pollutants measured by local air monitoring station			
PM ₁₀ , µg/m ³	1.78 (1.29-2.46)	1.70 (1.29-2.23)	0.761
SO ₂ , µg/m ³	1.49 (1.05-2.11)	1.24 (0.82-1.86)	0.360
NO ₂ , µg/m ³	1.62 (1.18-2.23)	1.23 (0.93-1.61)	0.056
O ₃ , µg/m ³	1.06 (0.99-1.14)	1.04 (0.98-1.11)	0.403
MMEF < 75% of predicted value			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , µg/m ³	1.43 (1.05-1.93)	1.22 (0.97-1.55)	0.412
PM _{2.5} , µg/m ³	1.36 (1.06-1.75)	1.22 (1.00-1.49)	0.482
PM ₁₀ , µg/m ³	1.33 (1.07-1.66)	1.27 (1.06-1.53)	0.732
NO ₂ , µg/m ³	1.35 (1.05-1.73)	1.37 (1.11-1.70)	0.895
Air Pollutants measured by local air monitoring station			
PM ₁₀ , µg/m ³	1.70 (1.27-2.28)	1.69 (1.33-2.15)	0.969
SO ₂ , µg/m ³	1.71 (1.27-2.30)	1.16 (0.81-1.65)	0.023
NO ₂ , µg/m ³	1.42 (1.07-1.88)	1.29 (1.01-1.63)	0.430

O ₃ , µg/m ³	1.05 (0.98-1.11)	1.03 (0.97-1.09)	0.566
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Abbreviations: CI, confidence interval; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; MMEF, maximum mid expiratory flow rate; O₃, ozone; NO₂, nitrogen dioxides; PEF, peak expiratory flow rate; PM₁, airborne particulates with aerodynamic diameter <1 µm; PM_{2.5}, ≤2.5 µm, PM₁₀, ≤10 µm; SO₂, sulfur dioxide.

^aAdjusted for age, sex, height, birth weight, preterm birth, parental education, family income per year, exercise per week, passive smoke exposure, home coal use, house pet, home renovation in the past 2 years, area of residence per person, doctor-diagnosed asthma, family history of atopy, and short-term air pollution concentrations.

^bEffect expressed for a 1 interquartile range (i.e., 75th %tile - 25th %tile) change in ambient concentration for each pollutant (air pollutants were estimated using a spatial statistical model: 13.1 µg/m³ for PM₁, 10.0 µg/m³ for PM_{2.5}, 13.8 µg/m³ for PM₁₀, 7.3 µg/m³ for NO₂; air pollutants were measured by local air monitoring stations: 30.6 µg/m³ for PM₁₀, 23.4 µg/m³ for SO₂, 13.0 µg/m³ for NO₂, and 46.3 µg/m³ for O₃).

eTable 9. Estimated Absolute Change in Lung Function Test Measurements Associated With 4-Year Mean Ambient Air Pollutant Concentrations Stratified by Breastfed Status and Excluding Children With Mixed Feeding

Pollutant	Non-breastfed	Breastfed	Interaction
	β (95%CI) ^{ab}	β (95%CI) ^{ab}	<i>P</i> -Value
FVC (mL)			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , $\mu\text{g}/\text{m}^3$	-240.46 (-288.71, -192.21)	-39.68 (-71.74, -7.61)	<0.001
PM _{2.5} , $\mu\text{g}/\text{m}^3$	-217.97 (-259.95, -175.99)	-44.04 (-71.76, -16.32)	<0.001
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-185.99 (-224.08, -147.89)	-58.21 (-83.98, -32.44)	0.004
NO ₂ , $\mu\text{g}/\text{m}^3$	-179.26 (-221.32, -137.20)	-90.89 (-119.97, -61.82)	0.439
Air Pollutants measured by local air monitoring station			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-90.53 (-141.17, -39.88)	-13.24 (-51.04, 24.57)	<0.001
SO ₂ , $\mu\text{g}/\text{m}^3$	-41.87 (-104.28, 20.54)	-3.27 (-42.15, 35.61)	0.059
NO ₂ , $\mu\text{g}/\text{m}^3$	-25.51 (-75.17, 24.16)	4.54 (-26.19, 35.28)	0.086
O ₃ , $\mu\text{g}/\text{m}^3$	-14.44 (-24.23, -4.64)	-0.19 (-7.35, 6.97)	<0.001
FEV₁ (mL)			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , $\mu\text{g}/\text{m}^3$	-201.37 (-242.08, -160.65)	-31.63 (-59.86, -3.40)	<0.001
PM _{2.5} , $\mu\text{g}/\text{m}^3$	-181.68 (-217.06, -146.30)	-35.15 (-59.70, -10.61)	<0.001
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-154.14 (-186.37, -121.90)	-49.14 (-72.09, -26.18)	<0.001
NO ₂ , $\mu\text{g}/\text{m}^3$	-150.26 (-186.14, -114.39)	-80.50 (-106.25, -54.75)	0.176
Air Pollutants measured by local air monitoring station			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-77.50 (-116.16, -38.84)	-42.69 (-89.69, 4.31)	0.001
SO ₂ , $\mu\text{g}/\text{m}^3$	-48.18 (-96.46, 0.11)	-27.96 (-77.35, 15.41)	0.751
NO ₂ , $\mu\text{g}/\text{m}^3$	-10.86 (-50.57, 28.85)	-17.31 (-57.25, 22.63)	0.713
O ₃ , $\mu\text{g}/\text{m}^3$	-9.59 (-17.73, -1.44)	0.43 (-9.09, 9.95)	<0.001
PEF (mL/s)			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , $\mu\text{g}/\text{m}^3$	-333.29 (-438.21, -228.37)	-52.83 (-122.16, 16.49)	<0.001
PM _{2.5} , $\mu\text{g}/\text{m}^3$	-273.82 (-363.94, -183.69)	-59.41 (-119.58, 0.76)	<0.001
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-214.86 (-295.23, -134.48)	-70.50 (-126.52, -14.49)	0.006
NO ₂ , $\mu\text{g}/\text{m}^3$	-206.06 (-294.94, -117.18)	-85.77 (-148.60, -22.95)	0.044
Air Pollutants measured by local air monitoring station			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-203.83 (-310.55, -97.12)	-190.55 (-264.10, -117.01)	0.280
SO ₂ , $\mu\text{g}/\text{m}^3$	-138.63 (-269.56, -7.71)	-107.49 (-207.32, -7.67)	0.337
NO ₂ , $\mu\text{g}/\text{m}^3$	-72.39 (-179.16, 34.38)	-47.93 (-133.21, 37.34)	0.546
O ₃ , $\mu\text{g}/\text{m}^3$	-18.53 (-42.77, 5.72)	-12.29 (-32.14, 7.56)	0.207
MMEF (mL/s)			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , $\mu\text{g}/\text{m}^3$	-127.42 (-208.01, -46.84)	-5.89 (-59.51, 47.72)	0.022
PM _{2.5} , $\mu\text{g}/\text{m}^3$	-101.86 (-171.22, -32.49)	-17.26 (-63.94, 29.43)	0.045
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-77.17 (-139.14, -15.19)	-30.91 (-74.66, 12.83)	0.161
NO ₂ , $\mu\text{g}/\text{m}^3$	-66.16 (-134.19, 1.87)	-45.35 (-94.42, 3.71)	0.542
Air Pollutants measured by local air monitoring station			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-179.59 (-274.03, -85.14)	-165.04 (-246.81, -83.27)	0.383
SO ₂ , $\mu\text{g}/\text{m}^3$	-159.29 (-249.46, -69.13)	-138.92 (-235.83, -41.60)	0.702
NO ₂ , $\mu\text{g}/\text{m}^3$	-82.92 (-174.32, 8.48)	-60.90 (-144.00, 22.20)	0.397
O ₃ , $\mu\text{g}/\text{m}^3$	-18.39 (-39.72, 2.93)	-14.00 (-33.64, 5.64)	0.371

Abbreviations: CI, confidence interval; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; MMEF, maximum mid expiratory flow rate; O₃, ozone; NO₂, nitrogen dioxides; PEF, peak expiratory flow rate; PM₁, airborne particulates with aerodynamic diameter ≤1 μm; PM_{2.5}, ≤2.5 μm, PM₁₀, ≤10 μm; SO₂, sulfur dioxide.

