atmosphere

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Supplementary Materials:

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Table S1. Q-AIC values of model by changing df of the lag spaces for air pollutants.

Df of the lag spaces	Q-AIC Values
Df=2	19437.59
Df=3	19438.44
Df=4	19440.81
Df=5	19440.10
Df=6(main model)	**19437.30**
DF=7	19438.21
DF=8	19439.33
DF=9	19439.47

* Estimates were generated using distributed lag linear model, adjusted for calendar day; Q-AIC, Quasi Akaike information criteria, its corresponding formula is as follows: Q-AIC = −2(maximum log-likelihood) + 2df*$\hat{\varphi}$, where $\hat{\varphi}$ is the estimated overdispersion parameter.

Table S2. Descriptive statistics for yearly number of circulatory disease emergency dispatches, air pollutants, and temperature in Shenzhen, 2003–2020.

Variables	2013	2014	2015	2016	2017	2018	2019	2020
Circulatory EADs								
Mean(SD)	29.32(5.96)	31.13(6.31)	33.72(6.62)	40.30(7.10)	41.71(7.20)	45.78(8.12)	47.16(8.85)	46.64(9.46)
Median(P25, P75)	29.0(25.0, 33.0)	31.0(27.0, 35.0)	34.0(29.0, 38.0)	40.0(35.0, 45.0)	42.0(36.0, 47.0)	46.0(40.0, 51.0)	47.0(41.0, 52.0)	46.0(40.0, 52.0)
Min ,Max	15,50	16,50	18,53	25,65	24,64	26,70	23,84	23,78
$PM_{2.5}$(μg/m³)								
Mean(SD)	38.96(25.71)	34.54(20.12)	30.01(17.29)	27.30(14.44)	28.58(15.21)	26.20(12.96)	24.17(13.10)	19.31(11.28)
Median(P25, P75)	33.8(18.6, 51.6)	31.1(16.7, 47.7)	26.7(16.5, 40.2)	24.4(16.4, 36.0)	26.1(16.6, 38.3)	24.1(16.7, 33.9)	21.5(13.8, 32.4)	17.7(9.3,26.3)
Min, Max								
Temperature(℃)	5.40,135.60	7.14,107.14	7.33,109.33	5.57,103.00	6.75,85.38	6.18,103.09	5.09,74.00	3.91,60.64
Mean(SD)	23.12(5.16)	23.28(5.95)	23.96(5.24)	23.20(5.87)	23.66(5.18)	23.40(5.41)	24.03(4.52)	23.85(4.96)
Median(P25, P75)	24.2(19.4, 27.7)	24.6(18.9, 28.7)	25.6(19.3, 28.2)	25.0(18.7, 27.9)	24.3(19.5, 28.6)	24.4(20.0, 27.8)	24.9(20.7, 28.0)	24.4(20.1, 28.4)
Min ,Max	9.8,31.2	6.0,31.0	11.9,33.0	3.5,32.2	9.6,32.4	6.6,30.8	11.3,30.9	9.4,30.7

Abbreviations: EADs, emergency ambulance dispatches; SD, standard deviation; Min, minimum; Px, xth percentiles; Max, maximum; PM2.5, particulate matter less than 10 μm in aerodynamic diameter.

Table S3. Percentage increase (95% *CI*) of circulatory EADs for each 10 μg/m^3 increment in $PM_{2.5}$ with adjustment for co-pollutants.

