Supplementary Table 1. Data on the air pollution levels (particulate matter$_{10}$) by provinces (2019–2023) in Türkiye

NUTS-1	NUTS-2	NUTS-3	2019	2020	2021	2022	2023
İstanbul region (TR1)	İstanbul subregion	İstanbul	40.21	26.15	37.43	36.55	37.54
West Marmara region (TR2)	Tekirdağ subregion	Tekirdağ	31.06	29.22	44.05	33.35	36.37
		Edirne	33.04	30.76	63.00	41.40	45.04
		Kırklareli	38.63	23.07	30.21	22.92	26.37
	Balıkesir subregion	Balıkesir	39.38	23.07	52.89	43.43	46.45
		Çanakkale	26.71	21.53	36.38	27.94	35.74
Aegean region (TR3)	İzmir subregion	İzmir	35.55	38.26	35.15	44.37	40.33
	Aydın subregion	Aydın	50.35	55.54	37.97	53.35	50.36
		Denizli	54.78	59.78	76.49	57.04	42.89
		Muğla	54.74	52.68	43.02	54.32	45.12
	Manisa subregion	Manisa	63.41	53.78	33.21	51.74	56.30
		Afyonkarahisar	24.09	38.55	36.56	39.06	33.85
		Kütahya	30.21	35.38	52.41	30.04	N/A
		Uşak	N/A	N/A	N/A	41.74	33.00
East Marmara region (TR4)	Bursa subregion	Bursa	43.66	39.90	51.38	51.97	55.95
		Eskişehir	32.92	23.07	36.20	29.37	N/A
		Bilecik	26.92	23.07	39.31	24.55	23.27
	Kocaeli subregion	Kocaeli	39.80	26.15	40.54	37.92	39.40
		Sakarya	40.72	39.90	38.32	39.29	40.47
		Düzce	68.18	64.61	43.91	49.97	45.48
		Bolu	37.81	35.38	41.93	33.97	36.80
		Yalova	25.15	24.61	35.37	21.28	39.56
West Anatolia region (TR5)	Ankara subregion	Ankara	44.04	30.76	35.94	31.09	38.61
	Konya subregion	Konya	46.23	49.22	55.66	39.97	49.47
		Karaman	30.37	36.57	30.31	33.12	33.86
Mediterranean region (TR6)	Antalya subregion	Antalya	39.28	27.69	39.10	29.28	31.01
		Isparta	44.75	39.90	36.38	27.72	27.73
		Burdur	37.35	40.98	38.91	35.94	39.15
	Adana subregion	Adana	42.04	30.99	47.34	39.94	43.56
		Mersin	58.89	41.31	61.80	49.98	53.25
	Hatay subregion	Hatay	12.94	41.37	38.56	40.40	58.68
		Kahramanmaraş	75.50	N/A	66.77	49.35	66.33
		Osmaniye	58.29	N/A	75.14	61.07	78.60
Central Anatolia region (TR7)	Kırıkkale subregion	Kırıkkale	50.14	40.24	46.08	22.92	N/A
		Aksaray	21.98	44.64	43.77	33.09	37.01
		Niğde	49.80	30.76	45.30	51.67	51.35
		Nevşehir	24.66	41.45	42.03	52.87	45.66
		Kırşehir	24.91	15.38	42.01	16.35	N/A
	Kayseri subregion	Kayseri	58.01	38.46	54.85	46.03	48.44
		Sivas	51.20	38.46	43.74	33.64	42.91
		Yozgat	20.12	37.79	47.13	20.98	N/A
West Black Sea region (TR8)	Zonguldak subregion	Zonguldak	44.38	56.17	53.22	37.92	56.79
		Karabük	30.44	36.92	51.60	32.54	N/A
		Bartın	39.80	52.77	48.26	35.97	31.56
	Kastamonu subregion	Kastamonu	44.20	33.84	27.38	45.20	N/A
		Çankırı	31.97	29.22	38.47	14.03	31.15
		Sinop	50.06	50.30	40.08	36.57	23.33
	Samsun subregion	Samsun	46.88	26.15	41.21	32.17	39.85
		Tokat	51.94	57.85	43.70	40.81	42.22
		Çorum	64.71	55.38	52.60	43.01	43.67
		Amasya	52.47	49.22	39.52	33.09	37.65
East Black Sea region (TR9)	Trabzon subregion	Trabzon	41.20	36.92	36.83	30.91	30.29
		Ordu	52.98	47.88	46.36	41.86	41.18
		Giresun	42.71	25.50	39.29	30.98	26.18
		Rize	26.92	36.78	31.93	24.61	19.91
		Artvin	20.58	28.38	28.21	31.97	15.62
		Gümüşhane	44.11	45.04	36.71	49.84	49.32