^aAdjusted for age, sex, height, birth weight, preterm birth, parental education, family income per year, exercise per week, passive smoke exposure, home coal use, house pet, home renovation in the past 2 years, area of residence per person, doctor-diagnosed asthma, family history of atopy, and short-term air pollution concentrations.

^bEffect expressed for a 1 interquartile range (i.e., 75th %tile - 25th %tile) change in ambient concentration for each pollutant (air pollutants were estimated using a spatial statistical model: 13.1 μg/m³ for PM₁, 10.0 μg/m³ for PM_{2.5}, 13.8 μg/m³ for PM₁₀, 7.3 μg/m³ for NO₂; air pollutants were measured by local air monitoring stations: 30.6 μg/m³ for PM₁₀, 23.4 μg/m³ for SO₂, 13.0 μg/m³ for NO₂, and 46.3 μg/m³ for O₃).

eTable 10. Adjusted Odds Ratios (AORs) for Impaired Lung Function and 4-Year Mean Ambient Air Pollutant Concentrations Stratified by Breastfed Status and Excluding Children With Low Birth Weight or Preterm Birth

Pollutant	Non-breastfed	Breastfed	Interaction
	OR (95% CI) ^{ab}	OR (95% CI) ^{ab}	P-Value
FVC < 85% of predicted value			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , µg/m ³	2.59 (1.90-3.53)	1.19 (0.95-1.47)	<0.001
PM _{2.5} , µg/m ³	2.22 (1.73-2.86)	1.26 (1.04-1.52)	<0.001
PM ₁₀ , µg/m ³	1.94 (1.57-2.40)	1.47 (1.24-1.76)	0.032
NO ₂ , µg/m ³	1.91 (1.50-2.44)	1.70 (1.39-2.07)	0.406
Air Pollutants measured by local air monitoring station			
PM ₁₀ , µg/m ³	2.15 (1.65-2.80)	1.34 (1.10-1.63)	0.001
SO ₂ , µg/m ³	1.56 (1.12-2.16)	1.21 (0.93-1.57)	0.109
NO ₂ , µg/m ³	1.46 (1.13-1.89)	1.10 (0.90-1.35)	0.020
O ₃ , µg/m ³	1.09 (1.04-1.15)	1.03 (0.98-1.08)	0.004
FEV1 < 85% of predicted value			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , µg/m ³	2.74 (1.93-3.87)	1.44 (1.11-1.85)	0.002
PM _{2.5} , µg/m ³	2.66 (2.00-3.55)	1.55 (1.24-1.93)	0.002
PM ₁₀ , µg/m ³	2.48 (1.94-3.17)	1.83 (1.49-2.23)	0.034
NO ₂ , µg/m ³	2.67 (2.02-3.52)	2.19 (1.74-2.75)	0.225
Air Pollutants measured by local air monitoring station			
PM ₁₀ , µg/m ³	2.22 (1.61-3.06)	1.62 (1.25-2.11)	0.047
SO ₂ , µg/m ³	1.56 (1.12-2.15)	1.37 (0.93-2.01)	0.464
NO ₂ , µg/m ³	1.37 (1.00-1.88)	1.21 (0.92-1.59)	0.345
O ₃ , µg/m ³	1.08 (1.01-1.16)	1.01 (0.95-1.08)	0.009
PEF < 75% of predicted value			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , µg/m ³	1.77 (1.23-2.55)	1.24 (0.94-1.64)	0.106
PM _{2.5} , µg/m ³	1.55 (1.14-2.10)	1.18 (0.93-1.50)	0.138
PM ₁₀ , µg/m ³	1.41 (1.09-1.83)	1.18 (0.95-1.47)	0.260
NO ₂ , µg/m ³	1.46 (1.09-1.95)	1.29 (1.02-1.64)	0.492
Air Pollutants measured by local air monitoring station			
PM ₁₀ , µg/m ³	1.65 (1.18-2.30)	1.68 (1.29-2.21)	0.894
SO ₂ , µg/m ³	1.55 (1.10-2.17)	1.21 (0.80-1.83)	0.220
NO ₂ , µg/m ³	1.60 (1.15-2.22)	1.25 (0.96-1.64)	0.119
O ₃ , µg/m ³	1.06 (0.99-1.14)	1.04 (0.98-1.11)	0.446
MMEF < 75% of predicted value			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , µg/m ³	1.45 (1.05-2.01)	1.23 (0.98-1.56)	0.394
PM _{2.5} , µg/m ³	1.41 (1.08-1.84)	1.25 (1.02-1.52)	0.453
PM ₁₀ , µg/m ³	1.41 (1.11-1.78)	1.31 (1.08-1.57)	0.590
NO ₂ , µg/m ³	1.48 (1.14-1.93)	1.41 (1.14-1.75)	0.758
Air Pollutants measured by local air monitoring station			
PM ₁₀ , µg/m ³	1.61 (1.16-2.23)	1.73 (1.33-2.26)	0.636
SO ₂ , µg/m ³	1.80 (1.32-2.46)	1.09 (0.75-1.60)	0.006

NO ₂ , µg/m ³	1.43 (1.05-1.94)	1.30 (1.01-1.68)	0.490
O ₃ , µg/m ³	1.05 (0.98-1.12)	1.04 (0.97-1.10)	0.588

Abbreviations: CI, confidence interval; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; MMEF, maximum mid expiratory flow rate; O₃, ozone; NO₂, nitrogen dioxides; PEF, peak expiratory flow rate; PM₁, airborne particulates with aerodynamic diameter <1 µm; PM_{2.5}, ≤2.5 µm, PM₁₀, ≤10 µm; SO₂, sulfur dioxide.

^aAdjusted for age, sex, height, birth weight, parental education, family income per year, exercise per week, passive smoke exposure, home coal use, house pet, home renovation in the past 2 years, area of residence per person, doctor-diagnosed asthma, family history of atopy, and short-term air pollution concentrations.