Pollution	Group	Effect	Percentage increase in death (95% *CI*) [b]				
			Lag0-1	Lag0-2	Lag0-3	Lag0-4	Lag0-5
$PM_{2.5}$							
adjusted by PM_{10}							
	All [a]	Full year	**1.34(0.21,2.48)**	**1.67(0.51,2.84)**	**1.77(0.50,3.07)**	**1.66(0.37,2.97)**	1.33(-0.02,2.70)
		Cold season	**2.14(0.28,4.03)**	**2.71(0.78,4.67)**	**2.97(0.85,5.14)**	**2.79(0.60,5.03)**	2.11(-0.24,4.52)
		Warm season	0.72(-0.77,2.23)	0.78(-0.75,2.33)	0.62(-1.06,2.33)	0.40(-1.28,2.11)	0.18(-1.55,1.93)
	Females	Full year	1.58(-0.15,3.34)	1.39(-0.38,3.19)	1.13(-0.81,3.11)	1.32(-0.65,3.33)	**2.22(0.13,4.35)**
		Cold season	2.89(-0.08,5.95)	**3.50(0.41,6.67)**	**3.68(0.28,7.19)**	3.43(-0.09,7.07)	2.75(-1.04,6.69)
		Warm season	0.58(-1.60,2.81)	-0.21(-2.42,2.06)	-0.91(-3.33,1.57)	-0.72(-3.16,1.78)	0.79(-1.75,3.40)
	Males	Full year	1.13(-0.31,2.59)	**1.88(0.39,3.38)**	**2.30(0.67,3.96)**	**2.02(0.37,3.71)**	0.85(-0.86,2.60)
		Cold season	1.32(-1.05,3.76)	2.04(-0.43,4.57)	2.54(-0.19,5.35)	2.46(-0.37,5.38)	1.63(-1.43,4.78)
		Warm season	0.83(-1.06,2.75)	1.40(-0.55,3.37)	1.56(-0.57,3.75)	1.04(-1.09,3.22)	-0.30(-2.47,1.90)
	<65 years	Full year	1.46(-0.01,2.95)	**1.89(0.39,3.42)**	**2.10(0.43,3.78)**	**2.03(0.34,3.75)**	1.68(-0.09,3.48)
		Cold season	2.07(-0.26,4.46)	**3.03(0.60,5.52)**	**3.72(1.03,6.48)**	**3.81(1.02,6.68)**	**3.13(0.11,6.24)**
		Warm season	1.12(-0.86,3.15)	1.08(-0.95,3.15)	0.78(-1.45,3.06)	0.49(-1.75,2.78)	0.35(-1.95,2.69)
	≥65 years	Full year	1.13(-0.60,2.88)	1.40(-0.38,3.20)	1.47(-0.48,3.46)	1.35(-0.62,3.37)	1.05(-1.01,3.15)
		Cold season	1.83(-1.21,4.97)	1.98(-1.17,5.24)	1.78(-1.69,5.36)	1.20(-2.37,4.91)	0.27(-3.57,4.26)
		Warm season	0.16(-2.00,2.37)	0.28(-1.94,2.55)	0.26(-2.18,2.75)	0.11(-2.34,2.61)	-0.16(-2.66,2.40)
adjusted by NO_2							
	All [a]	Full year	**0.81(0.09,1.54)**	**0.96(0.21,1.71)**	**1.02(0.20,1.85)**	0.83(-0.03,1.69)	0.28(-0.65,1.23)
		Cold season	**1.44(0.33,2.57)**	**1.94(0.78,3.11)**	**2.36(1.11,3.63)**	**2.38(1.09,3.69)**	**1.83(0.44,3.24)**
		Warm season	0.35(-0.64,1.36)	0.31(-0.73,1.35)	0.19(-0.95,1.34)	-0.06(-1.26,1.15)	-0.46(-1.80,0.90)
	Females	Full year	0.90(-0.21,2.01)	0.67(-0.48,1.83)	0.42(-0.84,1.69)	0.24(-1.07,1.57)	0.19(-1.25,1.66)