Northeast Anatolia region (TRA)	Erzurum subregion	Erzurum	46.64	32.30	43.93	40.88	N/A
		Erzincan	55.24	69.71	52.35	52.71	N/A
		Bayburt	33.11	30.71	54.12	49.67	25.68
	Ağrı subregion	Ağrı	82.60	73.53	85.97	62.18	44.95
		Kars	54.98	42.30	52.02	44.61	34.86
		Iğdır	85.98	69.29	98.18	63.69	N/A
		Ardahan	39.63	30.06	55.55	54.61	40.95
Central East Anatolia region	Malatya subregion	Malatya	63.18	66.92	70.43	77.32	85.76
		Elazığ	58.32	49.55	41.96	41.80	35.67
		Bingöl	38.84	38.31	40.06	58.43	48.74
		Tunceli	41.57	43.80	46.19	45.71	37.11
	Van subregion	Van	40.95	39.70	42.32	45.58	38.42
		Muş	136.38	105.65	88.51	79.66	73.29
		Bitlis	21.11	17.69	22.79	28.97	19.68
		Hakkari	14.61	15.31	14.34	113.55	72.19
Southeast Anatolia region	Gaziantep subregion	Gaziantep	48.43	N/A	53.37	60.09	59.25
		Adıyaman	53.17	52.81	52.32	26.23	24.91
		Kilis	52.00	73.15	65.89	20.21	59.90
	Şanlıurfa subregion	Şanlıurfa	43.94	45.28	56.83	63.40	59.74
		Diyarbakır	39.49	39.30	43.67	44.11	40.39
	Mardin subregion	Mardin	40.61	26.91	53.53	54.17	54.25
		Batman	43.95	98.26	108.57	91.37	71.98
		Şırnak	81.44	70.74	75.77	79.67	65.55
		Siirt	42.84	42.86	45.39	51.87	43.24

N/A: non-applicable, NUTS: nomenclature of territorial units for statistics

Supplementary Table 2. Total number of deaths excluding accident injuries at the provincial level in Türkiye (2019–2023)

NUTS-1	NUTS-2	NUTS-3	2019	2020	2021	2022	2023
İstanbul region (TR1)	İstanbul subregion	İstanbul	61112	74209	82511	71884	67985
West Marmara region (TR2)	Tekirdağ subregion	Tekirdağ	5413	6138	7297	6934	1290
		Edirne	3427	3682	4486	4134	3864
		Kırklareli	2847	3175	3783	3671	3332
	Balıkesir subregion	Balıkesir	10528	10881	13392	12095	11519
		Çanakkale	4352	2053	2101	1857	1647
Aegean region (TR3)	İzmir subregion	İzmir	26540	28,678	32,972	31,441	29,715
	Aydın subregion	Aydın	7922	8739	9952	9353	8633
		Denizli	6393	7597	7832	7186	6975
		Muğla	5530	5999	7234	7097	6680
	Manisa subregion	Manisa	9455	11343	11750	11253	10503
		Afyonkarahisar	4929	6003	6083	5486	4993
		Kütahya	4508	5087	5790	5002	4635
		Uşak	2635	3120	2939	2851	2728
East Marmara region (TR4)	Bursa subregion	Bursa	16024	18789	21330	19032	18232
		Eskişehir	5562	6218	7313	6696	6192
		Bilecik	1540	1776	1961	1731	1609
	Kocaeli subregion	Kocaeli	8363	9548	11868	10234	9402
		Sakarya	6031	6767	8030	6837	6447
		Düzce	2285	2544	3011	2638	2513
		Bolu	2166	2506	2742	2509	2366
		Yalova	1521	1759	2229	2097	1903
West Anatolia region (TR5)	Ankara subregion	Ankara	25315	31998	32117	29746	28572
	Konya subregion	Konya	11309	14683	15682	12609	12506
		Karaman	1431	1691	1864	1601	1594
Mediterranean region (TR6)	Antalya subregion	Antalya	10677	11691	14783	13351	12820
		Isparta	3029	3453	3517	3332	3064
		Burdur	2002	2316	2447	2344	2145
	Adana subregion	Adana	10872	12977	14294	12759	12299
		Mersin	8916	10097	12129	10908	10736
	Hatay subregion	Hatay	7305	9351	9810	8462	8250
		Kahramanmaraş	4938	6151	6410	5467	5431
		Osmaniye	2403	2891	3589	2982	2850
Central Anatolia region (TR7)	Kırıkkale subregion	Kırıkkale	1836	2231	2440	2145	2026
