

Table S1. The definition of the MetS from different organization.

Index	Population	China	NCEP/ATP III	AHA	CDS	IDF
WC	Men	>85cm	>90cm	>102cm	>90cm	>94cm
	Women	>80cm	>80cm	>88cm	>85cm	>80cm
BP	All	SBP \geq 130 mmHg or DBP \geq 85 mmHg	SBP \geq 130 mmHg or DBP \geq 85 mmHg or on antihypertensive medication	SBP \geq 130 mmHg or DBP \geq 85 mmHg or on antihypertensive medication	SBP \geq 130 mmHg or DBP \geq 85 mmHg or diagnosed hypertension	SBP \geq 130 mmHg or DBP \geq 85 mmHg or taking anti-hypertensive medication
FBG	All	>100 mg/dL	\geq 150 mg/dL or antidiabetic medication	\geq 100 mg/dL or antidiabetic medication	FBG \geq 100 mg/dL or 2h-glucose \geq 140 mg/dL or diagnosed diabetes mellitus	\geq 100 mg/dL or taking antidiabetic medication
FTG	All	>150 mg/dL	\geq 150 mg/dL or on medication for elevated TG	\geq 150 mg/dL or on medication for elevated TG	\geq 150 mg/dL	\geq 150 mg/dL or taking medication for reduced TG
HDL-C	Men	<40 mg/dL	<40 mg/dL or taking medication for reduced HDL-C	<40 mg/dL or taking medication for reduced HDL-C	<40 mg/dL	<40 mg/dL or taking medication for reduced HDL-C
	Women	<50 mg/dL	<50 mg/dL or taking medication for reduced HDL-C	<50 mg/dL or taking medication for reduced HDL-C	<40 mg/dL	<50 mg/dL or taking medication for reduced HDL-C

Abbreviations: NCEP/ATP III, the US National Cholesterol Education Programme Adult Treatment Panel III guidelines; AHA, American Heart Association; CDS, Chinese Diabetes Society; IDF, the International Diabetes Federation; SBP, systolic blood pressure; DBP, diastolic blood pressure; FBG, fasting blood glucose; HDL-C, high density lipoprotein cholesterol; MetS, metabolic syndrome; FTG, fasting triglyceride; WC, waist circumference. MetS was defined as if a participant presented with three or more of the abovementioned risk factors.

Table S2. The average concentration of the PM_{2.5} and its chemical constituent in different exposure window.

Air pollutants	Mean	SD	Min	P ₅	P ₂₅	Median	P ₇₅	P ₉₅	Max	Lag
PM _{2.5}	52.12	21.62	18.38	22.30	34.30	48.44	65.92	90.59	97.66	2y
BC	2.51	0.77	0.93	1.30	1.90	2.35	3.10	3.83	4.20	2y
NH ₄ ⁺	7.86	3.41	2.61	2.93	4.90	7.55	10.37	13.64	14.37	2y
NO ₃ ⁻	11.29	5.58	3.07	3.37	6.44	10.49	15.51	20.82	21.95	2y
OM	12.61	4.65	4.70	5.73	8.94	12.00	15.80	21.60	22.80	2y
SO ₄ ²⁻	9.75	3.69	2.91	4.65	6.78	9.42	12.63	16.15	17.11	2y
PM _{2.5}	54.16	22.69	17.89	22.53	36.05	51.24	70.29	94.29	101.29	3y
BC	2.63	0.82	0.92	1.33	1.98	2.48	3.31	3.93	4.39	3y
NH ₄ ⁺	8.15	3.59	2.52	2.94	4.96	7.89	10.89	14.14	14.85	3y
NO ₃ ⁻	11.66	5.86	3.01	3.36	6.53	11.01	16.21	21.74	22.70	3y
OM	13.03	4.86	4.56	5.68	9.17	12.45	16.81	21.91	23.54	3y
SO ₄ ²⁻	10.24	3.95	2.85	4.61	7.07	10.17	13.66	16.92	17.75	3y
PM _{2.5}	54.93	23.02	18.18	22.69	36.53	51.29	71.12	95.56	102.88	4y
BC	2.69	0.84	0.94	1.33	2.03	2.53	3.44	4.09	4.46	4y
NH ₄ ⁺	8.29	3.66	2.53	2.93	5.15	8.12	11.10	14.46	15.03	4y
NO ₃ ⁻	11.78	5.93	3.08	3.32	6.61	11.16	16.32	22.06	22.87	4y
OM	13.18	4.90	4.61	5.75	9.28	12.43	16.94	21.83	23.63	4y
SO ₄ ²⁻	10.48	4.07	2.89	4.65	7.15	10.41	13.97	17.54	18.30	4y
PM _{2.5}	55.66	23.10	18.20	23.60	36.89	52.97	72.79	96.71	103.30	5y
BC	3.65	1.59	0.94	1.70	2.42	3.30	4.38	6.94	7.53	5y
NH ₄ ⁺	8.32	3.65	2.49	2.91	5.18	8.15	11.26	14.35	14.98	5y
NO ₃ ⁻	11.86	5.93	3.06	3.31	6.70	10.99	16.53	22.04	22.79	5y
OM	13.50	5.06	4.57	5.78	9.43	12.85	17.50	22.53	23.78	5y
SO ₄ ²⁻	10.70	4.17	2.87	4.66	7.24	10.59	14.34	17.78	18.71	5y