		Cold season	**2.08(0.32,3.88)**	**2.24(0.41,4.11)**	**2.30(0.32,4.31)**	**2.28(0.25,4.36)**	**2.21(0.03,4.45)**
		Warm season	0.38(-1.08,1.87)	0.05(-1.48,1.60)	-0.24(-1.91,1.46)	-0.27(-2.03,1.53)	0.08(-1.91,2.10)
	Males	Full year	0.80(-0.12,1.73)	**1.19(0.22,2.16)**	**1.44(0.39,2.51)**	**1.22(0.12,2.33)**	0.32(-0.88,1.54)
		Cold season	1.23(-0.19,2.67)	**1.94(0.46,3.45)**	**2.58(0.97,4.22)**	**2.61(0.96,4.30)**	1.77(-0.01,3.57)
		Warm season	0.31(-0.95,1.58)	0.43(-0.89,1.76)	0.39(-1.05,1.85)	-0.03(-1.55,1.51)	-0.96(-2.64,0.76)
	<65 years	Full year	0.66(-0.27,1.60)	0.57(-0.40,1.55)	0.39(-0.66,1.45)	0.03(-1.07,1.14)	-0.56(-1.76,0.66)
		Cold season	**1.89(0.50,3.30)**	**2.34(0.90,3.81)**	**2.67(1.11,4.26)**	**2.64(1.03,4.27)**	**2.13(0.41,3.89)**
		Warm season	-0.14(-1.44,1.18)	-0.58(-1.93,0.79)	-1.07(-2.54,0.44)	-1.53(-3.08,0.05)	-1.94(-3.67,-0.17)
	≥65 years	Full year	**1.16(0.03,2.29)**	**1.65(0.47,2.84)**	**2.06(0.77,3.36)**	**2.09(0.75,3.46)**	**1.62(0.14,3.12)**
		Cold season	1.08(-0.75,2.93)	1.62(-0.28,3.56)	**2.15(0.09,4.25)**	**2.24(0.12,4.41)**	1.69(-0.58,4.01)
		Warm season	1.08(-0.40,2.57)	1.57(0.02,3.14)	**1.93(0.23,3.67)**	**1.98(0.18,3.81)**	1.61(-0.40,3.66)
adjusted by SO_2							
	All [a]	Full year	**0.80(0.05,1.56)**	**1.11(0.30,1.93)**	**1.29(0.38,2.20)**	**1.26(0.30,2.22)**	0.99(-0.06,2.06)
		Cold season	**1.15(0.05,2.25)**	**1.73(0.59,2.89)**	**2.15(0.88,3.43)**	**2.09(0.77,3.43)**	1.41(-0.02,2.85)
		Warm season	0.26(-0.82,1.36)	0.32(-0.85,1.52)	0.31(-1.01,1.64)	0.32(-1.09,1.75)	0.41(-1.15,2.00)
	Females	Full year	0.90(-0.25,2.07)	1.05(-0.19,2.30)	1.17(-0.21,2.56)	1.42(-0.05,2.90)	**1.87(0.24,3.52)**
		Cold season	**1.77(0.03,3.53)**	**2.12(0.30,3.97)**	**2.34(0.33,4.40)**	**2.49(0.39,4.64)**	**2.59(0.31,4.93)**
		Warm season	0.06(-1.51,1.66)	0.11(-1.60,1.86)	0.28(-1.64,2.23)	0.78(-1.28,2.89)	1.75(-0.56,4.11)
	Males	Full year	0.82(-0.15,1.80)	**1.24(0.20,2.29)**	**1.45(0.29,2.62)**	**1.25(0.03,2.49)**	0.55(-0.80,1.91)
		Cold season	0.86(-0.54,2.27)	**1.66(0.18,3.15)**	**2.26(0.62,3.93)**	**2.14(0.43,3.87)**	1.02(-0.82,2.89)
		Warm season	0.48(-0.89,1.88)	0.50(-1.00,2.02)	0.29(-1.38,1.98)	-0.06(-1.84,1.74)	-0.51(-2.47,1.49)
	<65 years	Full year	0.98(-0.00,1.96)	**1.21(0.16,2.26)**	**1.28(0.11,2.46)**	1.20(-0.04,2.45)	0.98(-0.39,2.36)
		Cold season	**1.43(0.06,2.82)**	**2.03(0.60,3.49)**	**2.45(0.86,4.07)**	2.44(0.78,4.13)	**1.88(0.09,3.71)**
		Warm season	0.41(-1.03,1.86)	0.30(-1.26,1.88)	0.08(-1.65,1.85)	-0.02(-1.87,1.88)	0.12(-1.95,2.23)
	≥65 years	Full year	0.71(-0.46,1.90)	1.15(-0.11,2.43)	**1.49(0.08,2.91)**	**1.57(0.08,3.09)**	1.35(-0.30,3.02)