^bEffect expressed for a 1 interquartile range (i.e., 75th %tile - 25th %tile) change in ambient concentration for each pollutant (air pollutants were estimated using a spatial statistical model: 13.1 µg/m³ for PM₁, 10.0 µg/m³ for PM_{2.5}, 13.8 µg/m³ for PM₁₀, 7.3 µg/m³ for NO₂; air pollutants were measured by local air monitoring stations: 30.6 µg/m³ for PM₁₀, 23.4 µg/m³ for SO₂, 13.0 µg/m³ for NO₂, and 46.3 µg/m³ for O₃).

eTable 11. Estimated Absolute Change in Lung Function Test Measurements Associated With 4-Year Mean Ambient Air Pollutant Concentrations Stratified by Breastfed Status and Excluding Children With Low Birth Weight or Preterm Birth

Pollutant	Non-breastfed	Breastfed	Interaction
	β (95%CI) ^{ab}	β (95%CI) ^{ab}	P-Value
FVC (mL)			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , $\mu\text{g}/\text{m}^3$	-237.14 (-288.06, -186.22)	-36.49 (-68.71, -4.27)	<0.001
PM _{2.5} , $\mu\text{g}/\text{m}^3$	-214.38 (-258.57, -170.20)	-40.11 (-67.91, -12.31)	<0.001
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-182.61 (-222.53, -142.69)	-55.31 (-81.12, -29.50)	0.005
NO ₂ , $\mu\text{g}/\text{m}^3$	-174.58 (-218.52, -130.64)	-87.84 (-117.01, -58.68)	0.440
Air Pollutants measured by local air monitoring station			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-91.36 (-143.89, -38.82)	-22.05 (-62.16, 18.07)	<0.001
SO ₂ , $\mu\text{g}/\text{m}^3$	-38.63 (-103.13, 25.87)	-0.40 (-41.88, 41.09)	0.069
NO ₂ , $\mu\text{g}/\text{m}^3$	-34.07 (-84.60, 16.46)	1.74 (-31.22, 34.69)	0.025
O ₃ , $\mu\text{g}/\text{m}^3$	-16.79 (-26.34, -7.24)	-0.97 (-8.64, 6.70)	<0.001
FEV ₁ (mL)			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , $\mu\text{g}/\text{m}^3$	-198.29 (-241.13, -155.44)	-26.22 (-54.51, 2.07)	<0.001
PM _{2.5} , $\mu\text{g}/\text{m}^3$	-179.05 (-216.16, -141.95)	-30.28 (-54.80, -5.76)	<0.001
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-152.24 (-185.93, -118.55)	-45.87 (-68.78, -22.96)	<0.001
NO ₂ , $\mu\text{g}/\text{m}^3$	-148.74 (-186.14, -111.34)	-77.29 (-103.10, -51.48)	0.154
Air Pollutants measured by local air monitoring station			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-78.63 (-119.07, -38.20)	-49.05 (-98.45, 0.35)	0.001
SO ₂ , $\mu\text{g}/\text{m}^3$	-45.92 (-96.08, 4.24)	-30.74 (-82.20, 20.71)	0.862
NO ₂ , $\mu\text{g}/\text{m}^3$	-19.13 (-59.95, 21.68)	-18.42 (-60.86, 24.02)	0.305
O ₃ , $\mu\text{g}/\text{m}^3$	-12.31 (-20.16, -4.46)	0.27 (-9.88, 10.41)	<0.001
PEF (mL/s)			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , $\mu\text{g}/\text{m}^3$	-332.96 (-443.30, -222.61)	-55.23 (-124.61, 14.16)	<0.001
PM _{2.5} , $\mu\text{g}/\text{m}^3$	-270.95 (-365.38, -176.53)	-60.34 (-120.40, -0.27)	0.001
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-211.08 (-294.86, -127.29)	-72.84 (-128.78, -16.89)	0.013
NO ₂ , $\mu\text{g}/\text{m}^3$	-206.51 (-298.96, -114.06)	-85.36 (-148.41, -22.32)	0.050
Air Pollutants measured by local air monitoring station			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-184.87 (-298.68, -71.07)	-204.53 (-283.55, -125.52)	0.618
SO ₂ , $\mu\text{g}/\text{m}^3$	-128.50 (-264.25, 7.24)	-127.25 (-232.71, -21.78)	0.799
NO ₂ , $\mu\text{g}/\text{m}^3$	-92.43 (-199.30, 14.44)	-54.40 (-146.10, 37.30)	0.321
O ₃ , $\mu\text{g}/\text{m}^3$	-22.57 (-46.55, 1.40)	-13.45 (-34.96, 8.07)	0.073
MMEF (mL/s)			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , $\mu\text{g}/\text{m}^3$	-129.49 (-214.66, -44.32)	-7.10 (-60.96, 46.76)	0.037
PM _{2.5} , $\mu\text{g}/\text{m}^3$	-103.48 (-176.54, -30.42)	-17.74 (-64.48, 29.01)	0.065
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-80.24 (-145.23, -15.25)	-31.99 (-75.77, 11.78)	0.168
NO ₂ , $\mu\text{g}/\text{m}^3$	-74.63 (-145.80, -3.45)	-47.22 (-96.58, 2.14)	0.433
Air Pollutants measured by local air monitoring station			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-165.65 (-268.44, -62.87)	-172.24 (-259.86, -84.61)	0.781
SO ₂ , $\mu\text{g}/\text{m}^3$	-161.53 (-253.89, -69.18)	-141.67 (-255.03, -28.31)	0.580
NO ₂ , $\mu\text{g}/\text{m}^3$	-93.44 (-185.89, -0.99)	-64.29 (-152.23, 23.65)	0.275

O ₃ , µg/m ³	-20.33 (-41.82, 1.16)	-15.17 (-35.95, 5.61)	0.246
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Abbreviations: CI, confidence interval; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; MMEF, maximum mid expiratory flow rate; O₃, ozone; NO₂, nitrogen dioxides; PEF, peak expiratory flow rate; PM₁, airborne particulates with aerodynamic diameter ≤1 µm; PM_{2.5}, ≤2.5 µm, PM₁₀, ≤10 µm; SO₂, sulfur dioxide.

^aAdjusted for age, sex, height, birth weight, parental education, family income per year, exercise per week, passive smoke exposure, home coal use, house pet, home renovation in the past 2 years, area of residence per person, doctor-diagnosed asthma, family history of atopy, and short-term air pollution concentrations.

^bEffect expressed for a 1 interquartile range (i.e., 75th %tile - 25th %tile) change in ambient concentration for each pollutant (when air pollutants were estimated using a spatial statistical model: 13.1 µg/m³ for PM₁, 10.0 µg/m³ for PM_{2.5}, 13.8 µg/m³ for PM₁₀, 7.3 µg/m³ for NO₂; when air pollutants were measured by local air monitoring station: 30.6 µg/m³ for PM₁₀, 23.4 µg/m³ for SO₂, 13.0 µg/m³ for NO₂, and 46.3 µg/m³ for O₃).

eTable 12. Adjusted Odds Ratios (AORs) for Impaired Lung Function and 4-Year Mean Ambient Air Pollutant Concentrations Stratified by Breastfed Status and Excluding Children With Asthma Diagnosed by a Physician

