Cumulative effect of $PM_{2.5}$ components is larger than the effect of $PM_{2.5}$ mass on child health in India

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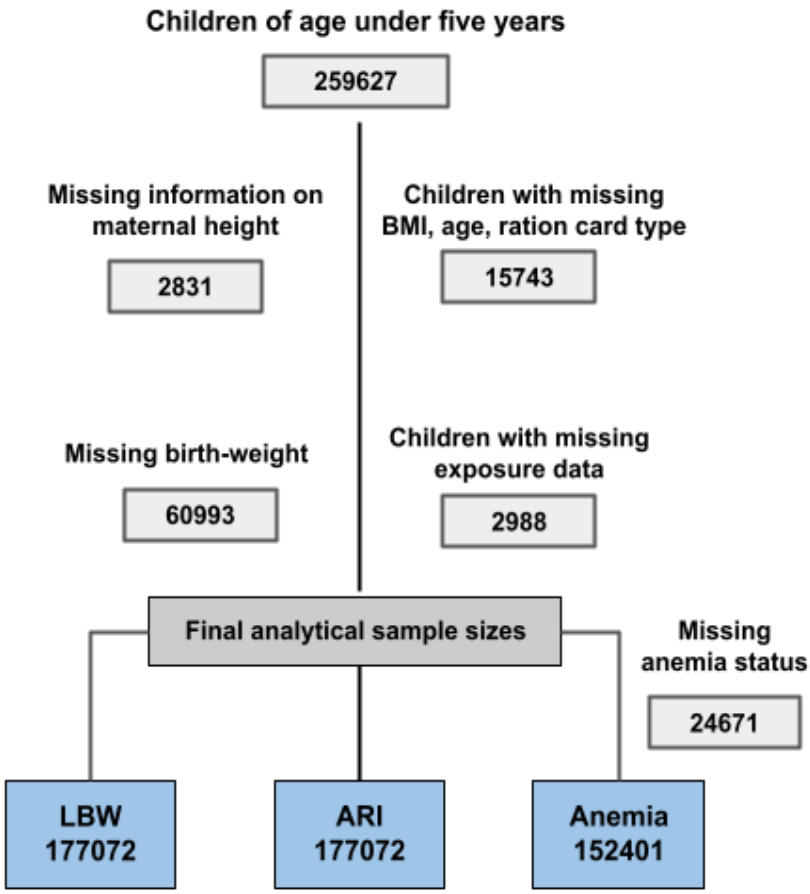
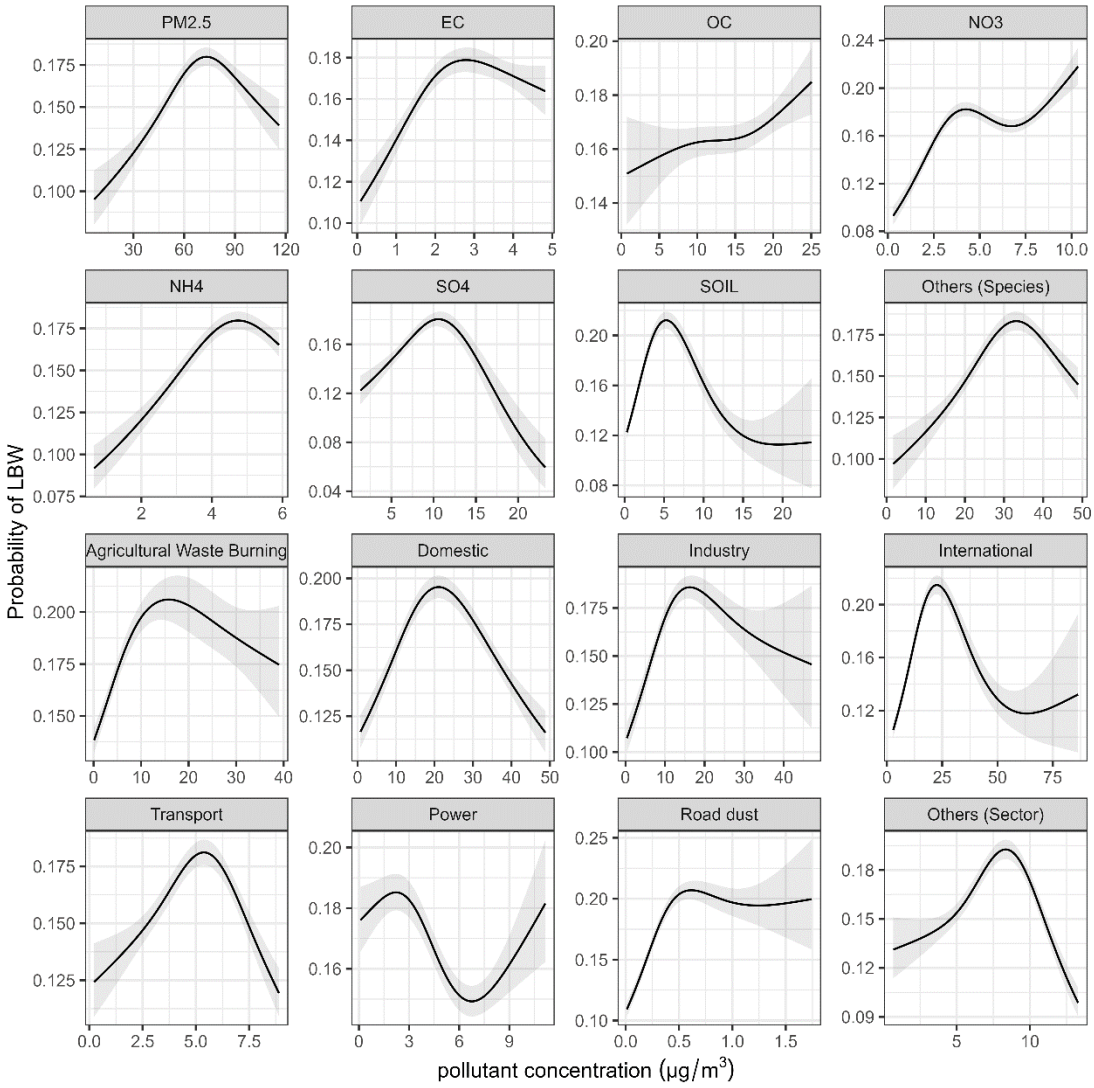
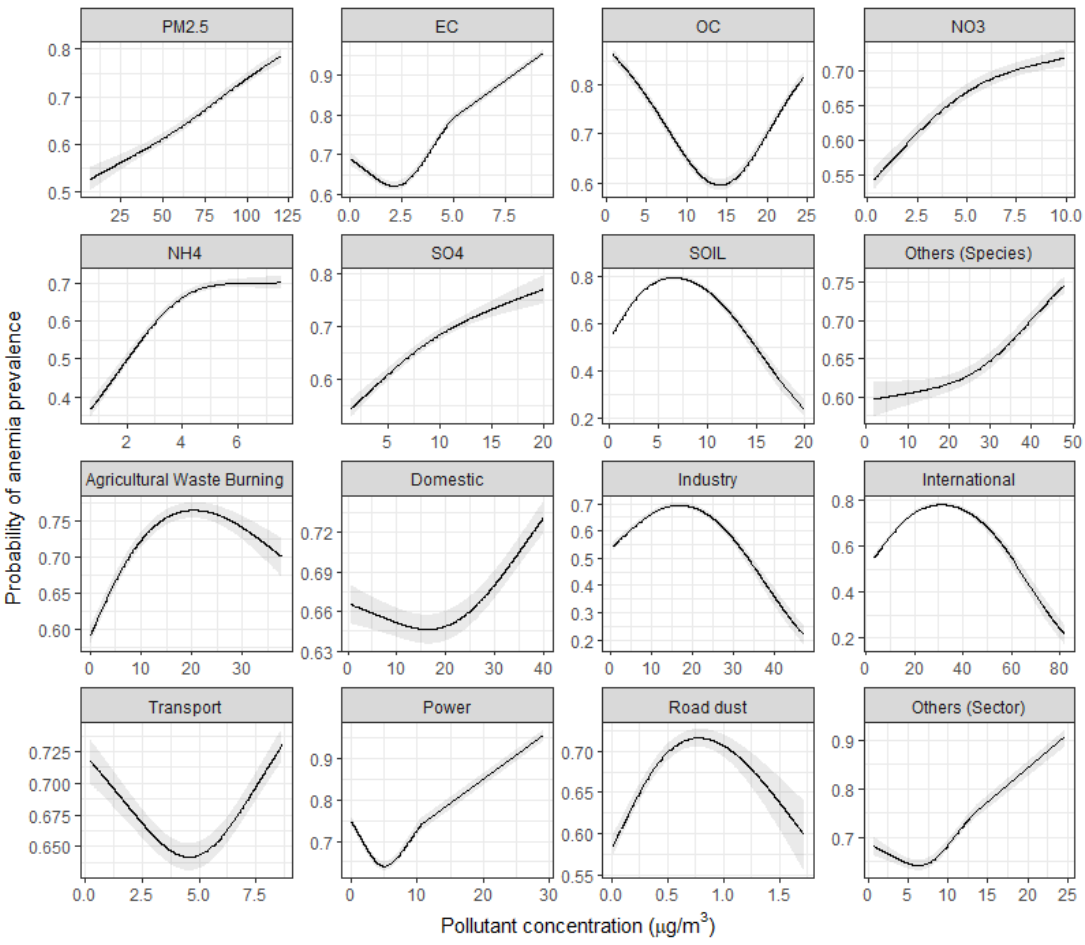