		Cold season	0.92(-0.88,2.75)	1.55(-0.34,3.48)	2.04(-0.06,4.18)	2.00(-0.19,4.24)	1.26(-1.10,3.67)
		Warm season	0.23(-1.36,1.84)	0.46(-1.27,2.23)	0.64(-1.30,2.62)	0.80(-1.27,2.92)	0.95(-1.35,3.31)
adjusted by CO							
	All [a]	Full year	**1.13(0.41,1.85)**	**1.31(0.57,2.05)**	**1.34(0.55,2.14)**	**1.34(0.53,2.15)**	**1.33(0.46,2.21)**
		Cold season	1.14(-0.11,2.39)	**1.57(0.29,2.86)**	**1.95(0.58,3.34)**	**2.26(0.84,3.69)**	**2.45(0.90,4.03)**
		Warm season	**1.00(0.04,1.96)**	**0.99(0.02,1.98)**	0.82(-0.24,1.88)	0.71(-0.37,1.80)	0.77(-0.39,1.94)
	Femal es	Full year	0.94(-0.16,2.05)	0.69(-0.43,1.82)	0.41(-0.79,1.63)	0.46(-0.76,1.71)	1.04(-0.29,2.39)
		Cold season	1.19(-0.80,3.22)	1.39(-0.66,3.48)	1.61(-0.58,3.85)	2.01(-0.24,4.32)	**2.68(0.21,5.22)**
		Warm season	0.99(-0.40,2.40)	0.61(-0.81,2.06)	0.19(-1.35,1.74)	0.26(-1.31,1.86)	1.11(-0.59,2.84)
	Males	Full year	**1.36(0.44,2.29)**	**1.82(0.87,2.77)**	**2.05(1.03,3.08)**	**1.99(0.95,3.04)**	**1.61(0.49,2.74)**
		Cold season	1.46(-0.15,3.10)	**2.04(0.37,3.73)**	**2.50(0.71,4.32)**	**2.76(0.91,4.64)**	**2.77(0.76,4.82)**
		Warm season	1.11(-0.10,2.33)	**1.34(0.10,2.60)**	1.31(-0.04,2.67)	1.04(-0.33,2.42)	0.55(-0.91,2.04)
	<65 years	Full year	**1.04(0.10,1.98)**	**1.08(0.12,2.04)**	1.00(-0.03,2.03)	0.96(-0.09,2.02)	1.06(-0.07,2.20)
		Cold season	**1.69(0.11,3.29)**	**2.10(0.48,3.75)**	**2.40(0.66,4.17)**	**2.65(0.86,4.48)**	**2.89(0.93,4.89)**
		Warm season	0.81(-0.45,2.09)	0.58(-0.71,1.89)	0.24(-1.15,1.66)	0.15(-1.27,1.60)	0.48(-1.05,2.04)
	≥65 years	Full year	**1.50(0.40,2.62)**	**1.88(0.75,3.03)**	**2.06(0.84,3.30)**	**2.09(0.84,3.35)**	**1.98(0.64,3.34)**
		Cold season	**1.48(0.09,2.89)**	**1.78(0.35,3.24)**	**1.79(0.24,3.37)**	2.14(-0.21,4.54)	2.51(-0.06,5.15)
		Warm season	0.83(-1.22,2.92)	1.25(-0.86,3.41)	1.71(-0.56,4.03)	**1.61(0.02,3.22)**	1.27(-0.42,2.99)
adjusted by O_3							
	All [a]	Full year	**1.25(0.52,1.97)**	**1.65(0.87,2.44)**	**1.92(1.05,2.81)**	**2.06(1.14,3.00)**	**2.08(1.07,3.09)**
		Cold season	**1.76(0.49,3.05)**	**2.54(1.14,3.97)**	**3.18(1.58,4.81)**	**3.52(1.82,5.25)**	**3.49(1.64,5.36)**
		Warm season	0.89(-0.03,1.83)	**1.16(0.17,2.15)**	**1.28(0.18,2.40)**	**1.34(0.18,2.52)**	**1.37(0.12,2.64)**
	Femal es	Full year	0.91(-0.20,2.02)	1.08(-0.11,2.28)	1.24(-0.10,2.59)	**1.54(0.13,2.97)**	**2.06(0.52,3.62)**
		Cold season	1.59(-0.42,3.65)	2.18(-0.04,4.45)	**2.78(0.26,5.36)**	**3.43(0.75,6.18)**	**4.16(1.24,7.16)**
		Warm season	0.73(-0.62,2.10)	0.84(-0.61,2.31)	0.90(-0.72,2.54)	1.10(-0.61,2.83)	1.54(-0.31,3.42)

	Males	Full year	**1.52(0.59,2.45)**	**2.06(1.06,3.07)**	**2.38(1.26,3.52)**	**2.40(1.22,3.60)**	**2.08(0.80,3.38)**
		Cold season	**1.90(0.27,3.55)**	**2.84(1.03,4.68)**	**3.58(1.53,5.68)**	**3.85(1.67,6.08)**	**3.52(1.16,5.94)**
		Warm season	1.07(-0.10,2.26)	**1.40(0.14,2.67)**	**1.51(0.11,2.93)**	1.44(-0.03,2.93)	1.19(-0.39,2.80)
	<65 years	Full year	**1.36(0.42,2.31)**	**1.75(0.73,2.77)**	**2.01(0.86,3.16)**	**2.19(0.98,3.41)**	**2.33(1.02,3.66)**
		Cold season	**1.61(0.03,3.22)**	**2.69(0.94,4.48)**	**3.65(1.65,5.69)**	**4.13(2.00,6.29)**	**3.93(1.63,6.28)**
		Warm season	1.18(-0.05,2.42)	1.28(-0.03,2.61)	1.26(-0.20,2.75)	1.37(-0.17,2.93)	**1.73(0.06,3.43)**
	≥65 years	Full year	**1.20(0.09,2.32)**	**1.63(0.43,2.84)**	**1.90(0.56,3.27)**	**1.99(0.57,3.42)**	**1.86(0.33,3.42)**
		Cold season	**2.11(0.02,4.25)**	**2.42(0.11,4.78)**	2.62(-0.00,5.30)	**2.96(0.18,5.82)**	**3.60(0.57,6.71)**
		Warm season	0.67(-0.68,2.04)	1.13(-0.32,2.60)	1.41(-0.21,3.06)	1.37(-0.33,3.10)	0.93(-0.89,2.79)

[a] "All" meant daily EADs count, not stratified by sex and age.