Pollutant	Non-breastfed	Breastfed	Interaction
	OR (95% CI) ^{ab}	OR (95% CI) ^{ab}	P-Value
FVC < 85% of predicted value			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , µg/m ³	2.50 (1.84-3.38)	1.25 (1.00-1.56)	<0.001
PM _{2.5} , µg/m ³	2.15 (1.68-2.76)	1.30 (1.08-1.58)	0.001
PM ₁₀ , µg/m ³	1.89 (1.53-2.33)	1.50 (1.26-1.79)	0.073
NO ₂ , µg/m ³	1.83 (1.44-2.32)	1.73 (1.41-2.11)	0.692
Air Pollutants measured by local air monitoring station			
PM ₁₀ , µg/m ³	2.14 (1.64-2.79)	1.31 (1.07-1.60)	0.001
SO ₂ , µg/m ³	1.64 (1.20-2.25)	1.23 (0.96-1.59)	0.067
NO ₂ , µg/m ³	1.37 (1.06-1.77)	1.06 (0.86-1.31)	0.029
O ₃ , µg/m ³	1.09 (1.03-1.14)	1.03 (0.98-1.07)	0.011
FEV1 < 85% of predicted value			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , µg/m ³	2.75 (1.95-3.88)	1.49 (1.15-1.93)	0.003
PM _{2.5} , µg/m ³	2.59 (1.95-3.45)	1.58 (1.27-1.98)	0.004
PM ₁₀ , µg/m ³	2.39 (1.88-3.05)	1.84 (1.50-2.25)	0.068
NO ₂ , µg/m ³	2.53 (1.92-3.34)	2.20 (1.74-2.78)	0.394
Air Pollutants measured by local air monitoring station			
PM ₁₀ , µg/m ³	2.14 (1.55-2.94)	1.58 (1.22-2.05)	0.057
SO ₂ , µg/m ³	1.52 (1.11-2.09)	1.37 (0.94-1.98)	0.536
NO ₂ , µg/m ³	1.33 (0.98-1.81)	1.18 (0.91-1.54)	0.375
O ₃ , µg/m ³	1.07 (1.00-1.15)	1.02 (0.96-1.08)	0.047
PEF < 75% of predicted value			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , µg/m ³	1.82 (1.27-2.59)	1.31 (0.99-1.73)	0.128
PM _{2.5} , µg/m ³	1.63 (1.21-2.19)	1.24 (0.98-1.59)	0.137
PM ₁₀ , µg/m ³	1.51 (1.17-1.95)	1.23 (0.99-1.54)	0.193
NO ₂ , µg/m ³	1.60 (1.20-2.13)	1.34 (1.05-1.72)	0.320
Air Pollutants measured by local air monitoring station			
PM ₁₀ , µg/m ³	1.77 (1.28-2.45)	1.66 (1.28-2.16)	0.690
SO ₂ , µg/m ³	1.48 (1.05-2.08)	1.21 (0.81-1.81)	0.299
NO ₂ , µg/m ³	1.62 (1.18-2.22)	1.24 (0.95-1.61)	0.075
O ₃ , µg/m ³	1.06 (1.00-1.14)	1.04 (0.98-1.11)	0.493
MMEF < 75% of predicted value			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , µg/m ³	1.41 (1.03-1.93)	1.30 (1.03-1.65)	0.672
PM _{2.5} , µg/m ³	1.37 (1.06-1.79)	1.31 (1.06-1.60)	0.756
PM ₁₀ , µg/m ³	1.36 (1.08-1.71)	1.34 (1.11-1.62)	0.923
NO ₂ , µg/m ³	1.41 (1.09-1.83)	1.44 (1.16-1.79)	0.883
Air Pollutants measured by local air monitoring station			
PM ₁₀ , µg/m ³	1.54 (1.13-2.11)	1.63 (1.27-2.10)	0.719
SO ₂ , µg/m ³	1.65 (1.23-2.23)	1.08 (0.76-1.56)	0.017

NO ₂ , µg/m ³	1.40 (1.06-1.86)	1.29 (1.02-1.62)	0.512
O ₃ , µg/m ³	1.05 (0.99-1.12)	1.04 (0.98-1.10)	0.712

Abbreviations: CI, confidence interval; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; MMEF, maximum mid expiratory flow rate; O₃, ozone; NO₂, nitrogen dioxides; PEF, peak expiratory flow rate; PM₁, airborne particulates with aerodynamic diameter <1 µm; PM_{2.5}, ≤2.5 µm, PM₁₀, ≤10 µm; SO₂, sulfur dioxide.

^aAdjusted for age, sex, height, birth weight, preterm birth, parental education, family income per year, exercise per week, passive smoke exposure, home coal use, house pet, home renovation in the past 2 years, area of residence per person, family history of atopy, and short-term air pollution concentrations.

^bEffect expressed for a 1 interquartile range (i.e., 75th %tile - 25th %tile) change in ambient concentration for each pollutant (when air pollutants were estimated using a spatial statistical model: 13.1 µg/m³ for PM₁, 10.0 µg/m³ for PM_{2.5}, 13.8 µg/m³ for PM₁₀, 7.3 µg/m³ for NO₂; when air pollutants were measured by local air monitoring station: 30.6 µg/m³ for PM₁₀, 23.4 µg/m³ for SO₂, 13.0 µg/m³ for NO₂, and 46.3 µg/m³ for O₃).

eTable 13. Estimated Absolute Change in Lung Function Test Measurements Associated With 4-Year Mean Ambient Air Pollutant Concentrations Stratified by Breastfed Status and Excluding Children With Asthma Diagnosed by a Physician

Pollutant	Non-breastfed	Breastfed	Interaction
	β (95%CI) ^{ab}	β (95%CI) ^{ab}	P-Value
FVC (mL)			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , $\mu\text{g}/\text{m}^3$	-232.39 (-281.88, -182.91)	-48.66 (-81.04, -16.28)	<0.001
PM _{2.5} , $\mu\text{g}/\text{m}^3$	-207.15 (-250.22, -164.09)	-50.26 (-78.25, -22.27)	<0.001
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-174.36 (-213.40, -135.31)	-62.50 (-88.54, -36.46)	0.013
NO ₂ , $\mu\text{g}/\text{m}^3$	-165.10 (-208.11, -122.09)	-93.80 (-123.15, -64.45)	0.590
Air Pollutants measured by local air monitoring station			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-87.20 (-139.81, -34.59)	-21.32 (-60.45, 17.80)	<0.001
SO ₂ , $\mu\text{g}/\text{m}^3$	-39.26 (-103.04, 24.52)	-7.14 (-47.43, 33.16)	0.120
NO ₂ , $\mu\text{g}/\text{m}^3$	-29.84 (-80.02, 20.34)	4.29 (-27.68, 36.25)	0.045
O ₃ , $\mu\text{g}/\text{m}^3$	-14.82 (-24.76, -4.88)	-0.98 (-8.45, 6.49)	<0.001
FEV₁ (mL)			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , $\mu\text{g}/\text{m}^3$	-193.84 (-235.44, -152.24)	-39.72 (-68.26, -11.18)	<0.001
PM _{2.5} , $\mu\text{g}/\text{m}^3$	-172.75 (-208.90, -136.60)	-41.35 (-66.14, -16.56)	<0.001
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-144.39 (-177.33, -111.46)	-53.76 (-76.94, -30.58)	0.002
NO ₂ , $\mu\text{g}/\text{m}^3$	-137.67 (-174.23, -101.12)	-83.69 (-109.71, -57.66)	0.299
Air Pollutants measured by local air monitoring station			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-72.49 (-112.57, -32.41)	-47.70 (-96.51, 1.11)	0.003
SO ₂ , $\mu\text{g}/\text{m}^3$	-48.76 (-97.71, 0.19)	-27.52 (-77.34, 22.30)	0.744
NO ₂ , $\mu\text{g}/\text{m}^3$	-14.70 (-54.00, 24.60)	-16.27 (-58.25, 25.72)	0.450
O ₃ , $\mu\text{g}/\text{m}^3$	-9.80 (-17.89, -1.71)	-0.39 (-10.40, 9.62)	<0.001
PEF (mL/s)			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , $\mu\text{g}/\text{m}^3$	-334.21 (-442.95, -225.46)	-73.08 (-143.07, -3.09)	0.001
PM _{2.5} , $\mu\text{g}/\text{m}^3$	-267.83 (-361.17, -174.49)	-78.53 (-139.22, -17.84)	0.005
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-203.92 (-287.01, -120.83)	-85.97 (-142.50, -29.43)	0.039
NO ₂ , $\mu\text{g}/\text{m}^3$	-191.41 (-283.09, -99.73)	-96.51 (-160.02, -33.00)	0.121
Air Pollutants measured by local air monitoring station			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-209.52 (-312.20, -106.84)	-195.79 (-273.32, -118.25)	0.249
SO ₂ , $\mu\text{g}/\text{m}^3$	-140.96 (-268.71, -13.20)	-119.31 (-222.84, -15.78)	0.387
NO ₂ , $\mu\text{g}/\text{m}^3$	-93.13 (-194.70, 8.45)	-47.70 (-137.63, 42.24)	0.245
O ₃ , $\mu\text{g}/\text{m}^3$	-21.01 (-44.29, 2.27)	-14.55 (-35.28, 6.18)	0.153
MMEF (mL/s)			
Air Pollutants estimated using a spatial statistical model			
PM ₁ , $\mu\text{g}/\text{m}^3$	-118.73 (-201.84, -35.62)	-28.12 (-82.18, 25.93)	0.112
PM _{2.5} , $\mu\text{g}/\text{m}^3$	-93.54 (-164.97, -22.11)	-36.19 (-83.22, 10.83)	0.199
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-68.09 (-131.76, -4.42)	-45.69 (-89.73, -1.65)	0.442
NO ₂ , $\mu\text{g}/\text{m}^3$	-54.75 (-124.57, 15.08)	-57.88 (-107.35, -8.41)	0.878
Air Pollutants measured by local air monitoring station			
PM ₁₀ , $\mu\text{g}/\text{m}^3$	-164.00 (-257.22, -70.78)	-163.92 (-252.60, -75.25)	0.527
SO ₂ , $\mu\text{g}/\text{m}^3$	-153.34 (-247.04, -59.65)	-128.61 (-234.59, -22.62)	0.760
NO ₂ , $\mu\text{g}/\text{m}^3$	-85.94 (-171.44, -0.44)	-58.97 (-146.65, 28.70)	0.287