Abbreviations: BC: Black Carbon; NH₄⁺: Ammonium; NO₃⁻: Nitrate; OM: organic matter; SO₄²⁻: Sulfate.

Table S3. The summary of the statistics of the concentration of PM_{2.5} constitution in different region.

East ¹ (µg/m ³)									
Constitution	Mean	SD	Min	P ₅	P ₂₅	Median	P ₇₅	P ₉₅	Max
PM _{2.5}	57.24	22.58	24.52	25.32	33.78	59.12	79.46	86.23	89.85
BC	2.65	0.80	1.45	1.53	1.91	2.53	3.47	3.80	3.99
NH ₄ ⁺	8.40	3.42	3.49	3.72	4.72	9.17	11.46	13.03	13.39
NO ₃ ²⁻	12.46	5.60	4.41	4.72	5.99	13.98	17.42	19.88	20.40
OM	13.53	4.98	6.62	7.09	8.87	12.75	18.11	21.39	21.70
SO ₄ ²⁻	10.52	3.57	5.08	5.30	6.88	11.11	13.98	15.44	15.95
Middle ² (µg/m ³)									
PM _{2.5}	56.40	16.43	26.93	31.05	43.68	54.35	65.67	86.38	93.27
BC	2.51	0.59	1.59	1.60	2.06	2.31	2.89	3.54	3.83
NH ₄ ⁺	8.93	2.41	4.07	4.86	6.80	8.56	10.74	12.68	14.03
NO ₃ ²⁻	13.25	4.11	5.17	6.57	9.82	12.67	16.06	19.80	21.38
OM	13.31	3.39	7.55	7.95	10.88	12.59	15.61	20.12	20.52
SO ₄ ²⁻	10.62	2.71	5.56	6.27	8.60	10.69	12.30	15.19	16.61
West ³ (µg/m ³)									
PM _{2.5}	36.52	12.77	19.84	20.41	23.53	35.41	44.76	61.46	62.06
BC	2.03	0.54	0.98	1.24	1.60	1.93	2.38	2.96	3.05
NH ₄ ⁺	5.49	2.37	2.76	2.85	3.34	5.11	7.50	9.84	10.65
NO ₃ ²⁻	7.14	3.40	3.07	3.30	4.08	6.77	9.53	13.41	14.38
OM	9.54	3.06	4.95	5.28	6.86	9.17	11.81	15.01	15.41
SO ₄ ²⁻	7.21	2.59	3.07	3.87	5.02	6.43	9.27	12.40	12.62
Northeast ⁴ (µg/m ³)									
PM _{2.5}	42.72	8.22	26.85	26.85	38.89	45.52	49.64	50.55	50.55
BC	1.97	0.39	1.26	1.26	1.69	2.04	2.31	2.42	2.42
NH ₄ ⁺	5.93	1.53	2.88	2.88	4.20	6.45	7.09	7.43	7.43
NO ₃ ²⁻	8.97	2.50	3.30	3.30	6.59	9.76	10.67	11.38	11.38
OM	10.00	2.29	6.22	6.22	8.14	10.18	12.21	12.55	12.55
SO ₄ ²⁻	7.11	1.50	4.86	4.86	5.08	7.60	8.61	8.62	8.62

Notes:

¹East including Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan.

²Middle including Shanxi, Anhui, Jiangxi, Henan, Hubei, and Hunan.

³ West including Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Xizang, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang.

⁴ Northeast including Liaoning, Jilin, and Heilongjiang.

Abbreviations: BC: Black Carbon; NH₄⁺: Ammonium; NO₃⁻: Nitrate; SO₄²⁻: Sulfate. OM: organic matter.

