

Supplementary Appendix for

Effects of Air Pollution on Adverse Birth Outcomes and Pregnancy Complications in the U.S. State of Kansas (2000-2015)

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Table S1. Maternal and infant characteristics from birth records of birth weight cohort, gestational diabetes (GDM) cohort, and gestational hypertension (GH) cohort singleton births in Kansas with an estimated date of conception from January 1st, 2000, to December 31st, 2015.

Maternal/Infant Characteristics	Birth Weight Cohort (N=554,787)	GDM Cohort (N=449,871)	GH Cohort (N=590,574)
Gestational Age (weeks)			
Mean (SD)	39.1 (1.1)	38.7 (1.6)	38.8 (1.7)
Maternal Education Level			
<High School	91,477 (16.6)	72,446 (16.2)	98,927 (16.8)
High School/GED	136,275 (24.7)	105,952 (23.7)	146,482 (24.9)
Some College/AA	159,040 (28.8)	135,801 (30.4)	168,882 (28.7)
BA+	165,156 (29.9)	132,687 (29.7)	173,311 (29.5)
Maternal Ethnicity			
Hispanic	137,910 (25.0)	108,061 (24.2)	148,196 (25.2)
Non-Hispanic	416,887 (75.0)		
Maternal Age (years)			
Mean (SD)	27.04 (5.8)	27.1 (5.7)	27.0 (5.8)
Maternal Marital Status			
Married	268,834 (48.5)	285,053 (63.4)	283,654 (48.0)
Unmarried	152,110 (27.4)	164,437 (36.6)	163,930 (27.8)
Missing	133,843 (24.1)	381 (0.1)	142,990 (24.2)
Parity			
1	175,801 (50.7)	140,464 (49.9)	185,692 (50.4)
2	100,916 (29.1)	81,882 (29.1)	107,076 (29.1)
≥3	70,286 (20.3)	59,354 (21.1)	75,809 (20.6)
Smoking during Pregnancy			
Yes	48,651 (8.8)	53,336 (11.9)	53,130 (9.0)
No	506,136 (91.2)		
Conception Season			
Winter	137,952 (24.9)	108,363 (24.1)	146,831 (24.9)
Spring	136,006 (24.5)	110,000 (24.5)	145,094 (24.6)
Summer	137,215 (24.7)	113,220 (25.2)	146,060 (24.7)
Autumn	143,614 (25.9)	118,288 (26.3)	152,589 (25.8)
Zip code level percent below poverty			
Mean (SD)	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)
Census Tract Level Percentage of Greenspace			
Mean (SD)	57.7 (33.5)	57.7 (33.5)	57.7 (33.5)

Table S2. Distributions (minimum, maximum, mean and percentiles) of 3 pollutants (NO₂, PM_{2.5}, O₃) by different exposure windows with an estimated date of conception from January 1st, 2000, to December 31st, 2015. W4: First 4 weeks. W6: First 6 weeks. T1: First trimester. T2: Second trimester. T3: Third trimester. Total: Total pregnancy.

Pollutants	Minimum	0.5th	1st	25th	50th	75th	99th	99.5th	Maximum	Mean
W4.NO ₂	1.45	5.19	6.09	13.50	18.70	24.77	37.86	40.09	70.68	19.49
W6.NO ₂	1.47	5.34	6.21	13.59	18.77	24.74	37.19	39.43	63.95	19.49
T1.NO ₂	1.71	5.57	6.46	13.74	18.74	24.64	36.36	38.01	56.14	19.48
T2.NO ₂	1.73	5.49	6.39	13.60	18.56	24.48	36.32	37.94	57.06	19.35
T3.NO ₂	1.58	5.35	6.24	13.37	18.45	24.38	36.52	38.36	56.85	19.20
Total.NO ₂	2.21	6.00	6.98	14.07	18.46	24.22	34.38	35.13	42.65	19.35
W4.PM _{2.5}	2.00	4.04	4.39	7.82	9.49	11.38	17.17	18.35	23.53	9.70
W6.PM _{2.5}	2.47	4.26	4.60	7.97	9.54	11.27	16.25	16.83	19.70	9.69
T1.PM _{2.5}	3.11	4.65	4.97	8.22	9.63	11.08	14.80	15.29	17.75	9.67
T2.PM _{2.5}	2.54	4.51	4.87	8.14	9.57	11.03	14.76	15.25	17.88	9.60
T3.PM _{2.5}	2.29	4.35	4.71	8.01	9.49	11.05	15.15	15.60	23.45	9.56
Total.PM _{2.5}	3.17	5.22	5.52	8.36	9.69	10.95	13.41	13.67	15.20	9.62
W4.O ₃	11.33	18.43	19.92	31.17	41.13	46.98	59.90	61.29	69.25	39.71
W6.O ₃	11.57	18.73	20.35	31.30	41.11	46.86	59.10	60.32	67.01	39.70
T1.O ₃	11.96	19.88	21.44	32.38	40.69	46.20	56.82	57.60	62.09	39.71
T2.O ₃	12.17	19.99	21.64	32.74	41.05	46.26	56.81	57.59	62.09	39.93
T3.O ₃	11.76	19.50	20.96	32.32	41.69	46.58	57.91	58.75	65.43	40.06
Total.O ₃	19.32	27.42	29.14	36.84	39.69	43.06	49.35	49.85	55.51	39.89

Table S3. Adjusted ORs or mean differences and 95% CIs for preterm birth, birth weight, GDM and GH per IQR increase in 3 ambient air pollutants in Kansas, U.S.A., with an estimated date of conception from January 1st, 2000, to December 31st, 2015.

Outcome	Pollutant	Period of pregnancy	Adjusted OR/mean difference (95% CI)
Preterm Birth	NO ₂	First 4 weeks	1.010 (0.983, 1.037)
		First 6 weeks	1.012 (0.984, 1.041)
		First Trimester	1.010 (0.981, 1.039)
		Second Trimester	0.998 (0.970, 1.027)
		Third Trimester	0.997 (0.970, 1.025)
		Total Pregnancy	1.002 (0.974, 1.032)
	PM _{2.5}	First 4 weeks	1.003 (0.981, 1.026)
		First 6 weeks	0.997 (0.974, 1.021)
		First Trimester	0.993 (0.969, 1.017)
		Second Trimester	0.997 (0.973, 1.022)
		Third Trimester	0.984 (0.962, 1.006)
		Total Pregnancy	0.987 (0.958, 1.016)
	O ₃	First 4 weeks	0.995 (0.960, 1.031)
		First 6 weeks	1.005 (0.969, 1.043)
		First Trimester	1.022 (0.985, 1.060)
		Second Trimester	1.051 (1.014, 1.089)
		Third Trimester	1.035 (1.002, 1.070)
		Total Pregnancy	1.048 (1.022, 1.075)
Birth weight	NO ₂	First 4 weeks	0.994 (-2.185, 4.173)
		First 6 weeks	1.584 (-1.671, 4.840)
		First Trimester	2.884 (-0.475, 6.244)
		Second Trimester	3.371 (0.015, 6.727)
		Third Trimester	1.392 (-2.047, 4.831)
		Total Pregnancy	-2.117 (-4.455, 0.221)
	PM _{2.5}	First 4 weeks	0.739 (-1.852, 3.330)
		First 6 weeks	0.593 (-2.117, 3.303)
		First Trimester	2.798 (-0.035, 5.631)
		Second Trimester	-0.189 (-3.071, 2.694)
		Third Trimester	1.962 (-1.091, 5.015)
		Total Pregnancy	1.260 (-1.595, 4.115)
	O ₃	First 4 weeks	-1.279 (-5.421, 2.864)
		First 6 weeks	-1.092 (-5.407, 3.222)
		First Trimester	-1.213 (-5.494, 3.067)
		Second Trimester	-9.857 (-14.022, -5.693)
		Third Trimester	-7.934 (-12.340, -3.528)
		Total Pregnancy	-0.671 (-3.343, 2.002)
Gestational Diabetes	NO ₂	First 4 weeks	1.044 (0.989, 1.102)