[b] Estimates were generated using a distributed lag linear model, adjusted for calendar day [natural cubic spline with 6 df for full year and 4 df for seasonal analysis], day of the week, holiday, temperature (lag0, natural smooth function, 3df), humidity (lag0, natural smooth function, 3df).

Bold represents statistically significant results at the 5% level (P<0.05).

Table S4. Percentage increase (95% *CI*) of circulatory disease EADs for each 10 μg/m^3 increment in $PM_{2.5}$ with adjustment for co-pollutants across temperature levels.

Pollution	**Group**	Temperature levels [b]	Percentage increase in death (95% *CI*)[c]				
			Lag0-1	Lag0-2	Lag0-3	Lag0-4	Lag0-5
$PM_{2.5}$							
adjusted by PM_{10}							
	All [a]	Low	**1.65(0.62,2.70)**	**1.59(0.48,2.72)**	**1.75(0.56,2.96)**	**1.69(0.43,2.97)**	**1.53(0.20,2.88)**
		High	0.60(-0.58,1.80)	0.47(-0.80,1.76)	0.76(-0.59,2.13)	0.75(-0.66,2.18)	0.56(-0.91,2.04)
	Females	Low	**2.58(1.15,4.02)**	**2.54(1.03,4.07)**	**2.87(1.30,4.46)**	**3.15(1.53,4.80)**	**3.36(1.70,5.05)**
		High	1.18(-0.41,2.79)	1.11(-0.56,2.81)	1.53(-0.21,3.30)	1.73(-0.07,3.56)	1.81(-0.03,3.69)
	Males	Low	**2.59(1.45,3.72)**	**2.99(1.77,4.22)**	**3.23(1.96,4.51)**	**3.17(1.86,4.49)**	**2.95(1.61,4.32)**
		High	1.14(-0.14,2.43)	**1.44(0.09,2.81)**	**1.72(0.31,3.15)**	**1.71(0.26,3.19)**	**1.56(0.06,3.08)**
	<65 years	Low	**2.87(1.62,4.12)**	**2.96(1.64,4.32)**	**2.97(1.60,4.36)**	**2.89(1.48,4.32)**	**2.66(1.21,4.12)**
		High	1.31(-0.07,2.70)	1.30(-0.15,2.77)	1.49(-0.02,3.03)	1.48(-0.07,3.06)	1.31(-0.29,2.92)