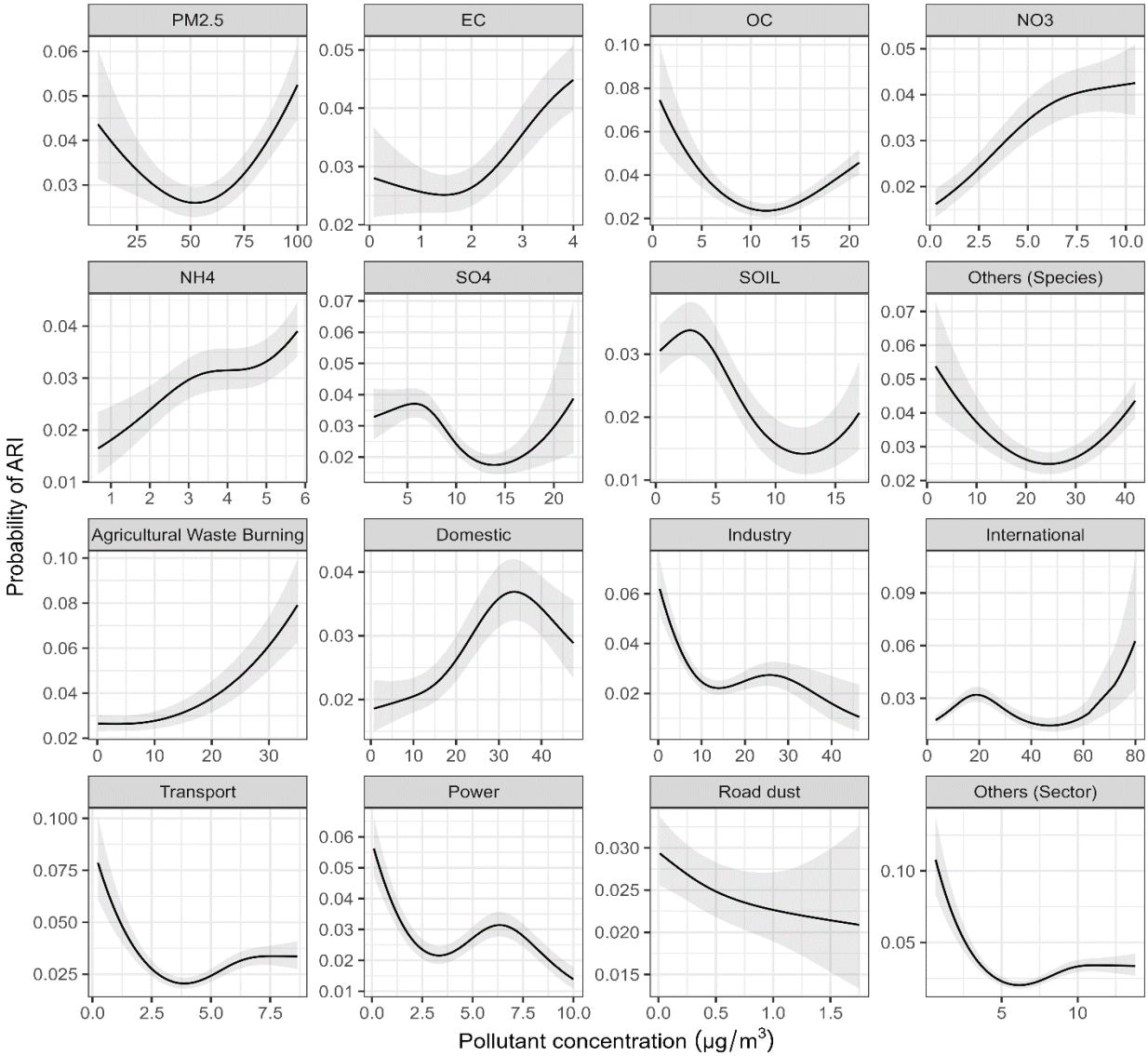
Supplementary Figure 1: Schematic consort diagram demonstrating the exclusion criteria of observations in the NFHS-4 dataset.