		Aksaray	1993	2333	2656	2311	2169
		Niğde	2025	2237	2509	2318	2101
		Nevşehir	1915	2258	2519	2117	2100
		Kırşehir	1580	1814	1962	1737	1632
	Kayseri subregion	Kayseri	6650	8335	9466	7751	7517
		Sivas	4155	5011	5431	4728	4313
		Yozgat	3000	3493	3765	3227	3192
West Black Sea region (TR8)	Zonguldak subregion	Zonguldak	4134	4461	5394	4796	4633
		Karabük	1684	1901	2227	2050	1887
		Bartın	1516	1580	1911	1808	1750
	Kastamonu subregion	Kastamonu	3632	3963	4649	4092	3936
		Çankırı	1662	2053	2101	1857	1647
		Sinop	1976	2395	2682	2487	2219
	Samsun subregion	Samsun	8236	9457	11736	10054	9271
		Tokat	4206	4914	5879	4899	4647
		Çorum	4076	4774	4837	4566	4256
		Amasya	2497	2889	3393	3020	2728
East Black Sea region (TR9)	Trabzon subregion	Trabzon	4864	5711	6881	6129	5212
		Ordu	5181	5773	7502	6695	5897
		Giresun	3587	4027	4945	4398	3917
		Rize	2353	2577	3054	2738	2503
		Artvin	1375	1574	1644	1608	1557
		Gümüşhane	861	1059	1188	1105	943
Northeast Anatolia region (TRA)	Erzurum subregion	Erzurum	3985	4629	4926	4107	3842
		Erzincan	1479	1626	1872	1684	1500
		Bayburt	455	595	645	497	468
	Ağrı subregion	Ağrı	1704	2098	2308	1664	1682
		Kars	1411	1498	1501	1351	1261
		Iğdır	718	796	758	706	676
		Ardahan	712	793	758	706	676
Central East Anatolia region	Malatya subregion	Malatya	4003	5357	5649	4519	4445
		Elazığ	3142	3934	3196	3592	3254
		Bingöl	1052	1286	1346	1106	1070
		Tunceli	524	719	671	640	539
	Van subregion	Van	3097	4085	4080	3091	3182
		Muş	1305	1517	1642	1365	1291
		Bitlis	1080	1440	1412	1244	1175
		Hakkari	724	929	789	657	651
Southeast Anatolia Region	Gaziantep subregion	Gaziantep	7519	10036	10192	8576	8943
		Adıyaman	2620	3148	3279	2738	2816
		Kilis	817	895	991	823	754
	Şanlıurfa subregion	Şanlıurfa	6093	7088	7770	6275	6653
		Diyarbakır	4993	6982	7295	5646	5688
	Mardin subregion	Mardin	2641	3470	3426	2868	2736
		Batman	1630	2296	2316	1760	1763
		Şırnak	1219	1591	1462	1184	1222
		Siirt	1023	1293	1306	1035	981

N/A: non-applicable, NUTS: nomenclature of territorial units for statistics

Supplementary Table 3. Provincial-level annual premature deaths excluding accident injuries attributable to average particulate matter$_{2.5}$ levels in Türkiye (2019–2023)

NUTS-1	NUTS-2	NUTS-3	Estimated number of attributable cases			Estimated number of attributable cases per 100,000 population at risk		
			Mean	Min	Max	Mean	Min	Max
İstanbul region (TR1)	İstanbul subregion	İstanbul	13076	10079,00	15926,00	130,44	100,54	158,88
West Marmara region (TR2)	Tekirdağ subregion	Tekirdağ	976	752,00	1190,00	135,36	104,30	164,93
		Edirne	801	619,00	972,00	274,13	211,96	332,88
		Kırklareli	379	291,00	463,00	144,88	111,29	177,07
	Balıkesir subregion	Balıkesir	2332	1802,00	2834,00	263,08	203,27	319,68
		Çanakkale	392	301,00	479,00	100,58	77,31	122,84
Aegean region (TR3)	İzmir subregion	İzmir	5112	3946,00	6218,00	168,04	129,71	204,40
	Aydın subregion	Aydın	1998	1549,00	2419,00	258,64	200,56	313,19
		Denizli	1779	1384,00	2147,00	255,64	198,92	308,51