	≥65 years	Low	**2.37(0.98,3.72.65(1.17,4.12.96(1.41,4.9)**	**6)**	**53)**	**2.98(1.38, 4.60)**	**2.89(1.24, 4.56)**
		High	0.93(-0.66,2.54)	1.01(-0.67,2.73)	1.40(-0.37,3.19)	1.46(-0.36,3.32)	1.34(-0.55,3.26)
adjusted by NO_2							
	All [a]	Low	**1.26(0.52,2.01.24(0.44,2.01.21(0.35,2.0)**	**4)**	**07)**	**0.94(0.04, 1.86)**	0.61(-0.35,1.57)
		High	0.27(-0.60,1.15)	0.21(-0.71,1.14)	0.34(-0.64,1.32)	0.17(-0.85,1.19)	-0.15(-1.20,0.91)
	Females	Low	**1.42(0.25,2.61.27(0.00,2.51)**	**5)**	1.29(-0.06,2.65)	1.15(-0.25,2.58)	1.16(-0.30,2.64)
		High	0.30(-1.00,1.61)	0.19(-1.18,1.58)	0.35(-1.09,1.81)	0.22(-1.27,1.74)	0.13(-1.41,1.69)
	Males	Low	**1.41(0.47,2.31.52(0.49,2.51.43(0.34,2.6)**	**5)**	**52)**	1.13(-0.01,2.28)	0.72(-0.46,1.92)
		High	0.31(-0.73,1.36)	0.38(-0.73,1.50)	0.38(-0.79,1.56)	0.19(-1.02,1.42)	-0.09(-1.33,1.18)
	<65 years	Low	**1.51(0.48,2.51.21(0.10,2.35)**	**3)**	0.92(-0.25,2.11)	0.65(-0.57,1.88)	0.26(-1.00,1.54)
		High	0.34(-0.78,1.47)	0.03(-1.16,1.22)	-0.02(-1.27,1.23)	-0.19(-1.47,1.12)	-0.47(-1.80,0.87)
	≥65 years	Low	**1.29(0.12,2.41.63(0.36,2.91.75(0.39,3.7)**	**3)**	**13)**	**1.52(0.10, 2.97)**	**1.50(0.01, 3.02)**
		High	0.04(-1.27,1.38)	0.19(-1.22,1.63)	0.39(-1.11,1.91)	0.26(-1.30,1.84)	0.18(-1.44,1.83)
adjusted by SO_2							
	All [a]	Low	**1.26(0.47,2.01.33(0.46,2.21.56(0.61,2.6)**	**2)**	**52)**	**1.50(0.48, 2.54)**	**1.32(0.23, 2.43)**
		High	0.20(-0.70,1.10)	0.21(-0.76,1.18)	0.54(-0.50,1.59)	0.56(-0.53,1.66)	0.37(-0.77,1.52)
	Females	Low	**2.22(0.98,3.42.52(1.16,3.93.11(1.66,4.8)**	**0)**	**58)**	**3.40(1.88, 4.94)**	**3.68(2.10, 5.29)**
		High	0.67(-0.63,1.99)	0.85(-0.53,2.25)	1.40(-0.05,2.88)	**1.62(0.10, 3.16)**	**1.72(0.15, 3.32)**
	Males	Low	**2.03(1.03,3.02.42(1.32,3.52.67(1.49,3.4)**	**4)**	**86)**	**2.66(1.43, 3.91)**	**2.43(1.15, 3.73)**
		High	0.60(-0.45,1.66)	0.83(-0.29,1.96)	1.06(-0.12,2.26)	1.11(-0.12,2.36)	0.98(-0.29,2.27)
	<65 years	Low	**2.94(1.85,4.03.06(1.86,4.23.14(1.85,4.5)**	**7)**	**43)**	**3.01(1.68, 4.36)**	**2.71(1.32, 4.11)**
		High	**1.19(0.06,2.32)**	1.13(-0.06,2.34)	**1.36(0.10,2.64)**	**1.36(0.05, 2.69)**	1.17(-0.18,2.55)
	≥65 years	Low	0.75(-0.48,1.99)	1.19(-0.17,2.58)	**1.56(0.09,3.06)**	**1.60(0.06, 3.16)**	**1.63(0.01, 3.27)**
		High	-0.51(-1.82,0.82)	-0.31(-1.72,1.13)	0.05(-1.44,1.57)	0.12(-1.44,1.71)	0.07(-1.56,1.73)
adjusted by CO							