Table S4. The association of metabolic syndrome (MetS) with an IQR incremental change in 1-year average PM_{2.5} and its constitution in different model.

PM and its composition	Different Model	Exposure window	Odds Ratio	P value
PM _{2.5}	Crude Model	1y	1.23(1.16,1.3)	<0.001
PM _{2.5}	Model II	1y	1.25(1.16,1.34)	<0.001
PM _{2.5}	Model III	1y	1.27(1.17,1.37)	<0.001
PM _{2.5}	Model IV	1y	1.27(1.17,1.37)	<0.001
PM _{2.5}	Model V	1y	1.27(1.17,1.37)	<0.001
BC	Crude Model	1y	1.2(1.14,1.27)	<0.001
BC	Model II	1y	1.23(1.15,1.32)	<0.001
BC	Model III	1y	1.25(1.16,1.36)	<0.001
BC	Model IV	1y	1.25(1.15,1.36)	<0.001
BC	Model V	1y	1.25(1.16,1.36)	<0.001
NH ₄ ⁺	Crude Model	1y	1.15(1.09,1.22)	<0.001
NH ₄ ⁺	Model II	1y	1.18(1.1,1.27)	<0.001
NH ₄ ⁺	Model III	1y	1.21(1.12,1.31)	<0.001
NH ₄ ⁺	Model IV	1y	1.21(1.12,1.31)	<0.001
NH ₄ ⁺	Model V	1y	1.21(1.12,1.31)	<0.001
NO ₃ ⁻	Crude Model	1y	1.19(1.13,1.26)	<0.001
NO ₃ ⁻	Model II	1y	1.22(1.13,1.31)	<0.001
NO ₃ ⁻	Model III	1y	1.25(1.15,1.35)	<0.001
NO ₃ ⁻	Model IV	1y	1.24(1.14,1.35)	<0.001
NO ₃ ⁻	Model V	1y	1.25(1.15,1.35)	<0.001
OM	Crude Model	1y	1.2(1.14,1.27)	<0.001
OM	Model II	1y	1.22(1.14,1.31)	<0.001
OM	Model III	1y	1.25(1.15,1.35)	<0.001
OM	Model IV	1y	1.25(1.15,1.35)	<0.001
OM	Model V	1y	1.25(1.15,1.35)	<0.001
SO ₄ ²⁻	Crude Model	1y	1.17(1.1,1.24)	<0.001
SO ₄ ²⁻	Model II	1y	1.19(1.11,1.29)	<0.001
SO ₄ ²⁻	Model III	1y	1.23(1.13,1.33)	<0.001
SO ₄ ²⁻	Model IV	1y	1.22(1.12,1.33)	<0.001
SO ₄ ²⁻	Model V	1y	1.22(1.12,1.33)	<0.001

Notes: Crude Model: No adjustment. Model II: Crude Model+ age, sex, urbanicity, educational level, marriage status, physical activity. Model III: Model II+ cooking fuel type, heating fuel type. Model IV: Model III+ smoke. Mode V (Fully Model): Model IV+ drinking. Abbreviations: BC: Black Carbon; NH₄⁺: Ammonium; NO₃⁻: Nitrate; OM: organic matter; SO₄²⁻: Sulfate.

Table S5. The association of metabolic syndrome (MetS) with an IQR incremental change in PM_{2.5} and its constitution in different exposure window.

PM and its composition	Exposure Window	Odds Ratio	P value
PM _{2.5}	1y	1.27(1.17,1.37)	<0.001
PM _{2.5}	2y	1.25(1.16,1.35)	<0.001
PM _{2.5}	3y	1.26(1.16,1.36)	<0.001
PM _{2.5}	4y	1.25(1.16,1.35)	<0.001
PM _{2.5}	5y	1.16(1.04,1.30)	<0.001
BC	1y	1.25(1.16,1.36)	<0.001
BC	2y	1.25(1.15,1.36)	<0.001
BC	3y	1.24(1.14,1.35)	<0.001
BC	4y	1.24(1.14,1.36)	<0.001
BC	5y	1.21(1.14,1.29)	<0.001
NH ₄ ⁺	1y	1.21(1.12,1.31)	<0.001
NH ₄ ⁺	2y	1.22(1.12,1.32)	<0.001
NH ₄ ⁺	3y	1.22(1.12,1.33)	<0.001
NH ₄ ⁺	4y	1.21(1.11,1.32)	<0.001
NH ₄ ⁺	5y	1.21(1.11,1.32)	<0.001
NO ₃ ⁻	1y	1.25(1.15,1.35)	<0.001
NO ₃ ⁻	2y	1.25(1.15,1.36)	<0.001
NO ₃ ⁻	3y	1.25(1.15,1.36)	<0.001
NO ₃ ⁻	4y	1.24(1.14,1.35)	<0.001
NO ₃ ⁻	5y	1.24(1.14,1.35)	<0.001
OM	1y	1.25(1.15,1.35)	<0.001
OM	2y	1.24(1.15,1.34)	<0.001
OM	3y	1.25(1.15,1.36)	<0.001
OM	4y	1.25(1.15,1.36)	<0.001
OM	5y	1.24(1.14,1.35)	<0.001
SO ₄ ²⁻	1y	1.22(1.12,1.33)	<0.001
SO ₄ ²⁻	2y	1.21(1.12,1.32)	<0.001
SO ₄ ²⁻	3y	1.22(1.12,1.33)	<0.001
SO ₄ ²⁻	4y	1.22(1.11,1.33)	<0.001
SO ₄ ²⁻	5y	1.22(1.11,1.33)	<0.001