		Muğla	1466	1137,00	1775,00	205,17	159,12	248,39
	Manisa subregion	Manisa	2498	1938,00	3022,00	258,46	200,60	312,70
		Afyonkarahisar	984	758,00	1200,00	210,67	162,30	256,74
		Kütahya	956	737,00	1163,00	242,31	187,00	294,81
		Uşak	-	-	-	-	-	-
East Marmara region (TR4)	Bursa subregion	Bursa	4135	3205,00	5009,00	202,25	156,77	245,00
		Eskişehir	1060	815,00	1294,00	173,97	133,77	212,40
		Bilecik	268	206,00	327,00	175,32	134,62	214,36
	Kocaeli subregion	Kocaeli	1843	1422,00	2244,00	145,01	111,84	176,54
		Sakarya	1335	1031,00	1623,00	197,73	152,69	240,40
		Düzce	617	479,00	745,00	240,02	186,49	290,08
		Bolu	461	356,00	562,00	217,07	167,43	264,20
		Yalova	307	236,00	375,00	164,88	126,71	201,42
West Anatolia region (TR5)	Ankara subregion	Ankara	5448	4200,00	6635,00	146,55	112,99	178,46
	Konya subregion	Konya	2939	2278,00	3561,00	205,80	159,49	249,34
		Karaman	285	219,00	347,00	177,57	136,70	216,55
Mediterranean region (TR6)	Antalya subregion	Antalya	2221	1710,00	2707,00	130,74	100,67	159,41
		Isparta	596	460,00	726,00	205,12	158,09	249,88
		Burdur	431	333,00	525,00	235,40	181,68	286,36
	Adana subregion	Adana	2512	1941,00	3053,00	184,25	142,34	223,91
		Mersin	2467	1915,00	1983,00	208,16	161,65	251,71
	Hatay subregion	Hatay	1654	1276,00	2012,00	176,58	136,28	214,81
		Kahramanmaraş	1482	1156,00	1785,00	226,51	176,62	272,80
		Osmaniye	794	620,00	955,00	246,12	192,17	296,03
Central Anatolia region (TR7)	Kırıkkale subregion	Kırıkkale	501	389,00	605,00	178,79	138,86	216,17
		Aksaray	423	326,00	515,00	166,78	128,58	203,10
		Niğde	478	370,00	579,00	216,91	167,94	263,06
		Nevşehir	437	338,00	531,00	222,41	171,87	270,22
		Kırşehir	257	197,00	314,00	162,82	124,88	199,30
	Kayseri subregion	Kayseri	1771	1373,00	2145,00	203,47	157,75	246,42
		Sivas	957	740,00	1162,00	236,20	182,58	286,90
		Yozgat	579	446,00	706,00	214,32	164,99	261,38
West Black Sea region (TR8)	Zonguldak subregion	Zonguldak	1051	815,00	1273,00	255,50	198,14	309,37
		Karabük	380	293,00	462,00	230,47	177,96	280,24
		Bartın	345	267,00	419,00	246,78	190,73	299,79
	Kastamonu subregion	Kastamonu	762	587,00	927,00	284,28	219,28	346,01
		Çankırı	300	230,00	366,00	224,97	172,87	274,86
		Sinop	462	357,00	562,00	295,81	228,46	359,59
	Samsun subregion	Samsun	1833	1414,00	2231,00	204,23	157,54	248,58
		Tokat	1069	828,00	1296,00	270,05	209,21	327,29
		Çorum	1037	805,00	1255,00	289,56	224,75	350,30
		Amasya	591	457,00	718,00	258,20	199,61	313,57
East Black Sea region (TR9)	Trabzon subregion	Trabzon	1046	806,00	1274,00	193,47	149,11	235,69
		Ordu	1330	1030,00	1613,00	254,94	197,40	309,14
		Giresun	727	560,00	887,00	228,66	176,04	278,85
		Rize	417	320,00	509,00	177,57	136,38	217,04
		Artvin	227	174,00	278,00	188,98	144,93	231,35
		Gümüşhane	218	169,00	264,00	228,35	176,74	277,02
Northeast Anatolia region (TRA)	Erzurum subregion	Erzurum	849	656,00	1032,00	199,56	154,15	242,56
		Erzincan	392	305,00	474,00	258,53	200,96	312,30
		Bayburt	102	79,00	124,00	203,12	156,78	247,07
	Ağrı subregion	Ağrı	522	408,00	627,00	218,61	170,86	262,70