	All[a]	Low	1.36(0.66,2.07)	1.39(0.64,2.14)	1.48(0.69,2.28)	1.50(0.67, 2.33)	1.39(0.53, 2.26)
		High	0.31(-0.60,1.23)	0.25(-0.71,1.21)	0.46(-0.53,1.47)	0.52(-0.51,1.55)	0.38(-0.67,1.44)
	Females	Low	1.78(0.73,2.85)	1.76(0.64,2.89)	1.95(0.80,3.11)	2.16(0.98, 3.36)	2.25(1.04, 3.47)
		High	0.40(-0.93,1.75)	0.32(-1.07,1.73)	0.59(-0.85,2.04)	0.71(-0.76,2.21)	0.68(-0.83,2.21)
	Males	Low	2.23(1.38,3.09)	2.44(1.54,3.35)	2.54(1.60,3.48)	2.49(1.52, 3.46)	2.36(1.37, 3.35)
		High	0.83(-0.24,1.92)	0.95(-0.18,2.09)	1.08(-0.09,2.27)	1.09(-0.12,2.30)	1.00(-0.23,2.25)
	<65 years	Low	2.20(1.27,3.15)	2.16(1.18,3.15)	2.22(1.20,3.25)	2.19(1.15, 3.23)	2.11(1.05, 3.18)
		High	0.57(-0.59,1.74)	0.45(-0.76,1.67)	0.71(-0.54,1.98)	0.75(-0.53,2.05)	0.75(-0.57,2.08)
	≥65 years	Low	1.94(0.89,3.00)	2.14(1.03,3.27)	2.18(1.02,3.35)	2.12(0.93, 3.31)	1.95(0.73, 3.18)
		High	0.76(-0.61,2.14)	0.72(-0.72,2.18)	0.79(-0.70,2.31)	0.75(-0.79,2.31)	0.52(-1.06,2.12)
adjusted by O_3							
	All[a]	Low	**1.50(0.79,2.21)**	**1.68(0.88,2.48)**	**1.97(1.11,2.85)**	**2.05(1.13, 2.98)**	**2.03(1.05, 3.01)**
		High	0.57(-0.41,1.56)	0.71(-0.35,1.78)	**1.20(0.07,2.34)**	**1.30(0.13, 2.49)**	**1.25(0.04, 2.47)**
	Females	Low	**1.72(0.70,2.75)**	**1.70(0.61,2.81)**	**1.96(0.81,3.11)**	**2.24(1.06, 3.44)**	**2.28(1.05, 3.51)**
		High	0.28(-1.11,1.70)	0.17(-1.33,1.68)	0.54(-1.02,2.13)	0.79(-0.82,2.43)	0.68(-0.97,2.35)
	Males	Low	**2.16(1.34,2.99)**	**2.37(1.49,3.27)**	**2.53(1.61,3.47)**	**2.51(1.55, 3.48)**	**2.48(1.49, 3.48)**
		High	0.80(-0.33,1.95)	0.92(-0.29,2.15)	1.18(-0.10,2.47)	1.21(-0.10,2.55)	1.29(-0.06,2.65)
	<65 years	Low	**2.11(1.21,3.02)**	**2.05(1.09,3.03)**	**2.07(1.06,3.09)**	**2.05(1.01, 3.11)**	**1.96(0.89, 3.05)**
		High	0.20(-1.01,1.43)	0.13(-1.17,1.44)	0.37(-0.99,1.75)	0.47(-0.92,1.88)	0.48(-0.94,1.93)
	≥65 years	Low	**1.67(0.67,2.68)**	**1.94(0.85,3.05)**	**2.17(1.02,3.33)**	**2.24(1.05, 3.44)**	**2.29(1.06, 3.55)**
		High	0.75(-0.68,2.19)	0.71(-0.83,2.28)	1.07(-0.55,2.72)	1.19(-0.48,2.89)	1.27(-0.45,3.01)

[a] "All" meant daily EADs count, not stratified by sex and age.[b] Using the median of temperature (24.7℃) as the cut-off value.[c] Estimates were generated using GAM combined with stratification parametric model.

Bold represents statistically significant results at the 5% level (P<0.05).

Table S5. Percentage increase (95% *CI*) of circulatory EADs for each 10 μg/m^3 increment in $PM_{2.5}$ excluding post-COVID-19 data-.

Pollution	Group	Effect	Percentage increase in death (95% *CI*) [b]				
			Lag0-1	Lag0-2	Lag0-3	Lag0-4	Lag0-5
$PM_{2.5}$							
	All [a]	Full year	**0.90(0.25,1.55)**	**1.14(0.46,1.81)**	**1.24(0.51,1.98)**	**1.24(0.48,2.01)**	**1.14(0.31,1.97)**
		Cold season	**1.46(0.55,2.37)**	**1.65(0.73,2.58)**	**1.73(0.74,2.74)**	**1.90(0.91,2.89)**	**2.26(1.27,3.26)**
		Warm season	0.64(-0.33,1.62)	**1.02(0.03,2.01)**	**1.06(0.01,2.13)**	0.95(-05,2.01)	0.89(-0.16,1.94)
	Females	Full year	0.58(-0.41,1.58)	0.57(-0.46,1.62)	0.54(-0.59,1.68)	0.61(-0.56,1.79)	0.86(-0.42,2.15)
		Cold season	1.10(-0.12,2.34)	**1.28(0.04,2.54)**	**1.43(0.09,2.78)**	**1.71(0.39,3.05)**	**2.24(0.91,3.59)**
		Warm season	0.24(-1.41,1.93)	0.07(-1.60,1.76)	-0.15(-1.93,1.67)	-0.26(-2.02,1.52)	-0.21(-1.94,1.55)
	Males	Full year	**1.14(0.31,1.99)**	**1.54(0.67,2.42)**	**1.74(0.79,2.70)**	**1.67(0.69,2.66)**	**1.30(0.23,2.38)**
		Cold season	**1.77(0.73,2.82)**	**2.24(1.19,3.31)**	**2.46(1.32,3.61)**	**2.46(1.34,3.59)**	**2.25(1.13,3.39)**
		Warm season	0.98(-0.39,2.36)	1.24(-0.15,2.64)	1.32(-0.17,2.82)	1.21(-0.25,2.68)	0.89(-0.54,2.35)
	<65 years	Full year	**0.90(0.08,1.74)**	**1.06(0.20,1.92)**	**1.10(0.17,2.05)**	**1.11(0.14,2.09)**	**1.11(0.05,2.18)**
		Cold season	**1.46(0.41,2.53)**	**1.64(0.57,2.73)**	**1.70(0.55,2.86)**	**1.83(0.69,2.98)**	**2.14(0.99,3.30)**
		Warm season	0.60(-0.73,1.94)	0.70(-0.64,2.06)	0.70(-0.73,2.16)	0.62(-0.79,2.06)	0.48(-0.92,1.89)
	≥65 years	Full year	0.96(-0.05,1.98)	**1.32(0.27,2.39)**	**1.52(0.37,2.68)**	**1.48(0.29,2.68)**	1.16(-0.13,2.47)
		Cold season	1.56(0.32,2.82)	**2.17(0.90,3.45)**	**2.56(1.20,3.95)**	**2.65(1.31,4.02)**	2.40(1.05,3.77)
		Warm season	0.80(-0.97,2.60)	0.83(-0.96,2.66)	0.71(-1.21,2.67)	0.53(-1.35,2.45)	0.34(-1.51,2.23