Gestational Hypertension	PM _{2.5}	First 6 weeks	1.044 (0.992, 1.098)
		First Trimester	1.059 (1.002, 1.120)
		Second Trimester	1.014 (0.959, 1.073)
		First 4 weeks	1.002 (0.968, 1.036)
		First 6 weeks	0.991 (0.956, 1.027)
		First Trimester	0.990 (0.952, 1.029)
	O ₃	Second Trimester	0.989 (0.951, 1.029)
		First 4 weeks	1.034 (0.982, 1.089)
		First 6 weeks	1.014 (0.961, 1.071)
	NO ₂	First Trimester	1.019 (0.964, 1.077)
		Second Trimester	1.041 (0.986, 1.099)
		First 4 weeks	0.970 (0.929, 1.013)
		First 6 weeks	0.968 (0.927, 1.012)
		First Trimester	0.967 (0.924, 1.013)
		Second Trimester	0.985 (0.941, 1.031)
	PM _{2.5}	Third Trimester	1.000 (0.954, 1.047)
		Total Pregnancy	0.997 (0.963, 1.031)
		First 4 weeks	1.006 (0.972, 1.042)
		First 6 weeks	1.006 (0.970, 1.043)
		First Trimester	1.004 (0.967, 1.044)
		Second Trimester	0.982 (0.945, 1.021)
	O ₃	Third Trimester	0.961 (0.923, 1.002)
		Total Pregnancy	0.998 (0.956, 1.041)
		First 4 weeks	1.089 (1.031, 1.149)
		First 6 weeks	1.106 (1.045, 1.170)
		First Trimester	1.107 (1.046, 1.172)
		Second Trimester	1.031 (0.976, 1.089)
		Third Trimester	0.991 (0.936, 1.050)
		Total Pregnancy	1.017 (0.977, 1.057)

Models were adjusted for maternal education level, race, ethnicity, age, marital status, smoking, infant parity, zip code level percent below poverty, census tract level greenness, season of conception, and long-term trend using a natural cubic spline on conception date. IQRs: First 4 Weeks NO₂: 11.26 (µg/m³); First 6 Weeks NO₂: 11.16 (µg/m³); First Trimester NO₂: 10.90 (µg/m³); Second Trimester NO₂: 10.88 (µg/m³); Third Trimester NO₂: 11.01 (µg/m³); Total Pregnancy NO₂: 10.16 (µg/m³); First 4 Weeks PM_{2.5}: 3.56 (ppb); First 6 Weeks PM_{2.5}: 3.30 (ppb); First Trimester PM_{2.5}: 2.86 (ppb); Second Trimester PM_{2.5}: 2.89 (ppb); Third Trimester PM_{2.5}: 3.04 (ppb); Total Pregnancy PM_{2.5}: 2.86 (ppb); First 4 Weeks O₃: 15.81 (ppb); First 6 Weeks O₃: 15.56 (ppb); First Trimester O₃: 13.82 (ppb); Second Trimester O₃: 13.51 (ppb); Third Trimester O₃: 14.26 (ppb); Total Pregnancy O₃: 6.23 (ppb).

Table S4. Stratum-specific adjusted ORs or mean difference and 95% CI for preterm birth, birth weight, GDM and GH per interquartile range (IQR) increase in 3 pollutants (NO₂, PM_{2.5}, and O₃) in Kansas, U.S.A., with an estimated date of conception from January 1st, 2000, to December 31st, 2015.

Outcome	Pollutant	Stratification	Period of Pregnancy	Stratum	Adjusted OR/mean difference (95% CI)
Preterm	NO ₂	Race	First Trimester	White	1.004 (0.973, 1.037)
				Black	1.001 (0.917, 1.092)
				Asian	1.070 (0.828, 1.382)
				Other	1.171 (1.019, 1.344)
			Second Trimester	White	0.999 (0.967, 1.031)
				Black	0.984 (0.901, 1.074)
				Asian	0.986 (0.753, 1.291)
				Other	1.071 (0.929, 1.235)
			Third Trimester	White	0.997 (0.967, 1.028)
				Black	0.99 (0.913, 1.074)
				Asian	0.951 (0.743, 1.219)
				Other	1.069 (0.937, 1.220)
		Hispanic	First Trimester	Hispanic	1.021 (0.969, 1.075)
				Non-Hispanic	1.005 (0.970, 1.040)
			Second Trimester	Hispanic	1.003 (0.952, 1.056)
				Non-Hispanic	0.996 (0.962, 1.031)
			Third Trimester	Hispanic	0.982 (0.934, 1.032)
				Non-Hispanic	1.004 (0.971, 1.038)
		Age	First Trimester	≤27 years	1.011 (0.970, 1.053)
				>27 years	1.004 (0.964, 1.045)
			Second Trimester	≤27 years	1.016 (0.974, 1.058)
				>27 years	0.976 (0.937, 1.016)
			Third Trimester	≤27 years	1.017 (0.977, 1.057)
				>27 years	0.973 (0.936, 1.012)
		Zip Code Level Poverty	First Trimester	≤12%	0.975 (0.935, 1.017)
				>12%	1.042 (1.001, 1.084)
			Second Trimester	≤12%	0.968 (0.929, 1.010)
				>12%	1.026 (0.985, 1.068)
			Third Trimester	≤12%	0.964 (0.926, 1.004)
				>12%	1.029 (0.991, 1.070)
	PM _{2.5}	Race	First Trimester	White	1.003 (0.906, 1.111)
				Black	0.757 (0.555, 1.033)
				Asian	0.711 (0.333, 1.519)
				Other	1.127 (0.759, 1.673)
			Second Trimester	White	0.982 (0.886, 1.089)
				Black	
				Asian	
				Other	

O ₃	Hispanic	Third Trimester	Black	1.067 (0.786, 1.449)
			Asian	1.279 (0.598, 2.736)
			Other	1.030 (0.695, 1.526)
			White	0.973 (0.889, 1.065)
			Black	0.906 (0.702, 1.170)
			Asian	0.687 (0.359, 1.315)
			Other	0.751 (0.533, 1.059)
		First Trimester	Hispanic	0.941 (0.791, 1.118)
			Non-Hispanic	0.979 (0.877, 1.093)
		Second Trimester	Hispanic	0.944 (0.795, 1.122)
			Non-Hispanic	1.001 (0.896, 1.119)
		Third Trimester	Hispanic	0.959 (0.826, 1.115)
			Non-Hispanic	0.935 (0.849, 1.031)
	Age	First Trimester	≤27 years	0.953 (0.834, 1.088)
			>27 years	0.993 (0.872, 1.132)
		Second Trimester	≤27 years	0.999 (0.875, 1.142)
			>27 years	0.972 (0.853, 1.107)
		Third Trimester	≤27 years	0.908 (0.808, 1.021)
			>27 years	0.975 (0.87, 1.092)
	Zip Code Level Poverty	First Trimester	≤12%	0.921 (0.804, 1.055)
			>12%	1.013 (0.890, 1.152)
		Second Trimester	≤12%	0.950 (0.828, 1.089)
			>12%	1.016 (0.893, 1.156)
		Third Trimester	≤12%	0.922 (0.818, 1.039)
			>12%	0.954 (0.853, 1.068)
	Race	First Trimester	White	1.028 (0.996, 1.062)
			Black	0.972 (0.892, 1.060)
			Asian	0.976 (0.791, 1.204)
			Other	0.930 (0.828, 1.045)
		Second Trimester	White	1.039 (1.006, 1.073)
			Black	1.012 (0.929, 1.102)
			Asian	1.097 (0.883, 1.364)
			Other	1.088 (0.971, 1.220)
		Third Trimester	White	1.032 (1.003, 1.062)
			Black	1.003 (0.932, 1.08)
			Asian	1.157 (0.960, 1.394)
			Other	0.963 (0.869, 1.066)
		First Trimester	Hispanic	0.962 (0.912, 1.014)
			Non-Hispanic	1.037 (1.002, 1.074)
		Second Trimester	Hispanic	0.994 (0.943, 1.048)
			Non-Hispanic	1.060 (1.024, 1.096)
		Third Trimester	Hispanic	1.004 (0.959, 1.052)