		Kars	300	232,00	363,00	192,39	148,95	233,32
		Iğdır	214	168,00	257,00	200,81	157,38	240,66
		Ardahan	152	118,00	185,00	251,85	194,85	305,63
Central East Anatolia region	Malatya subregion	Malatya	1355	1060,00	1627,00	275,56	215,59	330,80
		Elazığ	728	563,00	882,00	197,36	152,78	239,38
		Bingöl	247	191,00	300,00	155,11	120,04	188,18
		Tunceli	127	98,00	154,00	206,63	159,79	250,90
	Van subregion	Van	704	544,00	855,00	131,18	101,38	159,38
		Muş	473	373,00	564,00	251,69	198,49	299,84
		Bitlis	172	131,00	211,00	100,29	76,79	122,96
		Hakkari	148	114,00	179,00	107,07	82,69	130,15
Southeast Anatolia Region	Gaziantep subregion	Gaziantep						
		Adıyaman	590	456,00	717,00	171,93	132,89	208,84
		Kilis	222	173,00	268,00	284,25	221,59	342,42
	Şanlıurfa subregion	Şanlıurfa	1597	1241,00	1931,00	176,12	136,81	212,91
		Diyarbakır	1228	949,00	1492,00	138,60	107,11	168,39
	Mardin subregion	Mardin	647	501,00	785,00	156,44	121,13	189,71
		Batman	595	468,00	712,00	200,25	157,22	239,57
		Şırnak	383	300,00	460,00	164,72	128,95	197,60
		Siirt	239	185,00	290,00	157,21	121,69	190,69

N/A: non-applicable, NUTS: nomenclature of territorial units for statistics, min: minimum, max: maximum

Supplementary Table 4. Data on the burden of certain respiratory system diseases attributed to long-term (2019–2023) air pollution ($PM_{2.5}$) in Türkiye

	COPD-2019			Lung cancer-2019			COPD-2023			Lung cancer-2023		
NUTS-3	**Percent (%)**	**Number of cases**	**Mortality rate***	**Percent (%)**	**Number of cases**	**Mortality rate***	**Percent (%)**	**Number of cases**	**Mortality rate***	**Percent (%)**	**Number of cases**	**Mortality rate***
İstanbul	17.97 (12.59-23.24)	74349 (52064-96126)	754.90 (528.63-976.01)	18.17 (12.37-23.75)	628 (428-821)	6.38 (4.34-8.34)	16.86 (11.67-21.93)	72270 (50007-93987)	708.07 (489.95-920.85)	17.22 (11.59-22.71)	617 (415-814)	6.04 (4.07-7.97)
Tekirdağ	13.99 (9.38-18.61)	4010 (2689-5336)	587.40 (393.93-781.54)	14.65 (9.55-19.78)	35 (23-47)	5.14 (3.35-6.94)	16.36 (11.26-21.34)	5301 (3649-6913)	687.09 (473.05-896.14)	16.78 (11.22-22.23)	45 (30-60)	5.89 (3.94-7.80)
Edirne	14.89 (10.10-19.65)	1801 (1222-2376)	625.55 (424.24-825.10)	15.48 (10.19-20.75)	16 (10-21)	5.43 (3.58-7.28)	19.89 (14.21-25.44)	2507 (1791-3207)	835.27 (596.74-1068.33)	19.75 (13.69-25.42)	21 (14-27)	6.93 (4.81-8.92)
Kırklareli	17.32 (12.04-22.47)	1850 (1286-2400)	727.39 (505.75-943.69)	17.61 (11.93-23.14)	16 (11-21)	6.18 (4.19-8.12)	11.73 (7.62-15.99)	1342 (872-1830)	492.73 (320.19-671.67)	12.53 (7.88-17.3)	12 (8-17)	4.40 (2.77-6.07)
Balıkesir	17.82 (12.45-23.05)	6464 (4519-8364)	748.27 (523.10-968.23)	18.04 (12.27-23.60)	55 (37-72)	6.33 (4.31-8.28)	20.42 (14.67-26.04)	7863 (5648-10002)	857.65 (616.03-1093.80)	20.18 (14.09-25.87)	65 (45-83)	7.08 (4.95-9.08)
Çanakkale	11.9 (7.78-16.2)	1890 (1231-2573)	499.77 (325.60-680.26)	12.69 (8.00-17.49)	17 (11-23)	4.45 (2.81-6.14)	16.09 (11.05-21.02)	2741 (1882-3581)	675.63 (463.96-882.74)	16.54 (11.02-21.96)	24 (16-31)	5.81 (3.87-7.71)