O ₃ , µg/m ³	-18.74 (-38.70, 1.23)	-16.01 (-36.48, 4.46)	0.433
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Abbreviations: CI, confidence interval; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; MMEF, maximum mid expiratory flow rate; O₃, ozone; NO₂, nitrogen dioxides; PEF, peak expiratory flow rate; PM₁, airborne particulates with aerodynamic diameter ≤1 µm; PM_{2.5}, ≤2.5 µm, PM₁₀, ≤10 µm; SO₂, sulfur dioxide.

^aAdjusted for age, sex, height, birth weight, preterm birth, parental education, family income per year, exercise per week, passive smoke exposure, home coal use, house pet, home renovation in the past 2 years, area of residence per person, family history of atopy, and short-term air pollution concentrations.

^bEffect expressed for a 1 interquartile range (i.e., 75th %tile - 25th %tile) change in ambient concentration for each pollutant (when air pollutants were estimated using a spatial statistical model: 13.1 µg/m³ for PM₁, 10.0 µg/m³ for PM_{2.5}, 13.8 µg/m³ for PM₁₀, 7.3 µg/m³ for NO₂; when air pollutants were measured by local air monitoring stations: 30.6 µg/m³ for PM₁₀, 23.4 µg/m³ for SO₂, 13.0 µg/m³ for NO₂, and 46.3 µg/m³ for O₃).

eTable 14. Adjusted Odds Ratios (AORs) for Impaired Forced Vital Capacity and 4-Year Mean PM₁ Concentrations per 1–Interquartile Range Change (13.1 µg/m³), Excluding Districts 1 at a Time Stratified by Breastfed Status

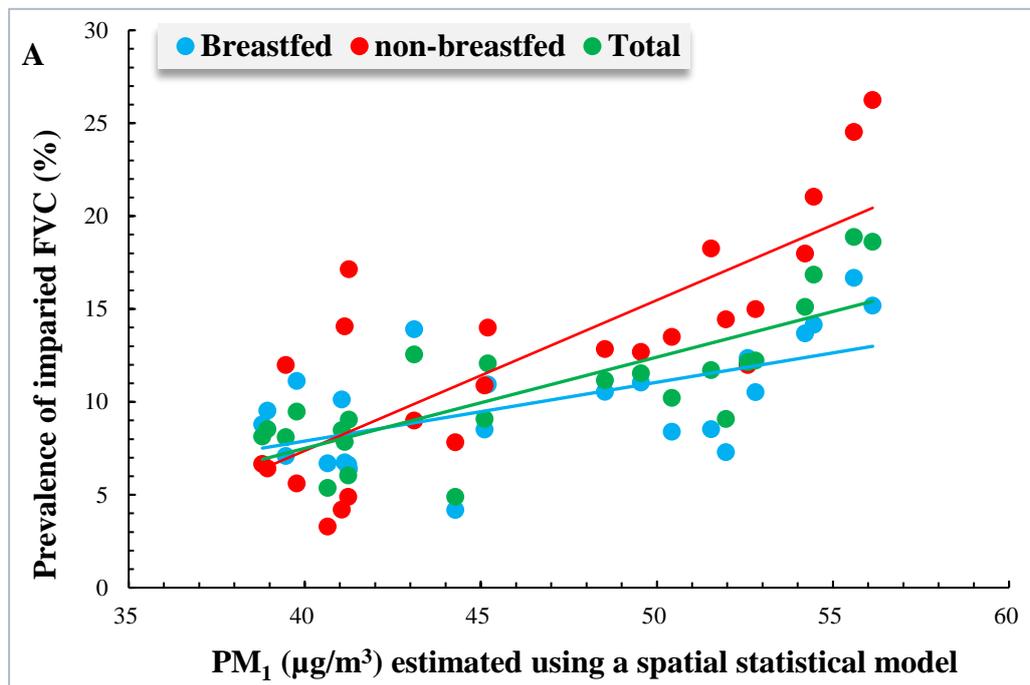
Excluding district	Non-breastfed	Breastfed	Interaction
	ORs (95% CI)	ORs (95% CI)	<i>p</i> Value
Excluding district 1	2.67 (1.98-3.58)	1.19 (0.96-1.47)	<0.001
Excluding district 2	2.88 (2.13-3.89)	1.26 (1.02-1.57)	<0.001
Excluding district 3	2.65 (1.97-3.57)	1.21 (0.98-1.50)	<0.001
Excluding district 4	2.48 (1.86-3.31)	1.16 (0.95-1.42)	<0.001
Excluding district 5	2.67 (1.97-3.60)	1.22 (0.98-1.51)	<0.001
Excluding district 6	2.60 (1.93-3.51)	1.20 (0.97-1.48)	<0.001
Excluding district 7	2.79 (2.07-3.76)	1.17 (0.94-1.45)	<0.001
Excluding district 8	2.68 (2.00-3.60)	1.20 (0.97-1.49)	<0.001
Excluding district 9	2.71 (2.02-3.64)	1.20 (0.97-1.49)	<0.001
Excluding district 10	2.97 (2.19-4.03)	1.21 (0.96-1.52)	<0.001
Excluding district 11	2.78 (2.02-3.81)	1.26 (1.00-1.59)	<0.001
Excluding district 12	2.58 (1.91-3.50)	1.10 (0.88-1.38)	<0.001
Excluding district 13	2.68 (1.97-3.63)	1.21 (0.96-1.51)	<0.001
Excluding district 14	2.64 (1.96-3.55)	1.23 (0.99-1.53)	<0.001
Excluding district 15	2.68 (1.99-3.60)	1.17 (0.94-1.45)	<0.001
Excluding district 16	2.67 (1.98-3.59)	1.17 (0.94-1.46)	<0.001
Excluding district 17	2.81 (2.09-3.79)	1.25 (1.01-1.55)	<0.001
Excluding district 18	2.72 (2.01-3.69)	1.15 (0.95-1.41)	<0.001
Excluding district 19	2.97 (2.18-4.04)	1.31 (1.05-1.63)	<0.001
Excluding district 20	2.73 (2.02-3.68)	1.19 (0.96-1.48)	<0.001
Excluding district 21	2.49 (1.83-3.38)	1.39 (1.11-1.74)	0.002
Excluding district 22	2.79 (2.07-3.77)	1.18 (0.95-1.46)	<0.001
Excluding district 23	2.82 (2.10-3.80)	1.22 (0.98-1.51)	<0.001
Excluding district 24	2.80 (2.08-3.76)	1.21 (0.98-1.50)	<0.001