				Non-Hispanic	1.036 (1.005, 1.068)
		Age	First Trimester	≤27 years	1.018 (0.976, 1.061)
				>27 years	1.019 (0.979, 1.061)
			Second Trimester	≤27 years	1.044 (1.002, 1.088)
				>27 years	1.040 (0.999, 1.082)
			Third Trimester	≤27 years	1.018 (0.982, 1.056)
				>27 years	1.035 (0.998, 1.072)
		Zip Code Level Poverty	First Trimester	≤12%	1.052 (1.008, 1.098)
				>12%	0.989 (0.951, 1.028)
			Second Trimester	≤12%	1.033 (0.990, 1.079)
				>12%	1.048 (1.008, 1.089)
			Third Trimester	≤12%	1.022 (0.984, 1.061)
				>12%	1.031 (0.996, 1.067)
Birth weight	NO ₂	Race	First Trimester	White	2.005 (-1.624, 5.634)
				Black	13.338 (0.943, 25.733)
				Asian	-10.126 (-37.585, 17.333)
				Other	2.865 (-14.511, 20.241)
			Second Trimester	White	1.470 (-2.150, 5.091)
				Black	14.797 (2.361, 27.233)
				Asian	11.718 (-16.749, 40.185)
				Other	17.553 (0.072, 35.033)
			Third Trimester	White	0.370 (-3.342, 4.082)
				Black	10.594 (-2.157, 23.345)
				Asian	5.500 (-23.138, 34.137)
				Other	-0.165 (-18.076, 17.746)
		Hispanic	First Trimester	Hispanic	4.544 (-1.949, 11.037)
				Non-Hispanic	2.386 (-1.550, 6.322)
			Second Trimester	Hispanic	5.173 (-1.309, 11.655)
				Non-Hispanic	2.719 (-1.214, 6.652)
			Third Trimester	Hispanic	0.918 (-5.725, 7.561)
				Non-Hispanic	1.710 (-2.321, 5.741)
		Age	First Trimester	≤27 years	3.322 (-1.613, 8.258)
				>27 years	3.249 (-1.340, 7.838)
			Second Trimester	≤27 years	3.755 (-1.181, 8.692)
				>27 years	3.864 (-0.718, 8.447)
			Third Trimester	≤27 years	2.831 (-2.221, 7.883)
				>27 years	1.162 (-3.539, 5.863)
		Zip Code Level Poverty	First Trimester	≤12%	3.252 (-1.362, 7.865)
				>12%	2.192 (-2.841, 7.225)
			Second Trimester	≤12%	2.216 (-2.364, 6.796)
				>12%	4.404 (-0.661, 9.470)

PM _{2.5}	Race	Third Trimester	≤12%	2.259 (-2.426, 6.945)
			>12%	0.150 (-5.051, 5.351)
		First Trimester	White	11.030 (-0.637, 22.697)
			Black	-3.175 (-46.219, 39.868)
			Asian	45.746 (-33.17, 124.661)
			Other	15.648 (-32.026, 63.321)
		Second Trimester	White	-2.628 (-14.374, 9.118)
			Black	-1.623 (-44.358, 41.112)
			Asian	-26.224 (-106.06, 53.613)
			Other	35.979 (-11.698, 83.656)
		Third Trimester	White	8.452 (-3.511, 20.415)
			Black	7.587 (-35.888, 51.062)
			Asian	-1.203 (-81.637, 79.232)
			Other	-10.605 (-58.741, 37.53)
	Hispanic	First Trimester	Hispanic	13.962 (-7.376, 35.300)
			Non-Hispanic	9.768 (-2.779, 22.316)
		Second Trimester	Hispanic	8.205 (-13.139, 29.55)
			Non-Hispanic	-3.394 (-16.030, 9.242)
		Third Trimester	Hispanic	1.040 (-20.766, 22.847)
			Non-Hispanic	9.265 (-3.575, 22.105)
	Age	First Trimester	≤27 years	10.945 (-4.854, 26.743)
			>27 years	9.913 (-4.889, 24.714)
		Second Trimester	≤27 years	10.786 (-5.070, 26.642)
			>27 years	-10.267 (-25.17, 4.636)
		Third Trimester	≤27 years	12.856 (-3.303, 29.016)
			>27 years	1.905 (-13.233, 17.043)
	Zip Code Level Poverty	First Trimester	≤12%	10.264 (-4.505, 25.032)
			>12%	12.091 (-3.934, 28.116)
		Second Trimester	≤12%	-5.025 (-19.930, 9.880)
			>12%	5.004 (-11.047, 21.055)
		Third Trimester	≤12%	9.508 (-5.659, 24.675)
			>12%	4.941 (-11.404, 21.286)
O ₃	Race	First Trimester	White	-0.975 (-4.665, 2.716)
			Black	-1.766 (-13.992, 10.460)
			Asian	23.821 (1.097, 46.545)
			Other	-3.781 (-17.686, 10.124)
		Second Trimester	White	-7.963 (-11.634, -4.293)
			Black	-9.583 (-21.598, 2.432)
			Asian	-8.559 (-31.286, 14.167)
			Other	-0.498 (-14.312, 13.316)
		Third Trimester	White	-5.909 (-9.628, -2.189)
			Black	-8.161 (-20.332, 4.010)

Gestational Diabetes	NO ₂	Hispanic	First Trimester	Asian	-40.054 (-62.790, -17.318)
				Other	7.873 (-6.168, 21.915)
				Hispanic	-1.339 (-7.925, 5.247)
				Non-Hispanic	-0.554 (-4.489, 3.381)
			Second Trimester	Hispanic	-5.009 (-11.549, 1.531)
				Non-Hispanic	-8.632 (-12.542, -4.721)
			Third Trimester	Hispanic	-2.309 (-8.929, 4.311)
				Non-Hispanic	-7.259 (-11.224, -3.294)
		Age	First Trimester	≤27 years	0.334 (-4.635, 5.304)
				>27 years	-2.110 (-6.704, 2.485)
			Second Trimester	≤27 years	-5.877 (-10.782, -0.971)
				>27 years	-9.679 (-14.277, -5.081)
			Third Trimester	≤27 years	-5.259 (-10.232, -0.286)
				>27 years	-6.778 (-11.441, -2.115)
		Zip Code Level Poverty	First Trimester	≤12%	-1.194 (-5.884, 3.495)
				>12%	-0.012 (-4.895, 4.871)
			Second Trimester	≤12%	-8.966 (-13.626, -4.306)
				>12%	-6.175 (-11.025, -1.326)
			Third Trimester	≤12%	-5.056 (-9.761, -0.350)
				>12%	-6.461 (-11.395, -1.527)
		Race	First Trimester	White	1.020 (0.959, 1.086)
				Black	1.271 (1.027, 1.573)
				Asian	1.155 (0.901, 1.481)
				Other	1.130 (0.948, 1.346)
			Second Trimester	White	0.975 (0.916, 1.039)
				Black	1.114 (0.885, 1.402)
				Asian	1.057 (0.813, 1.375)
				Other	1.202 (1.004, 1.439)
			Hispanic	Hispanic	1.157 (1.051, 1.273)
				Non-Hispanic	1.003 (0.939, 1.072)
			Second Trimester	Hispanic	1.094 (0.990, 1.209)
				Non-Hispanic	0.975 (0.911, 1.043)
		Age	First Trimester	≤27 years	1.085 (0.976, 1.205)
				>27 years	1.049 (0.984, 1.118)
			Second Trimester	≤27 years	0.967 (0.867, 1.078)
				>27 years	1.033 (0.969, 1.103)
		Zip Code Level Poverty	First Trimester	≤12%	1.032 (0.952, 1.119)
				>12%	1.038 (0.962, 1.12)
			Second Trimester	≤12%	0.990 (0.913, 1.074)
				>12%	0.999 (0.923, 1.082)