Notes: The model was adjusted for age, sex, urbanicity, educational level, marriage status, smoke, drinking, cooking fuel type, heating fuel type, and physical activity. Abbreviations: BC: Black Carbon; NH₄⁺: Ammonium; NO₃⁻: Nitrate; OM: organic matter; SO₄²⁻: Sulfate. Lag1 refers to the average exposure concentration of the previous year from the date of investigation.

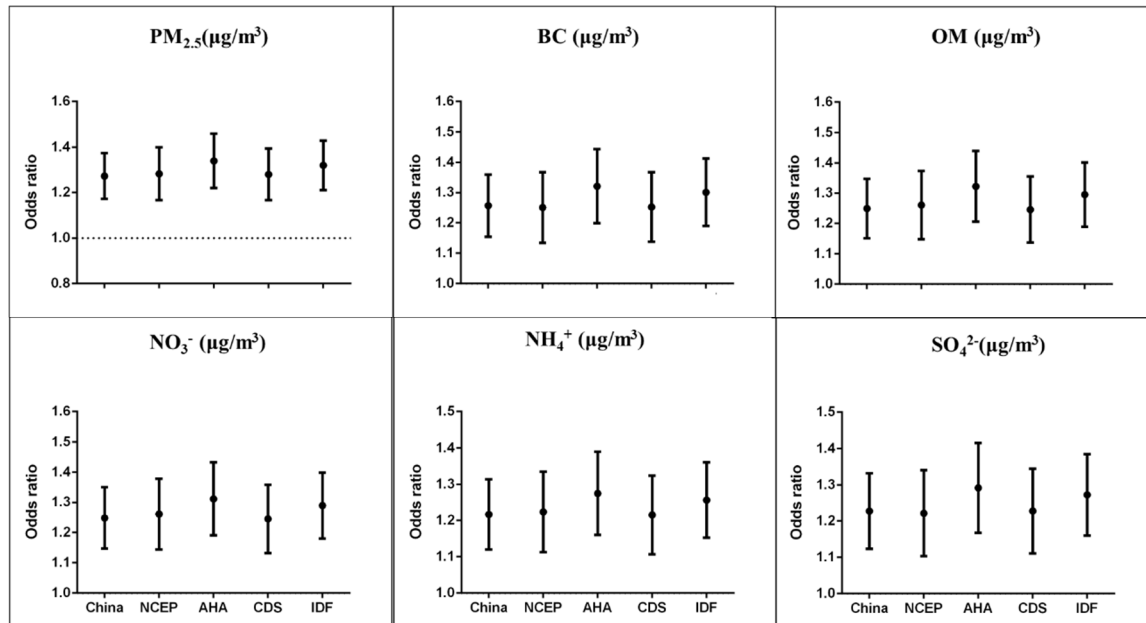


Figure S1. The association of metabolic syndrome (MetS) with an IQR incremental change in 1-year average PM_{2.5} and its constitution by different definition. The bars show main effect estimates and 95% confidence intervals. The model was adjusted for age, sex, urbanicity, educational level, marriage status, smoke, drinking, cooking fuel type, heating fuel type, and physical activity. Abbreviations: BC: Black Carbon; NH₄⁺: Ammonium; NO₃⁻: Nitrate; OM: organic matter; SO₄²⁻: Sulfate. NCEP, the US National Cholesterol Education Programme; AHA, American Heart Association; CDS, Chinese Diabetes Society; IDF, the International Diabetes Federation.