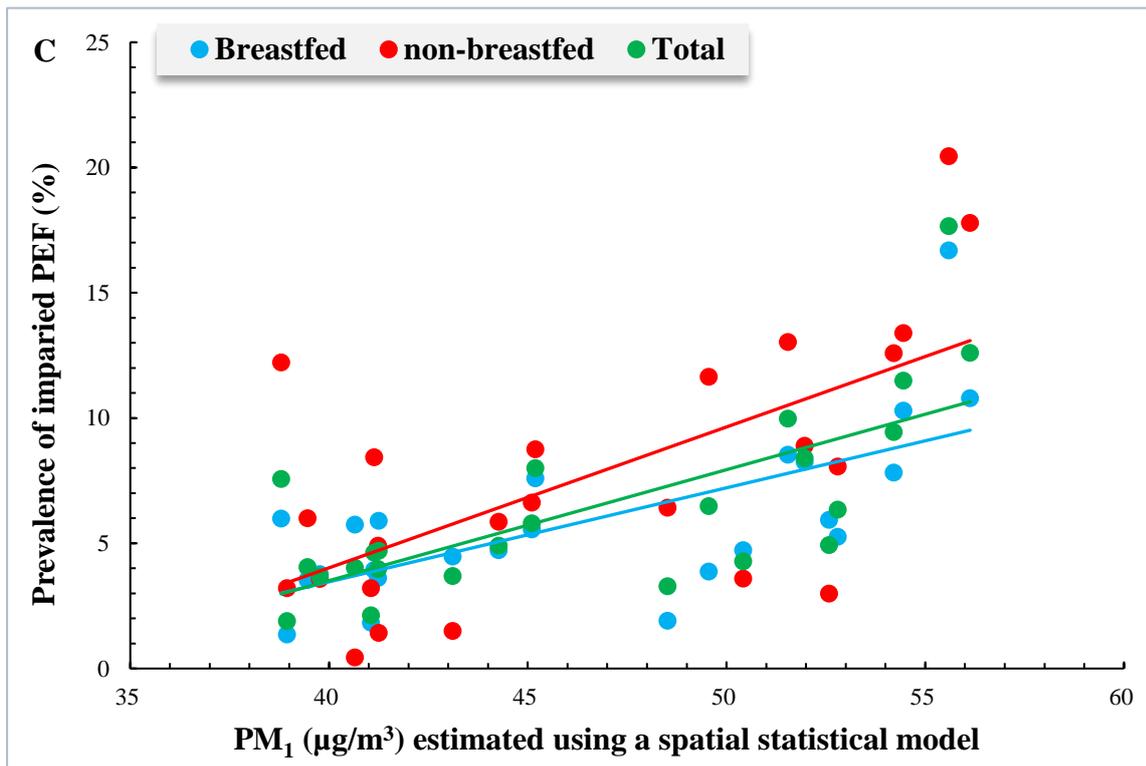
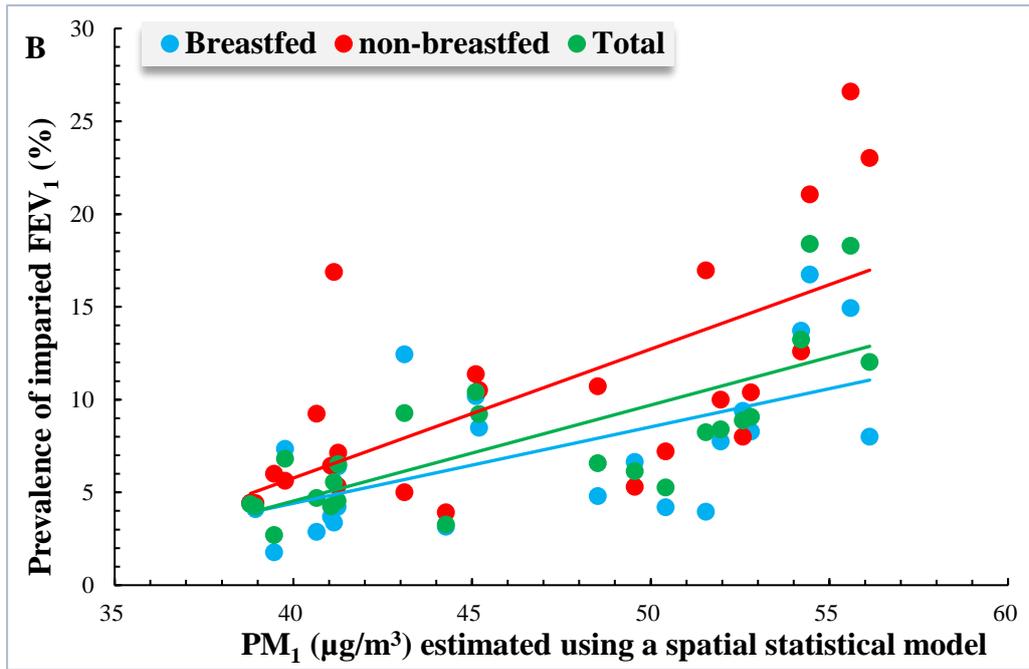
Abbreviations: CI, confidence interval; FVC, forced vital capacity; PM₁, airborne particulates with aerodynamic diameter <1 µm.