PM _{2.5}	Race	First Trimester	White	0.980 (0.831, 1.155)
			Black	1.235 (0.641, 2.379)
			Asian	0.941 (0.473, 1.872)
			Other	0.721 (0.450, 1.156)
		Second Trimester	White	0.994 (0.842, 1.174)
			Black	0.689 (0.353, 1.344)
			Asian	0.760 (0.375, 1.54)
			Other	0.965 (0.606, 1.537)
	Hispanic	First Trimester	Hispanic	1.215 (0.922, 1.603)
			Non-Hispanic	0.875 (0.735, 1.041)
		Second Trimester	Hispanic	1.272 (0.964, 1.678)
			Non-Hispanic	0.862 (0.723, 1.028)
	Age	First Trimester	≤27 years	0.988 (0.748, 1.305)
			>27 years	0.958 (0.806, 1.138)
		Second Trimester	≤27 years	1.097 (0.830, 1.449)
			>27 years	0.925 (0.777, 1.101)
O ₃	Zip Code Level Poverty	First Trimester	≤12%	0.954 (0.773, 1.178)
			>12%	0.973 (0.791, 1.195)
		Second Trimester	≤12%	0.899 (0.725, 1.113)
			>12%	1.044 (0.848, 1.284)
	Race	First Trimester	White	1.010 (0.961, 1.061)
			Black	1.119 (0.938, 1.335)
			Asian	1.124 (0.919, 1.374)
			Other	0.943 (0.822, 1.083)
		Second Trimester	White	1.036 (0.986, 1.089)
			Black	1.029 (0.862, 1.229)
			Asian	0.910 (0.744, 1.114)
			Other	1.071 (0.934, 1.228)
	Hispanic	First Trimester	Hispanic	0.964 (0.891, 1.043)
			Non-Hispanic	1.042 (0.989, 1.098)
		Second Trimester	Hispanic	1.048 (0.968, 1.134)
			Non-Hispanic	1.030 (0.977, 1.086)
	Age	First Trimester	≤27 years	1.071 (0.986, 1.164)
			>27 years	0.993 (0.944, 1.045)
		Second Trimester	≤27 years	1.026 (0.945, 1.114)
			>27 years	1.034 (0.983, 1.089)
	Zip Code Level Poverty	First Trimester	≤12%	1.008 (0.944, 1.076)
			>12%	1.013 (0.955, 1.074)
		Second Trimester	≤12%	1.064 (0.996, 1.136)
			>12%	1.004 (0.947, 1.064)

Gestational Hypertension	NO ₂	Race	First Trimester	White	0.974 (0.927, 1.023)
				Black	0.822 (0.699, 0.967)
				Asian	0.983 (0.587, 1.645)
				Other	1.166 (0.926, 1.469)
			Second Trimester	White	0.989 (0.941, 1.039)
				Black	0.898 (0.766, 1.053)
				Asian	1.270 (0.768, 2.099)
		Hispanic	First Trimester	Other	1.016 (0.794, 1.298)
				Hispanic	1.026 (0.937, 1.123)
				Non-Hispanic	0.950 (0.900, 1.002)
			Second Trimester	Hispanic	1.006 (0.919, 1.103)
				Non-Hispanic	0.978 (0.927, 1.031)
				Non-Hispanic	0.978 (0.927, 1.031)
	PM _{2.5}	Age	First Trimester	≤27 years	0.958 (0.891, 1.031)
				>27 years	0.975 (0.919, 1.034)
				>27 years	0.975 (0.919, 1.034)
			Second Trimester	≤27 years	0.992 (0.922, 1.067)
				>27 years	0.984 (0.928, 1.044)
				>27 years	0.984 (0.928, 1.044)
		Zip Code Level Poverty	First Trimester	≤12%	0.907 (0.849, 0.968)
				>12%	1.028 (0.964, 1.098)
				>12%	1.028 (0.964, 1.098)
			Second Trimester	≤12%	0.941 (0.881, 1.005)
				>12%	1.031 (0.965, 1.101)
				>12%	1.031 (0.965, 1.101)
	PM _{2.5}	Race	First Trimester	White	1.013 (0.866, 1.185)
				Black	1.230 (0.707, 2.139)
				Asian	0.809 (0.188, 3.478)
				Other	1.234 (0.611, 2.492)
			Second Trimester	White	0.960 (0.820, 1.124)
				Black	0.944 (0.547, 1.627)
				Asian	0.460 (0.104, 2.040)
		Hispanic	First Trimester	Other	0.833 (0.413, 1.679)
				Hispanic	1.183 (0.876, 1.597)
				Non-Hispanic	0.979 (0.827, 1.158)
			Second Trimester	Hispanic	1.029 (0.763, 1.388)
				Non-Hispanic	0.911 (0.769, 1.078)
				Non-Hispanic	0.911 (0.769, 1.078)
	PM _{2.5}	Age	First Trimester	≤27 years	1.008 (0.797, 1.273)
				>27 years	1.026 (0.850, 1.238)
				>27 years	1.026 (0.850, 1.238)
			Second Trimester	≤27 years	0.987 (0.782, 1.247)
				>27 years	0.909 (0.753, 1.098)
				>27 years	0.909 (0.753, 1.098)
	PM _{2.5}	Zip Code Level Poverty	First Trimester	≤12%	0.842 (0.684, 1.038)
				>12%	1.237 (1.005, 1.522)
				>12%	1.237 (1.005, 1.522)
			Second Trimester	≤12%	0.745 (0.604, 0.918)
				>12%	1.190 (0.967, 1.465)
				>12%	1.190 (0.967, 1.465)

O ₃	Race	First Trimester	White	1.085 (1.033, 1.138)
			Black	1.073 (0.921, 1.250)
			Asian	1.564 (1.047, 2.337)
			Other	0.968 (0.789, 1.188)
		Second Trimester	White	1.042 (0.993, 1.093)
			Black	1.023 (0.882, 1.186)
			Asian	0.667 (0.440, 1.012)
			Other	0.881 (0.721, 1.077)
	Hispanic	First Trimester	Hispanic	1.118 (1.022, 1.222)
			Non-Hispanic	1.071 (1.017, 1.128)
		Second Trimester	Hispanic	1.028 (0.941, 1.122)
			Non-Hispanic	1.024 (0.973, 1.078)
	Age	First Trimester	≤27 years	1.081 (1.005, 1.161)
			>27 years	1.086 (1.026, 1.149)
		Second Trimester	≤27 years	1.004 (0.935, 1.077)
			>27 years	1.044 (0.986, 1.105)
	Zip Code Level Poverty	First Trimester	≤12%	1.072 (1.004, 1.144)
			>12%	1.095 (1.030, 1.165)
		Second Trimester	≤12%	1.059 (0.993, 1.130)
			>12%	0.996 (0.937, 1.058)

Models were adjusted the same covariates as the main model besides the stratification variable. IQRs: First 4 Weeks NO₂: 11.26 (µg/m³); First 6 Weeks NO₂: 11.16 (µg/m³); First Trimester NO₂: 10.90 (µg/m³); Second Trimester NO₂: 10.88 (µg/m³); Third Trimester NO₂: 11.01 (µg/m³); Total Pregnancy NO₂: 10.16 (µg/m³); First 4 Weeks PM_{2.5}: 3.56 (ppb); First 6 Weeks PM_{2.5}: 3.30 (ppb); First Trimester PM_{2.5}: 2.86 (ppb); Second Trimester PM_{2.5}: 2.89 (ppb); Third Trimester PM_{2.5}: 3.04 (ppb); Total Pregnancy PM_{2.5}: 2.86 (ppb); First 4 Weeks O₃: 15.81 (ppb); First 6 Weeks O₃: 15.56 (ppb); First Trimester O₃: 13.82 (ppb); Second Trimester O₃: 13.51 (ppb); Third Trimester O₃: 14.26 (ppb); Total Pregnancy O₃: 6.23 (ppb).

Table S5. Sensitivity analysis of adjusted ORs or mean differences and 95% CIs for preterm birth, birth weight, GDM and GH per IQR increase in 3 ambient air pollutants in Kansas, U.S.A., with an estimated date of conception from January 1st, 2000, to December 31st, 2015 for different amounts of smoothing on conception date (degree of freedom = 5, 8, 10 or adjusted conception year as a character variable).