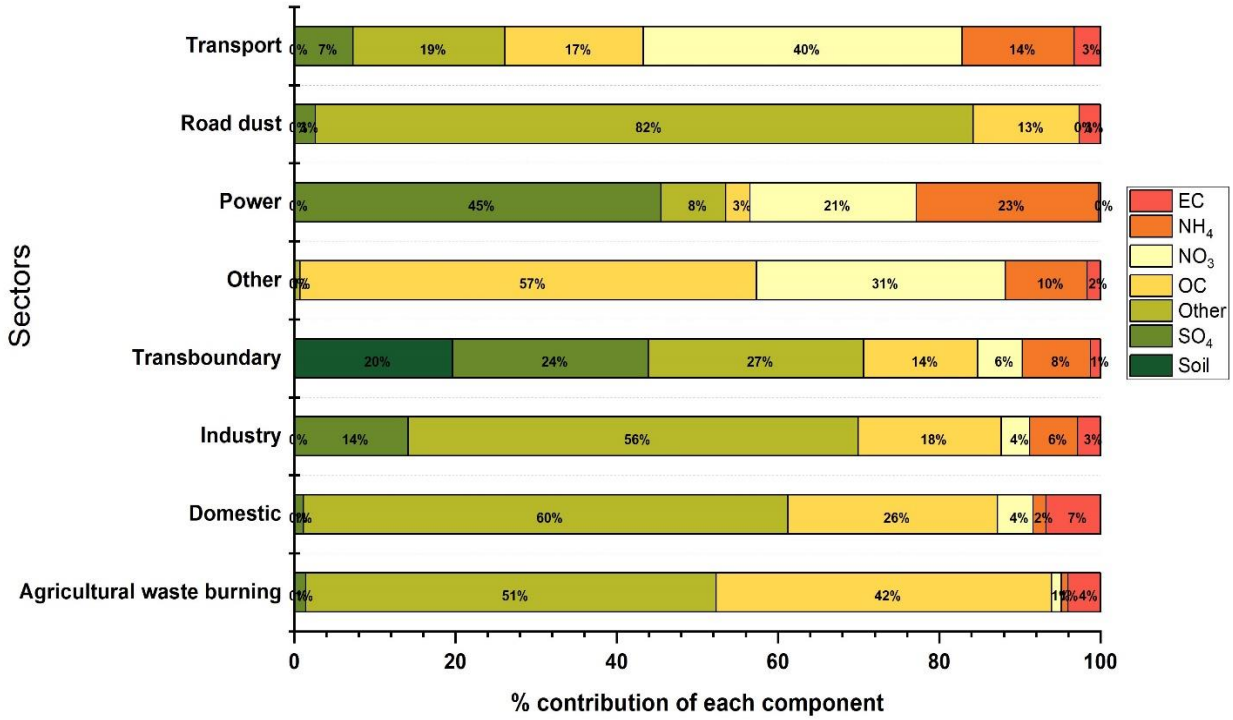
Supplementary Figure 2: Exposure-response curves for LBW against components and sectors contributing to $PM_{2.5}$. The shaded region represents 95% confidence interval. Source data are provided as a Source Data file.



Supplementary Figure 3: Exposure-response curves for anaemia against components and sectors contributing to $PM_{2.5}$. The shaded region represents 95% confidence interval. Source data are provided as a Source Data file.



Supplementary Figure 4: Exposure-response curves for ARI against components and sectors contributing to $PM_{2.5}$. The shaded region represents 95% confidence interval. Source data are provided as a Source Data file.



