



Figure S1 Calculation curves for childhood allergic diseases as a whole by sites. (A) Children from Beijing. (B) Children from Tangshan.

Table S1 Childhood allergy questionnaire

1. Has your child ever been diagnosed with asthma?

☐ yes ☐ no

2. Has your child experienced any wheezing, breathing difficulties, or whistling in the chest in the last 12 months?

☐ yes ☐ no

3. Has your child ever been diagnosed with allergic rhinitis?

☐ yes ☐ no

4. Has your child ever sneezing, runny nose, stuffy, or itchy in the last 12 months not due to having a cold or flu?

☐ yes ☐ no

4a. If YES, has this nose problem been accompanied by itchy–watery eyes?

☐ yes ☐ no

5. In the past 12 months, has your child had “hay fever”?

☐ yes ☐ no

6. Has your child had repeated skin itching or a rash on the bent side of the elbow or knee joint in the last 12 months?

☐ yes ☐ no

7. Has your child ever been diagnosed with eczema?

☐ yes ☐ no

8. Has your child had a history of food allergies (redness, swelling, rash, abdominal pain, etc. within 2 hours after eating)?

☐ yes ☐ no

9. Has your child ever been diagnosed by a doctor with a drug allergy?

☐ yes ☐ no

* All questions were translated into Chinese when used. The screened asthma/wheezing, allergic rhinitis, eczema and food/drug allergy were determined by ever diagnosis plus current symptoms. Children who were screened out one of above five types of allergies were considered to be screened positive for allergic diseases.

Table S2 Distributions of age, sex and excluded questionnaires between Beijing and Tangshan

Characteristics	Beijing (n=6,255)	Tangshan (n=3,246)	P
Sex			0.033
Males	3,126 (64.8%)	1,697 (35.2%)	
Females	3,129 (66.9%)	1,549 (33.1%)	
Age (months)	54.6 (47.6, 66.4)	55.8 (48.8, 66.7)	3.74E-10
Excluded questionnaires	538 (7.9%)	399 (10.9%)	2.51E-07

Table S3 The baseline characteristics of study children according to the presence of allergic diseases as a whole

Characteristics	Allergic diseases		P
	Absence	Presence	
Sample size	4,428	5,073	
Age (months)	54.8 (47.7, 65.8)	55.5 (48.1, 66.7)	0.309
Males	2,133 (48.2%)	2,690 (53.0%)	2.34E-06
Site			3.13E-122
Beijing	2,055 (46.4%)	1,191 (23.5%)	
Tangshan	2,373 (53.6%)	3,882 (76.5%)	
Body mass index (kg/m ²)	15.4 (14.4, 16.5)	15.4 (14.5, 16.6)	0.079
Outdoor activities (hours per day)			5.09E-11
>1.5	2,613 (59.0%)	2,653 (52.3%)	
≤1.5	1,815 (41.0%)	2,420 (47.7%)	
Secondhand smoke exposure			3.21E -08
No	2579 (58.2%)	2877 (56.7%)	
1–5 cigarettes per day	1313 (29.7%)	1364 (26.9%)	
5–10 cigarettes per day	323 (7.3%)	507 (10.0%)	
>10 cigarettes per day	213 (4.8%)	325 (6.4%)	
Bedtime at night	9.0 (9.0, 10.0)	9.0 (9.0, 10.0)	0.00E+00
Antibiotic use during childhood			1.23E-33
No	624 (14.1%)	335 (6.6%)	
Yes	3,804 (85.9%)	4,738 (93.4%)	
Pet raising			0.024
No	3,666 (82.8%)	4,287 (84.5%)	
Yes	762 (17.2%)	786 (15.5%)	
Gestational diabetes mellitus			5.70E-17
No	4,014 (93.8%)	4,241(88.8%)	
Yes	266 (6.2%)	536 (11.2%)	
Maternal pregnancy smoking			0.214
No	4,417 (99.8%)	5,053 (99.6%)	
Yes	11 (0.2%)	20 (0.4%)	

Table S3 (continued)

Table S3 (continued)