Outcome	Pollutant	Period of pregnancy	Adjusted OR/mean difference (95% CI) DF=5	Adjusted OR/mean difference (95% CI) DF=8	Adjusted OR/mean difference (95% CI) DF=10	Adjusted OR/mean difference (95% CI) Conception year as a factor variable
Preterm Birth	NO ₂	First 4 weeks	1.010 (0.983, 1.037)	1.010 (0.983, 1.037)	1.003 (0.976, 1.031)	1.005 (0.978, 1.033)
		First 6 weeks	1.012 (0.984, 1.041)	1.012 (0.984, 1.041)	1.005 (0.977, 1.034)	1.007 (0.979, 1.036)
		First Trimester	1.010 (0.981, 1.039)	1.010 (0.981, 1.039)	1.002 (0.974, 1.032)	1.005 (0.976, 1.034)
		Second Trimester	0.998 (0.970, 1.027)	0.998 (0.970, 1.027)	0.991 (0.963, 1.020)	0.994 (0.965, 1.023)
		Third Trimester	0.997 (0.970, 1.025)	0.992 (0.965, 1.020)	0.990 (0.963, 1.018)	0.991 (0.963, 1.019)
		Total Pregnancy	1.002 (0.974, 1.032)	0.996 (0.968, 1.025)	0.995 (0.966, 1.024)	0.997 (0.968, 1.026)
	PM _{2.5}	First 4 weeks	1.003 (0.981, 1.026)	1.003 (0.981, 1.026)	0.998 (0.976, 1.021)	0.996 (0.973, 1.019)
		First 6 weeks	0.997 (0.974, 1.021)	0.997 (0.974, 1.021)	0.992 (0.969, 1.016)	0.990 (0.967, 1.014)
		First Trimester	0.993 (0.969, 1.017)	0.993 (0.969, 1.017)	0.990 (0.966, 1.015)	0.993 (0.968, 1.018)
		Second Trimester	0.997 (0.973, 1.022)	0.997 (0.972, 1.022)	1.004 (0.979, 1.029)	1.001 (0.975, 1.027)
		Third Trimester	0.984 (0.962, 1.006)	0.987 (0.965, 1.009)	0.993 (0.971, 1.016)	0.986 (0.963, 1.009)
		Total Pregnancy	0.987 (0.958, 1.016)	0.991 (0.962, 1.020)	0.994 (0.965, 1.024)	0.990 (0.960, 1.021)
	O ₃	First 4 weeks	0.995 (0.960, 1.031)	0.995 (0.960, 1.031)	0.986 (0.951, 1.022)	0.986 (0.951, 1.022)
		First 6 weeks	1.005 (0.969, 1.043)	1.005 (0.968, 1.043)	0.994 (0.958, 1.032)	0.993 (0.956, 1.031)
		First Trimester	1.022 (0.985, 1.060)	1.022 (0.985, 1.060)	1.009 (0.972, 1.048)	1.006 (0.969, 1.045)
		Second Trimester	1.051 (1.014, 1.089)	1.052 (1.015, 1.090)	1.035 (0.998, 1.074)	1.041 (1.003, 1.080)
		Third Trimester	1.035 (1.002, 1.070)	1.025 (0.992, 1.060)	1.017 (0.983, 1.051)	1.024 (0.991, 1.059)
		Total Pregnancy	1.048 (1.022, 1.075)	1.040 (1.012, 1.069)	1.032 (1.004, 1.060)	1.037 (1.008, 1.066)
Birth weight	NO ₂	First 4 weeks	0.994 (-2.185, 4.173)	1.432 (-1.758, 4.621)	1.519 (-1.671, 4.708)	1.751 (-1.443, 4.944)
		First 6 weeks	1.584 (-1.671, 4.840)	2.061 (-1.207, 5.329)	2.162 (-1.106, 5.429)	2.421 (-0.853, 5.695)
		First Trimester	2.884 (-0.475, 6.244)	3.415 (0.040, 6.789)	3.518 (0.143, 6.892)	3.713 (0.329, 7.096)
		Second Trimester	3.371 (0.015, 6.727)	3.910 (0.540, 7.279)	4.012 (0.640, 7.384)	3.899 (0.507, 7.290)

Gestational Diabetes	PM _{2.5}	Third Trimester	1.392 (-2.047, 4.831)	1.969 (-1.485, 5.424)	2.083 (-1.375, 5.541)	1.730 (-1.739, 5.199)
		Total Pregnancy	-2.117 (-4.455, 0.221)	-2.094 (-4.432, 0.244)	-2.101 (-4.439, 0.237)	-2.096 (-4.434, 0.242)
		First 4 weeks	0.739 (-1.852, 3.330)	0.819 (-1.777, 3.415)	1.071 (-1.541, 3.684)	1.681 (-0.981, 4.344)
		First 6 weeks	0.593 (-2.117, 3.303)	0.676 (-2.039, 3.390)	0.968 (-1.768, 3.703)	1.532 (-1.257, 4.321)
		First Trimester	2.798 (-0.035, 5.631)	2.747 (-0.089, 5.583)	3.099 (0.238, 5.959)	3.310 (0.381, 6.240)
	O ₃	Second Trimester	-0.189 (-3.071, 2.694)	-0.387 (-3.281, 2.506)	-0.383 (-3.296, 2.531)	-0.488 (-3.478, 2.502)
		Third Trimester	1.962 (-1.091, 5.015)	1.749 (-1.313, 4.811)	1.433 (-1.671, 4.537)	1.374 (-1.844, 4.591)
		Total Pregnancy	1.260 (-1.595, 4.115)	1.259 (-1.596, 4.114)	1.262 (-1.593, 4.118)	1.274 (-1.581, 4.130)
		First 4 weeks	-1.279 (-5.421, 2.864)	-0.200 (-4.404, 4.003)	-0.279 (-4.483, 3.925)	0.200 (-4.025, 4.426)
		First 6 weeks	-1.092 (-5.407, 3.222)	0.179 (-4.209, 4.566)	0.124 (-4.263, 4.512)	0.827 (-3.594, 5.248)
	NO ₂	First Trimester	-1.213 (-5.494, 3.067)	0.316 (-4.062, 4.695)	0.278 (-4.099, 4.655)	1.410 (-3.036, 5.856)
		Second Trimester	-9.857 (-14.022, -5.693)	-8.736 (-13.008, -4.464)	-8.648 (-12.92, -4.376)	-8.422 (-12.736, -4.108)
		Third Trimester	-7.934 (-12.34, -3.528)	-6.781 (-11.279, -2.283)	-6.387 (-10.91, -1.863)	-7.439 (-11.972, -2.906)
		Total Pregnancy	-0.671 (-3.343, 2.002)	-0.682 (-3.354, 1.990)	-0.682 (-3.354, 1.990)	-0.687 (-3.360, 1.985)
		First 4 weeks	1.044 (0.989, 1.102)	1.044 (0.989, 1.103)	1.047 (0.992, 1.106)	1.041 (0.985, 1.099)
Gestational Hypertension	PM _{2.5}	First 6 weeks	1.044 (0.992, 1.098)	1.045 (0.993, 1.100)	1.048 (0.996, 1.103)	1.041 (0.990, 1.096)
		First Trimester	1.059 (1.002, 1.120)	1.061 (1.003, 1.122)	1.064 (1.006, 1.126)	1.057 (1.000, 1.118)
		Second Trimester	1.014 (0.959, 1.073)	1.016 (0.960, 1.074)	1.017 (0.961, 1.076)	1.013 (0.957, 1.072)
		First 4 weeks	1.002 (0.968, 1.036)	1.003 (0.97, 1.038)	1.012 (0.977, 1.048)	1.004 (0.970, 1.040)
		First 6 weeks	0.991 (0.956, 1.027)	0.993 (0.958, 1.029)	1.003 (0.966, 1.041)	0.995 (0.959, 1.032)
	O ₃	First Trimester	0.990 (0.952, 1.029)	0.992 (0.954, 1.031)	1.006 (0.966, 1.049)	0.999 (0.960, 1.039)
		Second Trimester	0.989 (0.951, 1.029)	0.991 (0.952, 1.031)	1.005 (0.964, 1.047)	0.996 (0.956, 1.036)
		First 4 weeks	1.034 (0.982, 1.089)	1.034 (0.982, 1.090)	1.027 (0.975, 1.083)	1.031 (0.978, 1.086)
		First 6 weeks	1.014 (0.961, 1.071)	1.015 (0.961, 1.072)	1.008 (0.954, 1.065)	1.010 (0.956, 1.067)
		First Trimester	1.019 (0.964, 1.077)	1.021 (0.965, 1.079)	1.013 (0.958, 1.072)	1.016 (0.960, 1.075)
Gestational Hypertension	NO ₂	Second Trimester	1.041 (0.986, 1.099)	1.044 (0.988, 1.104)	1.042 (0.986, 1.101)	1.051 (0.995, 1.111)
		First 4 weeks	0.970 (0.929, 1.013)	0.967 (0.926, 1.010)	0.967 (0.926, 1.009)	0.967 (0.926, 1.009)
		First 6 weeks	0.968 (0.927, 1.012)	0.965 (0.923, 1.009)	0.964 (0.923, 1.008)	0.964 (0.923, 1.008)