İzmir	16.01 (10.98-20.92)	20007 (13729-26154)	672.26 (461.28-878.80)	16.47 (10.96-21.88)	53 (36-71)	1.80 (1.19-2.39)	18.02 (12.62-23.29)	23605 (16538-30513)	756.74 (530.17-978.18)	18.21 (12.4-23.79)	199 (136-260)	6.39 (4.35-8.35)
Aydın	21.86 (15.88-27.60)	6871 (4993-8676)	918.03 (667.17-1159.21)	21.30 (15.13-27.08)	56 (40-71)	7.48 (5.31-9.50)	21.86 (15.88-27.6)	7362 (5350-9296)	918.03 (667.17-1159.21)	21.3 (15.13-27.08)	60 (43-76)	7.48 (5.31-9.50)
Denizli	23.41 (17.18-29.26)	6697 (4916-8373)	983.07 (721.55-1228.95)	22.47 (16.21-28.39)	17 (12-21)	2.45 (1.77-3.10)	19.05 (13.49-24.48)	5728 (4057-7362)	800.07 (566.68-1028.29)	19.07 (13.1-24.71)	48 (33-62)	6.69 (4.60-8.67)
Muğla	23.39 (17.17-29.24)	6696 (4914-8371)	982.41 (721.01-1228.22)	22.46 (16.12-28.38)	54 (39-68)	7.88 (5.68-9.96)	19.92 (14.23-25.47)	6331 (4524-8096)	836.51 (597.81-1069.76)	19.77 (13.71-25.45)	53 (36-68)	6.94 (4.81-8.93)
Manisa	26.20 (19.66-32.25)	10427 (7824-12835)	1100.42 (825.63-1354.52)	24.46 (18.01-30.49)	81 (60-101)	8.58 (6.32-10.70)	23.92 (17.62-29.82)	9969 (7342-12429)	1004.64 (739.94-1252.50)	22.85 (16.53-28.84)	80 (58-100)	8.02 (5.80-10.12)
Afyonkarahisar	10.58 (6.75-14.59)	2012 (1284-2775)	444.45 (283.43-612.76)	11.41 (7.06-15.94)	18 (11-25)	4.01 (2.48-5.60)	15.25 (10.39-20.07)	3100 (2111-4078)	640.64 (436.27-842.79)	15.8 (10.44-21.13)	27 (18-36)	5.55 (3.66-7.42)
Kütahya	13.59 (9.07-18.17)	2229 (1487-2981)	570.80 (380.83-763.24)	14.29 (9.26-19.35)	20 (13-27)	5.01 (3.25-6.79)	N/A	N/A	N/A	N/A	N/A	N/A
Uşak	N/A	N/A	N/A	N/A	N/A	N/A	14.87 (10.08-19.62)	1602 (1086-2113)	624.67 (423.54-824.08)	15.46 (10.18-20.73)	14 (9-19)	5.43 (3.57-7.28)
Bursa	19.35 (13.75-24.83)	16065 (11414-20609)	812.75 (577.47-1042.68)	19.31 (13.31-24.97)	134 (92-173)	6.78 (4.67-8.76)	23.8 (17.51-29.69)	21279 (15658-26547)	999.66 (735.59-1247.14)	22.76 (16.45-28.73)	170 (123-215)	7.99 (5.78-10.09)
Eskişehir	14.84 (10.06-19.58)	3714 (2517-4900)	623.21 (422.38-822.36)	15.43 (10.16-20.69)	32 (21-43)	5.42 (3.56-7.26)	N/A	N/A	N/A	N/A	N/A	N/A
Bilecik	12.01 (7.83-16.33)	731 (477-994)	504.24 (329.04-685.71)	8.98 (4.53-14.69)	7 (4-9)	4.49 (2.84-6.18)	10.16 (6.43-14.08)	652 (413-904)	426.63 (270.11-591.28)	11.00 (6.77-15.42)	6 (4-8)	3.86 (2.37-5.41)
Kocaeli	17.8 (12.44-23.04)	9061 (6333-11725)	747.74 (522.66-967.60)	18.03 (12.26-23.59)	77 (52-100)	6.33 (4.30-8.28)	17.64 (12.31-22.84)	9931 (6929-12862)	740.81 (516.89-959.46)	17.88 (12.15-23.44)	45 (30-59)	6.28 (4.26-8.23)
Sakarya	18.18 (12.76-23.48)	4940 (3467-6380)	763.58 (535.90-986.22)	18.34 (12.51-23.93)	42 (28-54)	6.44 (4.39-8.40)	18.08 (12.68-23.36)	5407 (3791-6987)	759.37 (532.38-981.28)	18.26 (12.44-23.84)	46 (31-60)	6.41 (4.37-8.37)
Düzce	27.63 (20.97-33.88)	2880 (2185-3531)	1160.53 (880.56-1422.99)	25.41 (18.83-31.58)	22 (16-28)	8.92 (6.61-11.08)	20.05 (14.35-25.63)	2253 (1612-2880)	842.20 (602.70-1076.31)	19.88 (13.82-25.56)	19 (13-24)	6.98 (4.85-8.97)