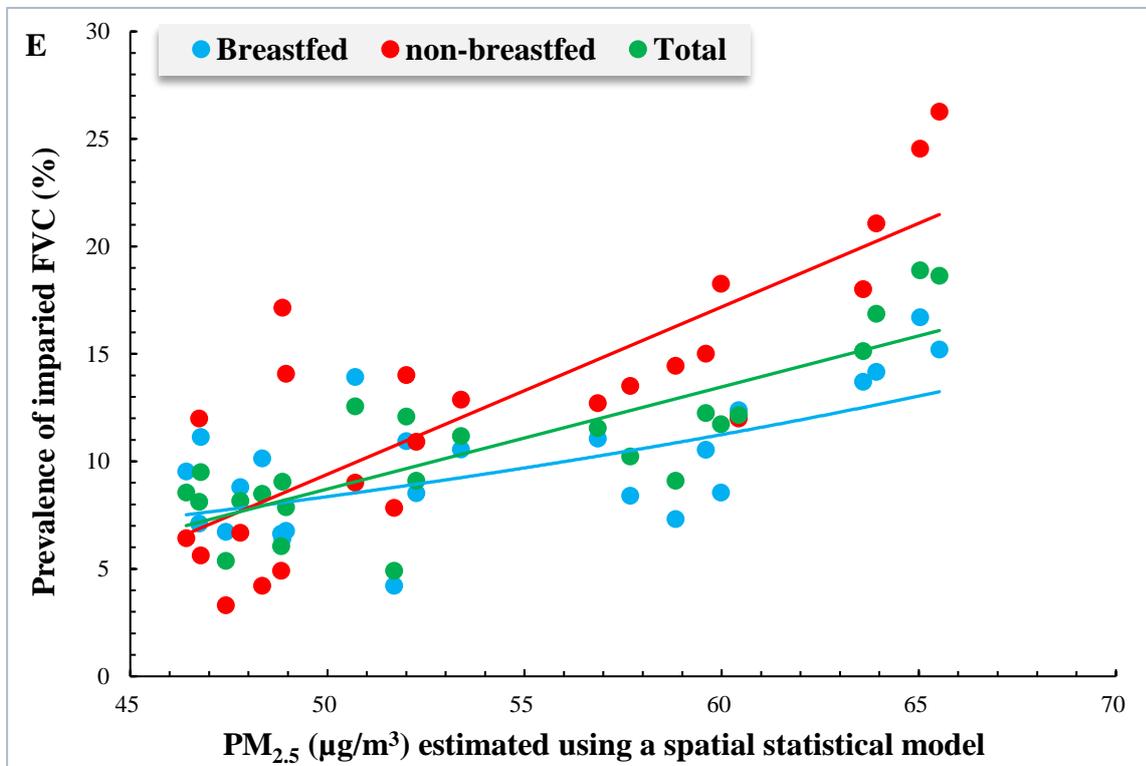
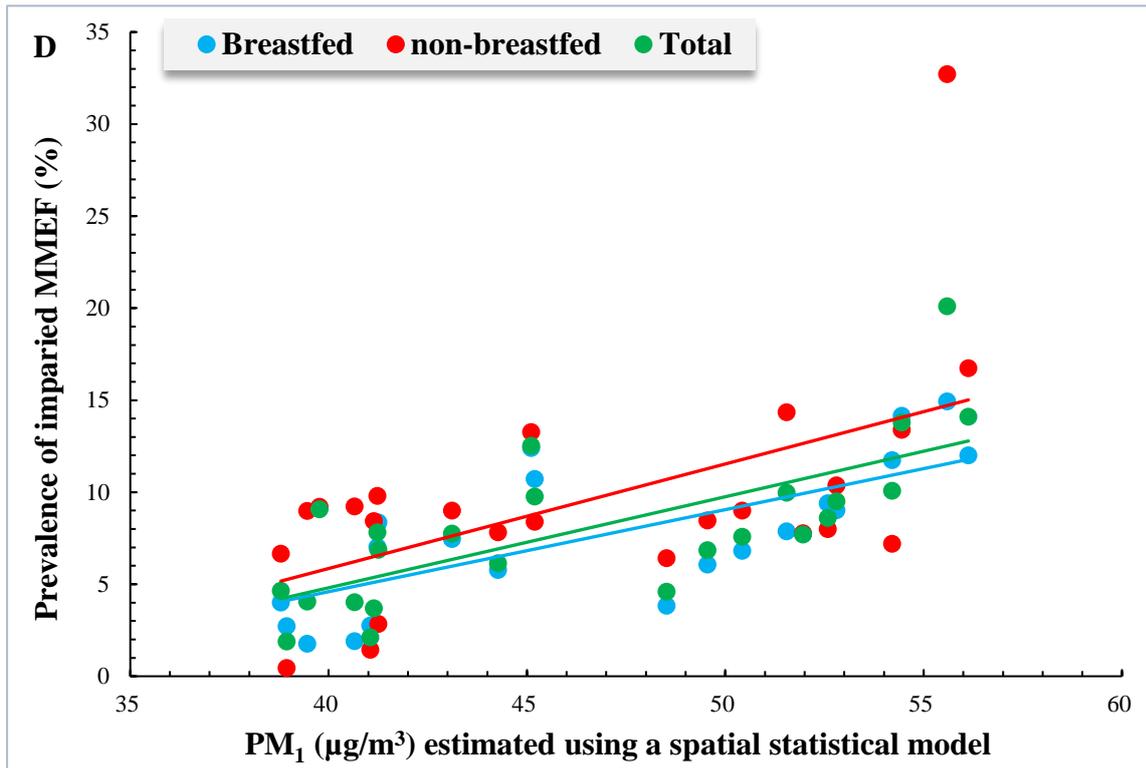
^aAdjusted for age, sex, height, birth weight, preterm birth, parental education, family income per year, exercise per week, passive smoke exposure, home coal use, house pet, home renovation in the past 2 years, area of residence per person, doctor-diagnosed asthma, family history of atopy, and short-term air pollution concentrations.

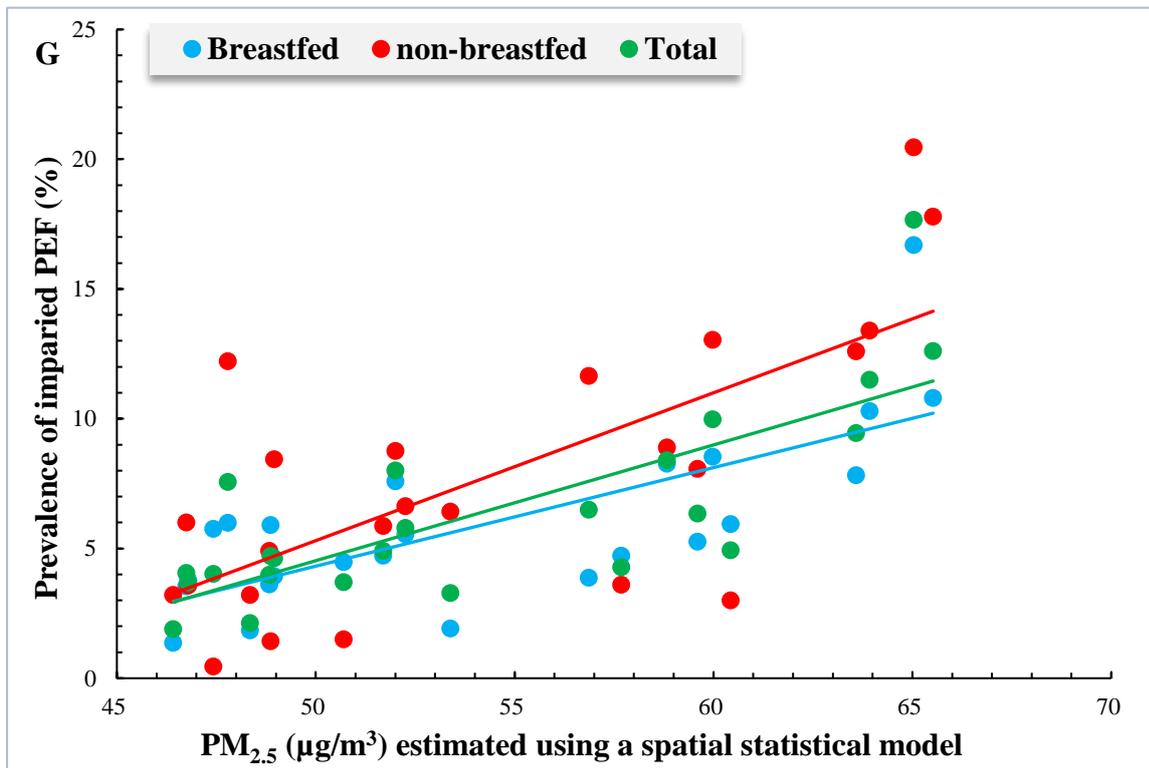
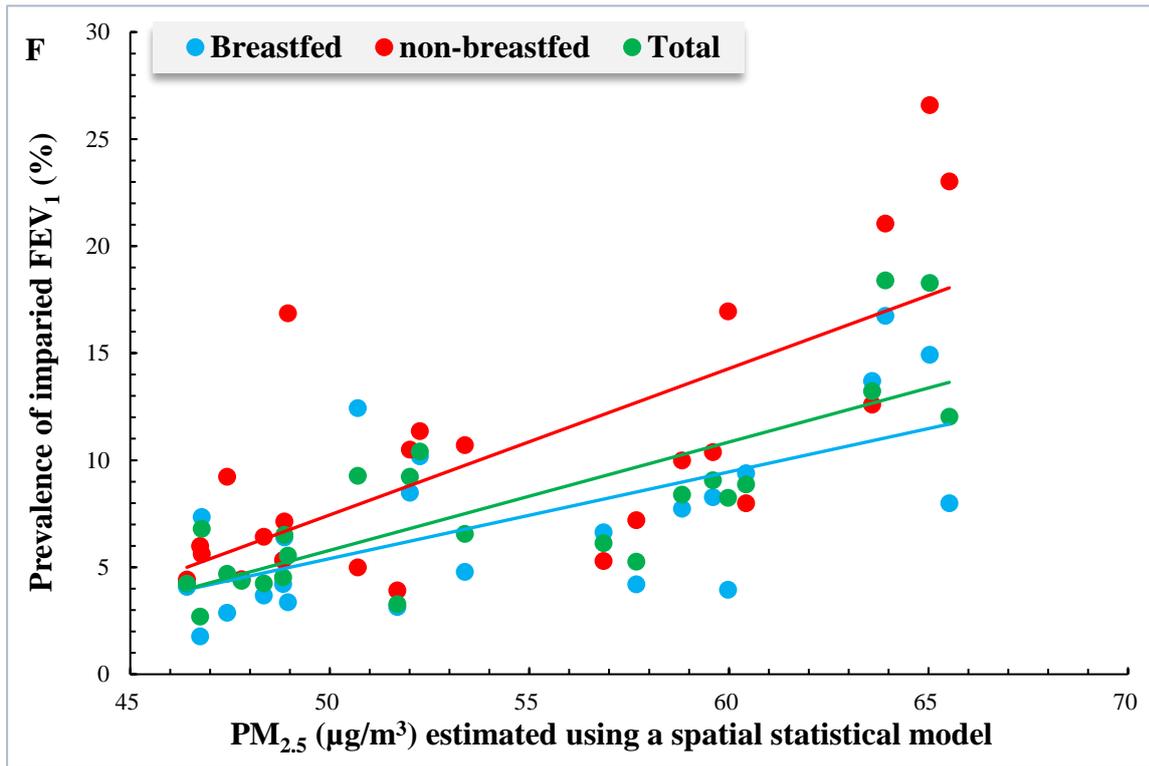
eFigure 1. Associations of the Prevalence of Impaired Lung Function With Ambient Pollutants Stratified by Breastfed Status