[a] "All" meant daily EADs count, not stratified by sex and age.

[b] Estimates were generated using distributed lag linear model, adjusted for calendar day [natural cubic spline with 6 df for full year and 4 df for seasonal analysis], day of the week, holiday, temperature (lag0, natural smooth function, 3df), humidity (lag0, natural smooth function, 3df).

Bold represents statistically significant results at the 5% level (P<0.05).

Table S6. Percentage increase (95% *CI*) of circulatory disease EADs for each 10 μg/m^3 increment in $PM_{2.5}$ across temperature levels excluding post-COVID-19 data.

Pollution	Group	Temperature levels [b]	Percentage increase in death (95% *CI*) [c]				
			Lag0-1	Lag0-2	Lag0-3	Lag0-4	Lag0-5
$PM_{2.5}$							
	All [a]	Low	**2.04(1.44,2.63)**	**2.15(1.52,2.77)**	**2.26(1.62,2.90)**	**2.32(1.67,2.98)**	**2.32(1.65,3.00)**
		High	0.32(-0.45,1.09)	0.36(-0.44,1.16)	0.57(-0.26,1.41)	0.68(-0.16,1.53)	0.65(-0.20,1.52)

Females	Low	**1.76(0.80,2.71**	**1.82(0.80,2.82**	**2.04(0.99,3.10)**	**2.29(1.21,3.38)**	**2.36(1.26,3.47)**
	High	0.36(-0.82,1.56)	0.40(-0.85,1.66)	0.71(-0.59,2.02)	0.88(-0.46,2.23)	0.82(-0.54,2.21)
Males	Low	**2.09(1.31,2.86)**	**2.28(1.46,3.11)**	**2.38(1.53,3.23)**	**2.34(1.47,3.22)**	**2.23(1.34,3.13)**
	High	0.63(-0.33,1.60)	0.74(-0.28,1.77)	0.87(-0.18,1.94)	0.90(-0.19,2.00)	0.84(-0.27,1.97)
<65 years	Low	**2.39(1.54,3.25)**	**2.32(1.43,3.23)**	**2.32(1.39,3.26)**	**2.29(1.34,3.24)**	**2.14(1.17,3.12)**
	High	0.83(-0.20,1.86)	0.67(-0.41,1.76)	0.85(-0.28,1.99)	0.88(-0.28,2.05)	0.79(-0.39,1.99)
≥65 years	Low	**1.27(0.32,2.21)**	**1.55(0.54,2.58)**	**1.68(0.63,2.74)**	**1.69(0.61,2.78)**	**1.60(0.49,2.73)**
	High	-0.17(-1.39,1.05)	-0.08(-1.37,1.23)	0.13(-1.22,1.49)	0.18(-1.21,1.59)	0.05(-1.38,1.51)

[a] "All" meant daily death count, not stratified by sex and age. [b] Using the median of temperature (24.8 °C) as the cut-off value. [c] Estimates were generated using GAM combined with stratification parametric model.

Bold represents statistically significant results at the 5% level (P<0.05).



Figure S1. Distribution of state-controlled air quality monitoring sites in Shenzhen.



Figure S2. Correlation between daily meteorological factors and air pollutants concentrations.

Abbreviations: Temp, temperature; RH, relative humidity.