Supplementary Figure 5: Overall percent contribution of each component in each sector. Sector 'other' involves refused burning, construction, crematoria, NH_3, biogenic emissions, and evaporative non-methane volatile organic compounds (NMVOCs). Whereas component 'other' involves chloride, sodium, magnesium, calcium, soil, water molecules, and unspecified species. Source data are provided as a Source Data file.

Supplementary Table 1- Prevalence of LBW, ARI and anaemia of U5 children in India stratified by potential predictors.

Variable	Prevalence (95% CI) in %		
	ARI	**LBW**	**Anaemia**
Overall	2.8 (2.72, 2.88)	16.6 (16.43, 16.77)	56.8 (56.64, 57.14)
Sex of Child			
Male (n= 92848)	2.9 (2.7, 3.01)	15.5 (15.27, 15.73)	56.9 (56.56, 57.24)
Female (n= 84224)	2.5 (2.39, 2.61)	17.8 (17.54, 18.06)	56.5 (56.44, 57.16)
Mother's Education			
No education (n= 41627)	2.6 (2.45, 2.75)	18.6 (18.23, 18.97)	64.8 (64.31, 65.29)
Primary (n= 24469)	3.1 (2.88, 3.32)	18.0 (17.52, 18.48)	58.9 (58.24, 59.56)
Secondary (n= 90267)	2.8 (2.69, 2.91)	16.0 (15.76, 16.24)	54.1 (53.75, 54.45)
Higher (n= 20709)	2.6 (2.38, 2.82)	13.2 (12.74, 13.66)	50.2 (49.46, 50.94)
Wealth index			
Poorest (n= 35662)	2.9 (2.73, 3.07)	18.3 (17.90, 18.70)	63.6 (63.06, 64.14)
Poor (n= 39257)	2.9 (2.73, 3.07)	17.1 (16.73, 17.47)	58.0 (57.47, 58.53)
Middle (n= 38133)	2.8 (2.63, 2.97)	16.4 (16.03, 16.77)	56.0 (55.46, 56.54)
Rich (n= 34345)	2.5 (2.33, 2.67)	16.1 (15.71, 16.49)	53.3 (52.73, 53.87)
Richest (n= 29675)	2.6 (2.42, 2.78)	14.4 (14.00, 14.80)	52.5 (51.89, 53.11)
Religion			
Hindu (n= 133085)	2.6 (2.51, 2.69)	17.4(17.2, 17.6)	56.7 (55.50, 57.90)
Muslim (n= 24214)	3.7 (3.46, 3.94)	16.5 (16.03, 16.97)	58.5 (58.22, 58.78)
Christian (n= 12177)	2.5 (2.22, 2.78)	8.9 (8.39, 9.41)	58.7 (58.03, 59.37)
Others (n= 7596)	3.1 (2.71, 3.49)	14.5 (13.71, 15.29)	35.8 (34.87, 36.73)
Household has BPL card			
BPL (n= 67048)	2.5 (2.38, 2.62)	16.7 (16.42, 16.98)	59.2 (58.80, 59.60)
Non-BPL (n= 110024)	2.9 (2.80, 3.00)	16.5 (16.28, 16.72)	55.5 (55.18, 55.82)
Place of residence			
Rural (n= 129357)	2.9 (2.81, 2.99)	16.7 (16.5, 16.9)	54.1 (53.62, 54.58)
Urban (n= 47715)	2.4 (2.26, 2.54)	16.2 (15.87, 16.53)	57.9 (57.61, 58.19)
Cooking Fuel			
Clean fuel (n= 61601)	2.5 (2.38, 2.62)	15.1 (14.82, 15.38)	53.0 (52.58, 53.42)
Solid fuel (n= 114064)	2.9 (2.80, 3.00)	17.3 (17.08, 17.52)	59.0 (58.69, 59.31)
Kerosine (n= 1407)	3.3 (2.37, 4.23)	17.8 (15.80, 19.80)	55.3 (52.48, 58.12)
Smoking Behaviour			
No (n= 90587)	2.6 (2.5, 2.7)	16.2 (15.96, 16.44)	56.7 (56.35, 57.05)
Yes (n= 86485)	2.9 (2.79, 3.01)	16.9 (16.65, 17.15)	57.1 (56.74, 57.46)
Gravida			
Primi (n= 74222)	2.9 (2.78, 3.02)	15.6 (15.34, 15.86)	54.1 (53.72, 54.48)