PM _{2.5}	First Trimester	0.967 (0.924, 1.013)	0.963 (0.920, 1.008)	0.962 (0.919, 1.007)	0.962 (0.919, 1.007)
	Second Trimester	0.985 (0.941, 1.031)	0.981 (0.936, 1.027)	0.978 (0.934, 1.024)	0.978 (0.934, 1.024)
	Third Trimester	1.000 (0.954, 1.047)	0.994 (0.949, 1.042)	0.991 (0.946, 1.039)	0.991 (0.946, 1.039)
	Total Pregnancy	0.997 (0.963, 1.031)	0.997 (0.963, 1.031)	0.997 (0.963, 1.031)	0.997 (0.963, 1.031)
	First 4 weeks	1.006 (0.972, 1.042)	1.008 (0.974, 1.044)	1.003 (0.968, 1.039)	1.003 (0.968, 1.039)
	First 6 weeks	1.006 (0.970, 1.043)	1.008 (0.972, 1.046)	1.002 (0.966, 1.040)	1.002 (0.966, 1.040)
O ₃	First Trimester	1.004 (0.967, 1.044)	1.008 (0.970, 1.047)	1.000 (0.962, 1.040)	1.000 (0.962, 1.040)
	Second Trimester	0.982 (0.945, 1.021)	0.987 (0.949, 1.026)	0.980 (0.942, 1.020)	0.980 (0.942, 1.020)
	Third Trimester	0.961 (0.923, 1.002)	0.961 (0.923, 1.002)	0.961 (0.922, 1.002)	0.961 (0.922, 1.002)
	Total Pregnancy	0.998 (0.956, 1.041)	0.998 (0.956, 1.041)	0.998 (0.956, 1.041)	0.998 (0.956, 1.041)
	First 4 weeks	1.089 (1.031, 1.149)	1.080 (1.022, 1.141)	1.084 (1.026, 1.145)	1.084 (1.026, 1.145)
	First 6 weeks	1.106 (1.045, 1.170)	1.097 (1.036, 1.162)	1.101 (1.040, 1.166)	1.101 (1.040, 1.166)
	First Trimester	1.107 (1.046, 1.172)	1.098 (1.036, 1.163)	1.102 (1.040, 1.168)	1.102 (1.040, 1.168)
	Second Trimester	1.031 (0.976, 1.089)	1.018 (0.962, 1.077)	1.021 (0.965, 1.081)	1.021 (0.965, 1.081)
	Third Trimester	0.991 (0.936, 1.050)	0.978 (0.922, 1.038)	0.978 (0.922, 1.038)	0.978 (0.922, 1.038)
	Total Pregnancy	1.017 (0.977, 1.057)	1.016 (0.977, 1.057)	1.016 (0.977, 1.057)	1.016 (0.977, 1.057)

Models were adjusted for maternal education level, race, ethnicity, age, marital status, smoking, infant parity, zip code level percent below poverty, census tract level greenness, season of conception, and long-term trend using a natural cubic spline on conception date. IQRs: First 4 Weeks NO₂: 11.26 (µg/m³); First 6 Weeks NO₂: 11.16 (µg/m³); First Trimester NO₂: 10.90 (µg/m³); Second Trimester NO₂: 10.88 (µg/m³); Third Trimester NO₂: 11.01 (µg/m³); Total Pregnancy NO₂: 10.16 (µg/m³); First 4 Weeks PM_{2.5}: 3.56 (ppb); First 6 Weeks PM_{2.5}: 3.30 (ppb); First Trimester PM_{2.5}: 2.86 (ppb); Second Trimester PM_{2.5}: 2.89 (ppb); Third Trimester PM_{2.5}: 3.04 (ppb); Total Pregnancy PM_{2.5}: 2.86 (ppb); First 4 Weeks O₃: 15.81 (ppb); First 6 Weeks O₃: 15.56 (ppb); First Trimester O₃: 13.82 (ppb); Second Trimester O₃: 13.51 (ppb); Third Trimester O₃: 14.26 (ppb); Total Pregnancy O₃: 6.23 (ppb).

Table S6. Sensitivity analysis of adjusted ORs or mean differences and 95% CIs for preterm birth after excluded induction labor births per IQR increase in 3 ambient air pollutants in Kansas, U.S.A., with an estimated date of conception from January 1st, 2000, to December 31st, 2015 for different amounts of smoothing on conception date (degree of freedom = 5, 8, 10 or adjusted conception year as a categorical variable).

Outcome	Pollutant	Period of pregnancy	Adjusted OR/mean difference (95% CI) DF=5	Adjusted OR/mean difference (95% CI) DF=8	Adjusted OR/mean difference (95% CI) DF=10	Adjusted OR/mean difference (95% CI) Conception year as a factor variable
Preterm Birth	NO ₂	First 4 weeks	1.009 (0.980, 1.039)	1.006 (0.977, 1.036)	1.007 (0.978, 1.036)	1.006 (0.978, 1.036)
		First 6 weeks	1.012 (0.982, 1.042)	1.008 (0.978, 1.039)	1.009 (0.979, 1.039)	1.008 (0.979, 1.039)
		First Trimester	1.010 (0.979, 1.041)	1.006 (0.975, 1.037)	1.007 (0.977, 1.039)	1.007 (0.977, 1.039)
		Second Trimester	1.000 (0.970, 1.031)	0.996 (0.965, 1.027)	0.997 (0.967, 1.029)	0.997 (0.967, 1.029)
		Third Trimester	0.995 (0.966, 1.024)	0.990 (0.962, 1.020)	0.991 (0.963, 1.021)	0.990 (0.961, 1.019)
		Total Pregnancy	1.003 (0.973, 1.034)	0.998 (0.968, 1.029)	1.000 (0.970, 1.031)	0.999 (0.969, 1.031)
	PM _{2.5}	First 4 weeks	0.997 (0.973, 1.021)	0.996 (0.972, 1.020)	0.994 (0.971, 1.018)	0.990 (0.966, 1.015)
		First 6 weeks	0.993 (0.969, 1.018)	0.992 (0.968, 1.018)	0.991 (0.966, 1.016)	0.988 (0.963, 1.013)
		First Trimester	0.986 (0.960, 1.012)	0.987 (0.962, 1.013)	0.986 (0.960, 1.012)	0.987 (0.961, 1.014)
		Second Trimester	1.000 (0.974, 1.026)	1.004 (0.977, 1.030)	1.007 (0.981, 1.035)	1.005 (0.977, 1.032)
		Third Trimester	0.985 (0.962, 1.009)	0.988 (0.965, 1.012)	0.993 (0.969, 1.017)	0.988 (0.964, 1.013)
		Total Pregnancy	0.985 (0.955, 1.016)	0.989 (0.959, 1.02)	0.993 (0.962, 1.025)	0.990 (0.958, 1.022)
	O ₃	First 4 weeks	0.991 (0.954, 1.029)	0.984 (0.947, 1.023)	0.987 (0.950, 1.026)	0.983 (0.945, 1.022)
		First 6 weeks	1.003 (0.964, 1.044)	0.996 (0.957, 1.037)	0.999 (0.959, 1.040)	0.992 (0.952, 1.033)
		First Trimester	1.023 (0.984, 1.064)	1.015 (0.975, 1.056)	1.018 (0.978, 1.060)	1.007 (0.967, 1.049)
		Second Trimester	1.064 (1.024, 1.105)	1.055 (1.015, 1.097)	1.058 (1.018, 1.100)	1.054 (1.013, 1.097)
		Third Trimester	1.042 (1.006, 1.079)	1.033 (0.997, 1.071)	1.031 (0.995, 1.069)	1.033 (0.997, 1.071)
		Total Pregnancy	1.057 (1.028, 1.086)	1.050 (1.020, 1.082)	1.053 (1.022, 1.084)	1.047 (1.016, 1.078)