Bolu	16.98 (11.76-22.06)	1480 (1025-1923)	712.99 (493.96-926.68)	17.32 (11.68-22.82)	13 (9-17)	6.08 (4.10-8.01)	16.54 (11.41-21.55)	1527 (1053-1989)	694.87 (479.24-905.24)	16.94 (11.36-22.41)	13 (9-17)	5.95 (3.99-7.87)
Yalova	11.12 (7.16-15.25)	830 (534-1137)	467.11 (300.65-640.43)	11.94 (7.45-16.6)	7 (5-10)	4.19 (2.61-5.83)	17.70 (12.36-22.92)	1510 (1055-1956)	743.48 (519.11-962.60)	17.94 (12.19-23.5)	13 (9-17)	6.30 (4.28-8.25)
Ankara	19.5 (13.88-25)	29666 (21111-38025)	819.04 (582.84-1049.81)	19.44 (13.41-25.09)	247 (171-319)	6.82 (4.71-8.81)	17.31 (12.04-22.46)	27893 (19392-36189)	727.12 (505.52-943.38)	17.61 (11.93-23.14)	237 (161-312)	6.18 (4.19-8.12)
Konya	20.34 (14.6-25.95)	11,308 (8115-14430)	854.24 (613.08-1090.10)	20.11 (14.04-25.8)	93 (65-120)	7.06 (4.93-9.06)	21.54 (15.62-27.25)	12900 (9357-16320)	904.74 (656.22-1144.53)	21.06 (14.89-26.81)	105 (75-734)	7.39 (5.23-9.41)
Karaman	13.66 (9.12-18.25)	890 (594-1189)	573.84 (383.22-766.55)	14.35 (9.31-19.43)	8 (5-11)	5.04 (3.27-6.82)	15.26 (10.39-20.07)	1071 (109-211)	640.93 (436.50-843.12)	15.81 (10.44-21.13)	9 (6-12)	5.55 (3.66-7.42)
Antalya	17.59 (12.26-22.78)	11981 (8355-15521)	738.67 (515.11-956.95)	17.84 (12.11-23.39)	102 (69-133)	6.26 (4.25-8.21)	13.96 (9.36-18.58)	10494 (7036-13966)	586.51 (393.22-780.53)	14.63 (9.54-19.76)	92 (60-124)	5.14 (3.35-6.93)
Isparta	19.77 (14.11-25.3)	2363 (1686-3024)	830.31 (592.48-1062.60)	19.66 (13.6-25.32)	20 (14-25)	6.90 (4.77-8.89)	12.4 (8.14-16.8)	1559 (1023-2113)	520.73 (341.74-705.77)	13.17 (8.37-18.03)	14 (9-19)	4.62 (2.94-6.33)
Burdur	16.84 (11.65-21.9)	1278 (884-1663)	707.25 (489.28-919.88)	17.2 (11.58-22.69)	11 (7-14)	6.04 (4.06-7.96)	17.54 (12.22-22.72)	1384 (965-1794)	736.52 (513.33-954.43)	17.58 (12.08-23.34)	12 (8-15)	6.25 (4.24-8.19)
Adana	18.71 (13.2-24.09)	10543 (7441-13578)	785.70 (554.51-1011.91)	18.78 (12.86-24.4)	88 (61-115)	6.59 (4.52-8.57)	19.31 (13.71-24.78)	11026 (7831-14149)	810.98 (575.96-1040.67)	19.28 (13.28-24.93)	92 (63-119)	6.77 (4.66-8.75)
Mersin	24.77 (18.38-30.68)	11873 (8812-14704)	1040.38 (772.16-1288.49)	23.46 (17.04-29.51)	94 (68-118)	8.23 (5.98-10.36)	22.88 (16.74-28.69)	11931 (8732-14960)	960.88 (703.24-1204.80)	22.08 (15.86-27.95)	96 (69-122)	7.75 (5.57-9.81)
Hatay	4.31 (2.24-6.71)	1662 (863-2589)	180.89 (94.00-281.85)	4.9 (2.37-7.56)	16 (8-24)	1.72 (0.83-2.65)	24.7 (18.32-30.61)	9458 (7015-11720)	1037.44 (769.49-1285.53)	23.41 (17-29.46)	75 (54-94)	8.22 (5.97-10.34)
Kahramanmaraş	29.69 (22.79-36.21)	7973 (6120-9726)	1246.88 (957.08-1520.97)	26.71 (19.92-32.93)	60 (45-74)	9.37 (6.99-11.56)	27.08 (20.45-33.27)	7437 (5613-9135)	1137.44 (858.84-1397.24)	25.05 (18.53-31.16)	57 (43-72)	8.79 (6.50-10.94)
Osmaniye	24.57 (18.2-30.48)	3212 (2380-3985)	1031.97 (764.50-1280.08)	23.32 (16.92-29.36)	25 (18-32)	8.18 (5.94-10.31)	30.52 (23.55-37.2)	4284 (3306-5222)	1281.67 (988.92-1562.24)	27.2 (20.36-33.46)	32 (24-39)	9.55 (7.15-11.74)
Kırıkkale	-	-	-	-	-	-	-	-	-	-	-	-