Multi (n= 102850)	2.7 (2.6, 2.8)	17.2 (16.97, 17.43)	58.9 (58.57, 59.23)
PM2.5			
<Q1 (n= 44268)	2.4 (2.26, 2.54)	13.6 (13.28, 13.92)	46.1 (45.60, 46.60)
Q1 - Q2 (n= 44268)	2.2 (2.06, 2.34)	17.1 (16.75, 17.45)	58.4 (57.91, 58.89)
Q2 - Q3 (n= 44268)	2.8 (2.65, 2.95)	18.3 (17.94, 18.66)	59.1 (58.61, 59.59)
>Q3 (n= 44268)	3.6 (3.43, 3.77)	17.3 (16.95, 17.65)	64.0 (63.52, 64.48)
Mother's age in year			
<20 (n= 4763)		19.9 (18.77, 21.03)	64.9 (63.22, 66.58)
20-35 (n= 157778)		16.6 (16.42, 16.78)	57.3 (57.04, 57.56)
>35 (n= 14531)		15 (14.42, 15.58)	50.8 (49.95, 51.65)
BMI of mother			
Under weight (n= 40500)		20.2 (19.81, 20.59)	62.3 (61.8, 62.8)
Normal weight (n= 108385)		15.9 (15.68, 16.12)	56.5 (56.18, 56.82)
Overweight (n= 21692)		14.1 (13.64, 14.56)	50.2 (49.48, 50.92)
Obesity (n= 6495)		13.7 (12.86, 14.54)	50.9 (49.6, 52.2)
Per capita Dietary Iron intake of the household(mg)			
0-15 (n= 109172)			52.7 (52.37, 53.03)
15-30 (n= 65594)			63 (62.61, 63.39)
30-50 (n= 2306)			62.4 (59.82, 64.98)
Mother anaemia			
yes (n= 99442)			63.9 (63.58, 64.22)
no (n= 77630)			53.5 (53.17, 53.83)

Supplementary Table 2: Distribution of $PM_{2.5}$ exposure along with its components and sectoral contribution at PSU level (total PSU numbers are 27828). All units are in $\mu g/m^3$.

Pollutant	**Mean**	**Median**	**SD**	**Q1**	**Q3**
$PM_{2.5}$	63.41	61.78	15.87	51.72	78.45
EC	2.29	1.98	0.92	1.56	3.14
OC	14.09	13.6	3.97	10.81	17.92
NO_3	4.49	3.74	2.29	2.59	6.71
NH_4	3.98	3.97	0.97	3.31	4.71
SO_4	7.73	7.99	2.08	6.15	9.05
SOIL	2.50	2.03	2.00	1.20	3.10
Others	28.71	27.77	7.90	23.00	35.96
Agriculture	5.10	4.09	4.44	2.51	6.04
Domestic	17.7	14.17	8.92	11.11	22.47
Industry	10.45	9.52	4.79	7.72	12.37
International	13.9	12.01	6.73	9.77	16.12
Others (sector)	7.21	6.84	2.02	5.74	8.86
Power	4.00	3.94	1.88	2.52	5.00
Road dust	0.34	0.30	0.20	0.21	0.40
Transport	4.72	4.57	1.41	3.69	5.91

Supplementary Table 3: WRF-CMAQ Model set-up details

Data/scheme type	Options
Model resolution	36 x 36 km with 25 vertical levels
Meteorology data used	ECMWF's ERA-5
Simulation period	The model was simulated from 1st Jan 2016 to 31st Dec 2016.
Micro Physics Options in WRF	WSM three-class simple ice scheme[1]
Shortwave radiation in WRF	Dudhia Shortwave Scheme[2]
Longwave radiation in WRF	RRTM Longwave Scheme[3]
Surface layer	Revised MM5 Monin-Obukhov scheme[4]
Land Surface Options in WRF	Unified Noah Land Surface Model scheme[5]
Boundary layer Options in WRF	ACM2[6]
Cumulus Options in WRF	Kain-Fritsch (new Eta) scheme[7]
Chemical mechanism used in CMAQ	CB6r3_ae7_aq (CB6r3 - Carbon Bond 6 version r3; ae7_aq module - CMAQ's aero7 for treatment of SOA set up for standard cloud chemistry)[8,9]
Emission inventory resolution	36x36 km
Emissions of neighbouring countries within the study domain	ECLIPSE (version 5) database of IIASA
Transboundary pollutant outside the study domain	Community Atmosphere Model with Chemistry (CAM-chem) model

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