Models were adjusted for maternal education level, race, ethnicity, age, marital status, smoking, infant parity, zip code level percent below poverty, census tract level greenness, season of conception, and long-term trend using a natural cubic spline on conception date. IQRs: First 4 Weeks NO₂: 11.26 (µg/m³); First 6 Weeks NO₂: 11.16 (µg/m³); First Trimester NO₂: 10.90 (µg/m³); Second Trimester NO₂: 10.88 (µg/m³); Third Trimester NO₂: 11.01 (µg/m³); Total Pregnancy NO₂: 10.16 (µg/m³); First 4 Weeks PM_{2.5}: 3.56 (ppb); First 6 Weeks PM_{2.5}: 3.30 (ppb); First

Trimester PM_{2.5}: 2.86 (ppb); Second Trimester PM_{2.5}: 2.89 (ppb); Third Trimester PM_{2.5}: 3.04 (ppb); Total Pregnancy PM_{2.5}: 2.86 (ppb); First 4 Weeks O₃: 15.81 (ppb); First 6 Weeks O₃: 15.56 (ppb); First Trimester O₃: 13.82 (ppb); Second Trimester O₃: 13.51 (ppb); Third Trimester O₃: 14.26 (ppb); Total Pregnancy O₃: 6.23 (ppb).

Table S7. Sensitivity analysis of adjusted ORs or mean differences and 95% CIs for preterm birth, birth weight, gestational diabetes (GDM) and gestational hypertension (GH) per IQR increase in 3 ambient air pollutants in Kansas, U.S.A., with an estimated date of conception from January 1st, 2000, to December 31st, 2015, by adjusting trimester-average exposures (trimester 1, trimester 2, and trimester 3) simultaneously in the model.

Outcome	Pollutant	Period of pregnancy	Adjusted OR/mean difference (95% CI)
Preterm Birth	NO ₂	First Trimester	1.011 (0.974, 1.050)
		Second Trimester	0.981 (0.904, 1.065)
		Third Trimester	1.026 (0.998, 1.055)
	PM _{2.5}	First Trimester	0.999 (0.986, 1.012)
		Second Trimester	1.005 (0.983, 1.028)
		Third Trimester	1.003 (0.995, 1.010)
	O ₃	First Trimester	1.007 (0.960, 1.057)
		Second Trimester	0.964 (0.880, 1.056)
		Third Trimester	1.041 (1.008, 1.076)
Birthweight	NO ₂	First Trimester	0.988 (-4.3, 6.277)
		Second Trimester	5.089 (-1.373, 11.551)
		Third Trimester	-3.282 (-8.732, 2.168)
	PM _{2.5}	First Trimester	2.782 (-0.243, 5.808)
		Second Trimester	-1.392 (-4.471, 1.687)
		Third Trimester	1.535 (-1.726, 4.796)
	O ₃	First Trimester	-3.594 (-8.513, 1.324)
		Second Trimester	-8.239 (-12.566, -3.911)
		Third Trimester	-8.359 (-13.417, -3.301)
Gestational Diabetes	NO ₂	First Trimester	1.067 (1.002, 1.136)
		Second Trimester	0.984 (0.924, 1.049)
	PM _{2.5}	First Trimester	0.991 (0.953, 1.030)
		Second Trimester	0.991 (0.952, 1.031)
	O ₃	First Trimester	1.016 (0.961, 1.074)

		Second Trimester	1.040 (0.985, 1.098)
Gestational Hypertension	NO ₂	First Trimester	0.955 (0.894, 1.020)
		Second Trimester	1.001 (0.924, 1.085)
		Third Trimester	1.024 (0.957, 1.096)
	PM _{2.5}	First Trimester	1.019 (0.978, 1.060)
		Second Trimester	0.990 (0.950, 1.032)
		Third Trimester	0.948 (0.908, 0.989)
	O ₃	First Trimester	1.125 (1.055, 1.199)
		Second Trimester	1.011 (0.955, 1.070)
		Third Trimester	1.042 (0.976, 1.112)

Models were adjusted for maternal education level, race, ethnicity, age, marital status, smoking, infant parity, zip code level percent below poverty, census tract level greenness, season of conception, and long-term trend using a natural cubic spline on conception date. IQRs: First 4 Weeks NO₂: 11.26 (µg/m³); First 6 Weeks NO₂: 11.16 (µg/m³); First Trimester NO₂: 10.90 (µg/m³); Second Trimester NO₂: 10.88 (µg/m³); Third Trimester NO₂: 11.01 (µg/m³); Total Pregnancy NO₂: 10.16 (µg/m³); First 4 Weeks PM_{2.5}: 3.56 (ppb); First 6 Weeks PM_{2.5}: 3.30 (ppb); First Trimester PM_{2.5}: 2.86 (ppb); Second Trimester PM_{2.5}: 2.89 (ppb); Third Trimester PM_{2.5}: 3.04 (ppb); Total Pregnancy PM_{2.5}: 2.86 (ppb); First 4 Weeks O₃: 15.81 (ppb); First 6 Weeks O₃: 15.56 (ppb); First Trimester O₃: 13.82 (ppb); Second Trimester O₃: 13.51 (ppb); Third Trimester O₃: 14.26 (ppb); Total Pregnancy O₃: 6.23 (ppb).

Table S8. Sensitivity analysis of adjusted ORs or mean differences and 95% CIs for preterm birth, birth weight, gestational diabetes (GDM) and gestational hypertension (GH) per IQR increase in 3 ambient air pollutants in Kansas, U.S.A., with an estimated date of conception from January 1st, 2000, to December 31st, 2015, by adjusting three pollutants (NO₂, PM_{2.5}, O₃) simultaneously in the model.

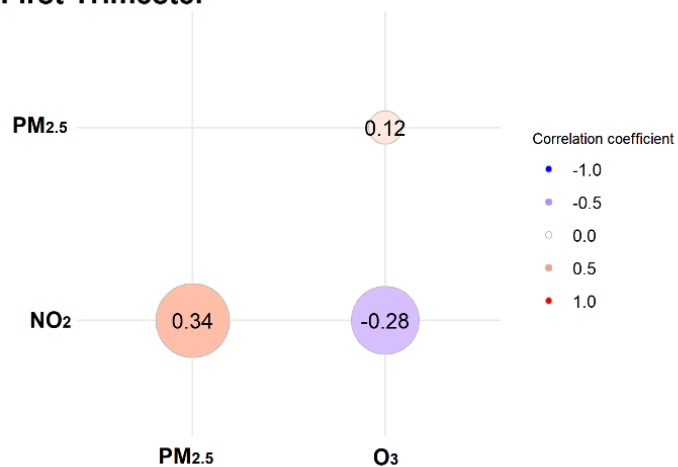
Outcome	Period of pregnancy	Pollutant	Adjusted OR/mean difference (95% CI)
Preterm Birth	First Trimester	NO ₂	1.016 (0.991, 1.041)
		PM _{2.5}	0.991 (0.971, 1.012)
		O ₃	1.021 (0.990, 1.053)
	Second Trimester	NO ₂	1.012 (0.988, 1.038)
		PM _{2.5}	0.998 (0.977, 1.019)
		O ₃	1.031 (1.000, 1.062)
	Third Trimester	NO ₂	1.014 (0.990, 1.039)
		PM _{2.5}	0.989 (0.970, 1.009)
		O ₃	1.035 (1.006, 1.065)
Birthweight	First Trimester	NO ₂	2.236 (-1.223, 5.694)
		PM _{2.5}	2.504 (-0.388, 5.395)
		O ₃	-1.036 (-5.380, 3.309)
	Second Trimester	NO ₂	2.428 (-1.016, 5.873)
		PM _{2.5}	-0.228 (-3.166, 2.709)
		O ₃	-9.449 (-13.661, -5.236)
	Third Trimester	NO ₂	0.119 (-3.410, 3.648)
		PM _{2.5}	2.207 (-0.901, 5.316)
		O ₃	-8.064 (-12.521, -3.607)
Gestational Diabetes	First Trimester	NO ₂	1.065 (1.007, 1.125)
		PM _{2.5}	0.985 (0.947, 1.024)
		O ₃	1.033 (0.976, 1.092)