Characteristics	Allergic diseases		P
	Absence	Presence	
Gestational age (weeks)			
<37	430 (9.7%)	415 (8.2%)	
37-42	3,882 (87.7%)	4,580 (90.3%)	
>42	116 (2.6%)	78 (1.5%)	
Delivery mode			1.42E-07
Vaginal delivery	2,246 (50.7%)	2,847 (56.1%)	
Cesarean section	2,182 (49.3%)	2,226 (43.9%)	
Birth weight (kg)	3.3 (3.0, 3.6)	3.3 (3.0, 3.6)	0.686
Infancy feeding type			7.13E-05
exclusive breastfeeding	2,640 (59.6%)	2,799 (55.2%)	
Partial breastfeeding	1,539 (34.8%)	1,957 (38.6%)	
exclusive formula feeding	249 (5.6%)	317 (6.2%)	
Breastfeeding duration (months)			0.001
≥12	2,979 (67.3%)	3,252 (64.1%)	
<12	1,449 (32.7%)	1,821 (35.9%)	
Solid food consumption age (months)	6.0 (6.0, 7.0)	6.0 (6.0, 6.0)	1.497E-12
Maternal age at delivery (years)	29.3 (27.0, 32.8)	29.2 (27.0, 32.5)	0.203
Paternal age at delivery (years)	30.4 (27.8, 34.2)	30.6 (27.8, 4.0)	0.791
Maternal BMI (kg/m ²)	22.4 (20.4, 24.7)	22.0 (20.1, 24.3)	1.796E-07
Paternal BMI (kg/m ²)	25.2 (22.9, 27.8)	25.2 (23.1, 27.7)	0.886
Maternal education			4.16E-126
High school degree or below	1,992 (45.0%)	1,117 (22.0%)	
Bachelor's degree	1,939 (43.8%)	2,968 (58.5%)	
Master's degree	411 (9.3%)	813 (16.0%)	
Doctor's degree or above	86 (1.9%)	175 (3.4%)	
Paternal education			5.92E-115
High school degree or below	2,134 (48.2%)	1,295 (25.5%)	
Bachelor's degree	1,729 (39.0%)	2,744 (54.1%)	
Master's degree	401 (9.1%)	729 (14.4%)	
Doctor's degree or above	164 (3.7%)	305 (6.0%)	
Family income (RMB per year)			1.24E-94
<100000	1,973 (44.6%)	1,251 (24.7%)	
100000-300000	1,454 (32.8%)	2,042 (40.3%)	
>300000	1,001 (22.6%)	1,780 (35.0%)	
Family history of allergic diseases			8.6E-183
No	3,429 (77.4%)	2,469 (48.7%)	
Yes	999 (22.6%)	2,604 (51.3%)	

Table S4 Prediction of five significant factors for allergic diseases as a whole in both training set and testing set

Risk factors*	Training set (n=5,701)				Testing set (n=3,800)				Z-test	P
	OR	LCI	UCI	P	OR	LCI	UCI	P		
Bedtime (per 1 hour late)	1.25	1.15	1.36	8.32E-08	1.24	1.12	1.37	3.96E-05	0.18	0.857
Outdoor activities (≤ 1.5 h per day)	1.23	1.10	1.37	3.44E-04	1.35	1.18	1.54	1.71E-05	-1.05	0.295
Family history of allergic diseases	2.84	2.52	3.21	0.00E+00	3.31	2.85	3.85	0.00E+00	-1.55	0.121
Antibiotic use during childhood	2.59	2.15	3.12	0.00E+00	2.64	2.10	3.31	2.22E-16	-0.11	0.911
Gestational diabetes mellitus	1.30	1.06	1.61	0.013	1.87	1.44	2.42	2.87E-06	-2.10	0.036

Abbreviations: OR, odds ratio; LCI, lower confidence interval; UCI, upper confidence interval. Variables under multivariable adjustment included age, sex, site, body mass index (BMI), pet raising, secondhand smoke exposure, maternal pregnancy smoking, gestational age, delivery mode, birth weight, infancy feeding type, breastfeeding duration, solid food consumption age, maternal age at delivery, paternal age at delivery, maternal BMI, paternal BMI, maternal education, paternal education, and family income.

Table S5 Prediction of four significant factors for allergic diseases as a whole in Beijing and Tangshan

Risk factors*	Beijing (n=6,255)				Tangshan (n=3,246)				Z-test	P
	OR	LCI	UCI	P	OR	LCI	UCI	P		
Bedtime (per 1 hour late)	1.13	1.03	1.22	0.006	1.43	1.29	1.58	6.42E-12	3.56	3.70E-04
Outdoor activities (≤ 1.5 h per day)	1.35	1.22	1.50	1.60E-08	1.20	1.04	1.39	0.012	-1.25	0.210
Family history of allergic diseases	2.97	2.65	3.31	0.00E+00	3.24	2.71	3.87	0.00E+00	0.82	0.413
Antibiotic use during childhood	2.47	2.09	2.91	0.00E+00	3.34	2.34	4.78	3.84E-11	1.51	0.131

Abbreviations: LCI, lower confidence interval; UCI, upper confidence interval. Variables under multivariable adjustment included age, sex, site, body mass index (BMI), pet raising, secondhand smoke exposure, maternal pregnancy smoking, gestational age, delivery mode, birth weight, infancy feeding type, breastfeeding duration, solid food consumption age, maternal age at delivery, paternal age at delivery, maternal BMI, paternal BMI, maternal education, paternal education, and family income.