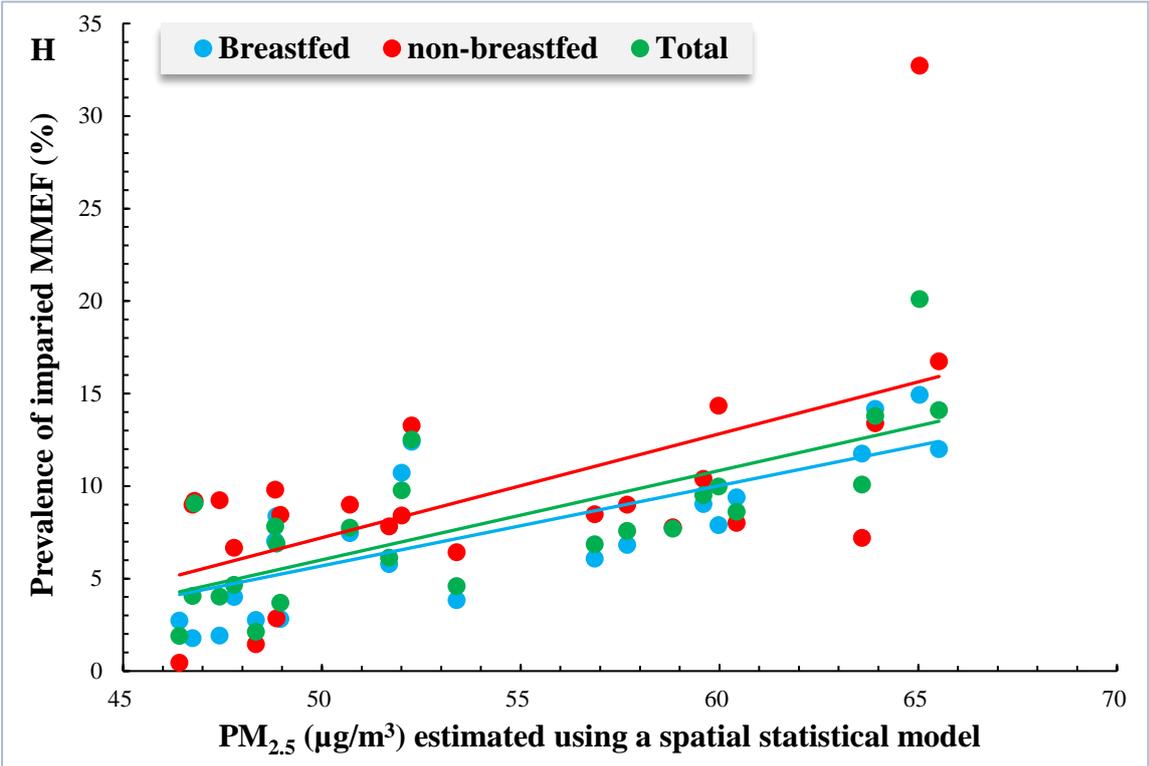
(A) for FVC and PM_{10} ; (B) for FEV_1 and PM_{10} ; (C) for PEF and PM_{10} ; (D) for MMEF and PM_{10} ; (E) for PEF and $PM_{2.5}$; (F) for MMEF and $PM_{2.5}$; (G) for PEF and $PM_{2.5}$; and (H) for MMEF and $PM_{2.5}$. The dose-response relationships of impaired lung function (%) with PM_{10} and $PM_{2.5}$ estimated using a spatial statistical model were assessed at the study district level. The prevalence of impaired lung function (%) was adjusted for age, sex, height, birth weight, preterm birth, parental education, annual family income per year, exercise per week, passive smoke exposure, home coal use, house pet, home renovation in the past 2 years, area of residence per person, doctor-diagnosed asthma, family history of atopy, and short-term air pollution concentrations.











eFigure 2. Estimated Absolute Change in Lung Function Test Measurements Associated With 4-Year Mean Ambient Air Pollutant Concentrations Estimated Using a Spatial Statistical Model Stratified by Breastfed Status

Adjusted for age, sex, height, birth weight, preterm birth, parental education, family income per year, exercise per week, passive smoke exposure, home coal use, house pet, home renovation in the past 2 years, area of residence per person, doctor-diagnosed asthma, family history of atopy, and short-term air pollution concentrations. Effect expressed for a 1 interquartile range (i.e., 75th %tile - 25th %tile) change in ambient concentration for each pollutant (13.1 $\mu\text{g}/\text{m}^3$ for PM_{10} , 10.0 $\mu\text{g}/\text{m}^3$ for $\text{PM}_{2.5}$).