Gestational Hypertension	Second Trimester	NO ₂	1.023 (0.967, 1.082)
		PM _{2.5}	0.985 (0.947, 1.025)
		O ₃	1.047 (0.991, 1.107)
	First Trimester	NO ₂	0.978 (0.933, 1.025)
		PM _{2.5}	1.002 (0.964, 1.042)
		O ₃	1.102 (1.041, 1.168)
	Second Trimester	NO ₂	0.992 (0.946, 1.039)
		PM _{2.5}	0.982 (0.944, 1.021)
		O ₃	1.031 (0.975, 1.090)
	Third Trimester	NO ₂	1.008 (0.961, 1.057)
		PM _{2.5}	0.949 (0.910, 0.989)
		O ₃	0.996 (0.940, 1.056)

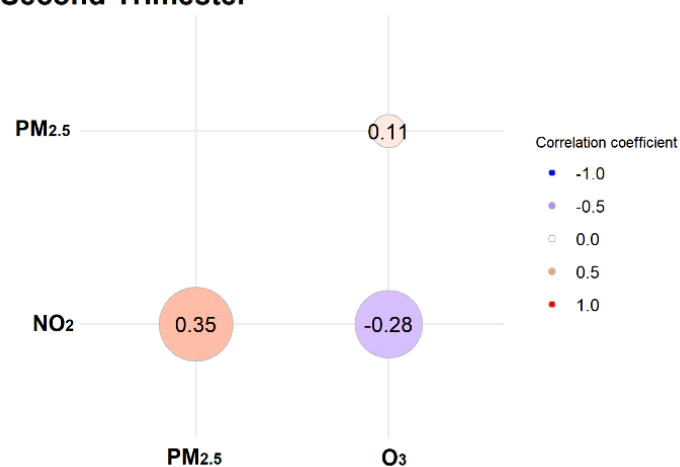
Models were adjusted for maternal education level, race, ethnicity, age, marital status, smoking, infant parity, zip code level percent below poverty, census tract level greenness, season of conception, and long-term trend using a natural cubic spline on conception date. IQRs: First 4 Weeks NO₂: 11.26 (µg/m³); First 6 Weeks NO₂: 11.16 (µg/m³); First Trimester NO₂: 10.90 (µg/m³); Second Trimester NO₂: 10.88 (µg/m³); Third Trimester NO₂: 11.01 (µg/m³); Total Pregnancy NO₂: 10.16 (µg/m³); First 4 Weeks PM_{2.5}: 3.56 (ppb); First 6 Weeks PM_{2.5}: 3.30 (ppb); First Trimester PM_{2.5}: 2.86 (ppb); Second Trimester PM_{2.5}: 2.89 (ppb); Third Trimester PM_{2.5}: 3.04 (ppb); Total Pregnancy PM_{2.5}: 2.86 (ppb); First 4 Weeks O₃: 15.81 (ppb); First 6 Weeks O₃: 15.56 (ppb); First Trimester O₃: 13.82 (ppb); Second Trimester O₃: 13.51 (ppb); Third Trimester O₃: 14.26 (ppb); Total Pregnancy O₃: 6.23 (ppb).

Figure S1. The correlation matrix of 3 pollutants for preterm birth cohort (N=596,926), Kansas, U.S.A., with an estimated date of conception from January 1st, 2000, to December 31st, 2015.

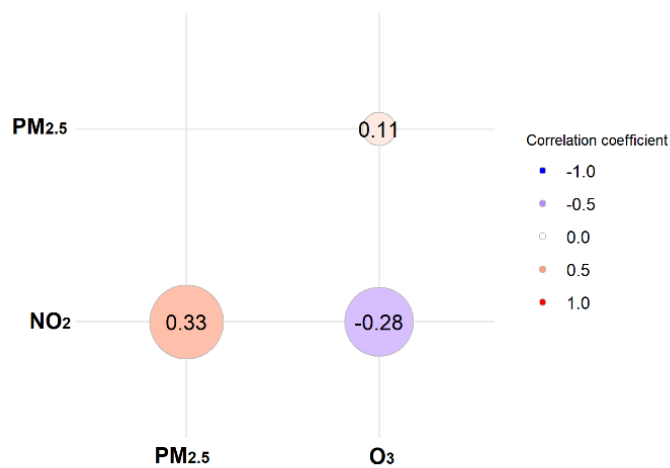
First Trimester



Second Trimester



Third Trimester



Total Pregnancy

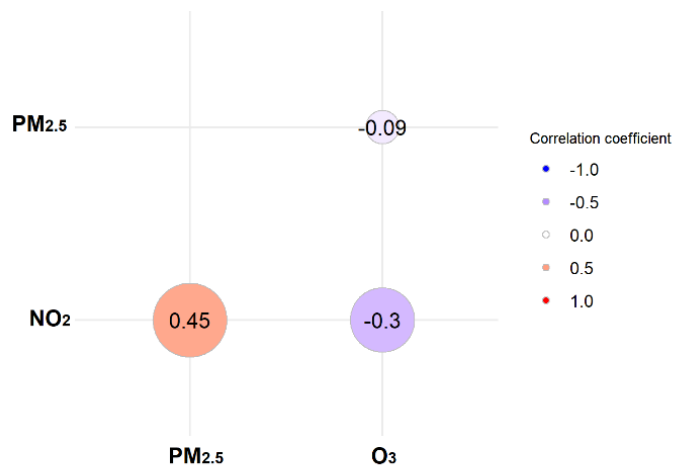
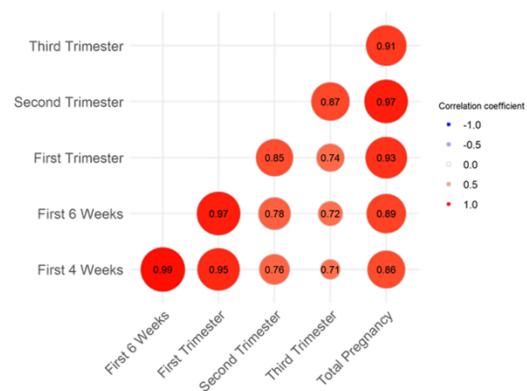
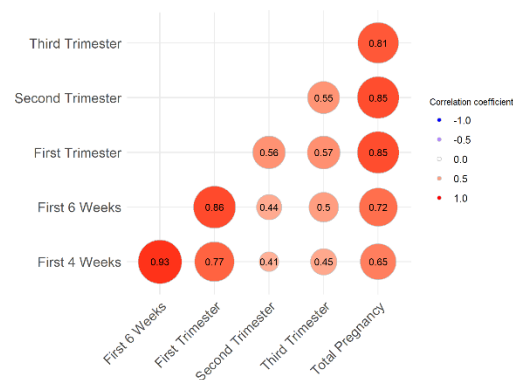


Figure S2. The correlation matrix of different exposure windows of 3 pollutants for preterm birth cohort (N=596,926), Kansas, U.S.A., with an estimated date of conception from January 1st, 2000, to December 31st, 2015.

NO₂



PM_{2.5}



O₃