Aksaray	9.48 (5.93-13.25)	963 (602-1347)	398.06 (248.87-556.56)	10.32 (6.28-14.57)	9 (5-12)	3.62 (2.20-5.12)	16.64 (11.48-21.66)	1868 (1289-2432)	698.74 (482.35-909.78)	17.02 (11.43-22.5)	16 (11-21)	5.98 (4.01-7.90)
Niğde	21.66 (15.72-27.38)	1946 (1413-2461)	909.65 (660.26)	21.15 (14.98-26.91)	16 (11-20)	7.42 (5.26-9.44)	21.58 (15.4-27.39)	2103 (1501-2669)	906.25 (646.67-1150.33)	21.58 (15.4-27.39)	18 (13-22)	7.57 (5.40-9.61)
Nevşehir	10.86 (6.96-14.93)	869 (557-1194)	456.29 (292.42-627.21)	11.69 (7.26-16.29)	8 (5-11)	4.10 (2.55-5.72)	20.12 (14.41-25.71)	1736 (1243-2218)	845.15 (605.25-1079.72)	19.94 (13.87-25.62)	14 (10-18)	7.00 (4.87-8.99)
Kırşehir	11 (7.06-15.1)	714 (459-980)	461.87 (296.66-634.03)	11.82 (7.36-16.45)	6 (4-9)	4.15 (2.58-5.77)	N/A	N/A	N/A	N/A	N/A	N/A
Kayseri	24.48 (18.12-30.39)	8680 (6425-10776)	1028.16 (761.03-1276.35)	23.25 (16.87-29.29)	69 (50-87)	8.16 (5.92-10.28)	21.16 (15.31-26.85)	8015 (5797-10166)	888.91 (642.91-1127.51)	20.77 (14.62-26.49)	66 (46-84)	7.29 (5.13-9.30)
Sivas	22.16 (16.14-27.93)	3688 (2686-4648)	930.72 (677.80-1172.97)	21.54 (15.36-27.34)	30 (21-38)	7.56 (5.39-9.60)	19.06 (13.5-24.49)	338 (239-435)	800.32 (566.89-1028.58)	19.07 (13.1-24.71)	3 (2-4)	6.69 (4.60-8.67)
Yozgat	8.47 (5.19-12.02)	945 (579-1340)	355.91 (217.93-504.70)	9.3 (5.53-13.29)	9 (5-12)	3.27 (1.94-4.67)	N/A	N/A	N/A	N/A	N/A	N/A
Zonguldak	19.63 (13.99-25.14)	3364 (2397-4309)	824.57 (587.56-1056.06)	19.54 (13.5-25.21)	28 (19-36)	6.86 (4.74-8.85)	24.08 (17.76-29.99)	633 (467-789)	151.70 (111.87-188.95)	22.96 (16.63-28.97)	34 (24-42)	8.06 (5.84-10.17)
Karabük	13.69 (9.15-18.28)	925 (618-1236)	575.05 (384.17-767.87)	14.38 (9.34-19.46)	8 (5-11)	5.05 (3.28-6.83)	N/A	N/A	N/A	N/A	N/A	N/A
Bartın	17.8 (12.44-23.04)	1020 (713-1320)	747.74 (522.66-967.60)	18.03 (12.26-23.59)	9 (6-11)	6.33 (4.30-8.28)	14.21 (9.56-18.86)	867 (583-1150)	596.96 (401.51-792.28)	14.86 (9.72-20.02)	8 (5-10)	5.22 (3.41-7.03)
Kastamonu	19.56 (13.93-25.06)	2158 (1537-2766)	821.56 (584.99-1052.65)	19.49 (13.45-25.15)	18 (12-23)	6.84 (4.72-8.83)	N/A	N/A	N/A	N/A	N/A	N/A
Çankırı	14.4 (9.71-19.08)	795 (536-1053)	604.99 (407.89-801.30)	15.03 (9.86-20.23)	7 (5-9)	5.28 (3.46-7.10)	14.03 (9.41-18.66)	833 (559-1107)	589.20 (395.35-783.56)	14.69 (9.79-19.83)	7 (5-10)	5.16 (3.36-6.96)
Sinop	21.75 (15.8-27.48)	1394 (1012-1761)	913.61 (663.53-1154.33)	21.22 (15.05-26.99)	11 (8-14)	7.45 (5.28-9.47)	10.18 (6.45-14.11)	706 (447-978)	427.64 (270.87-592.50)	11.02 (6.78-15.45)	6 (4-9)	3.87 (2.38-5.42)
Samsun	20.58 (14.81-26.22)	7556 (5436-9625)	864.44 (621.93-1101.18)	20.31 (14.21-26.01)	62 (44-80)	7.13 (4.99-9.13)	17.82 (12.46-23.06)	6947 (4857-8988)	748.54 (523.32-968.54)	18.04 (12.27-23.61)	59 (40-77)	6.33 (4.31-8.29)
Tokat	22.42 (16.36-28.21)	3725 (2718-4686)	941.69 (687.14-1184.63)	21.73 (15.55-27.57)	30 (22-38)	7.63 (5.46-9.68)	18.78 (13.26-24.18)	3226 (2278-4153)	788.79 (557.13-1015.43)	18.84 (12.92-24.47)	27 (19-35)	6.61 (4.53-8.59)
Çorum	26.59 (20.0-32.7)	3951 (2971-4859)	1116.83 (839.94-1373.51)	24.72 (18.26-30.77)	31 (23-38)	8.68 (6.41-10.80)	19.36 (13.75-24.83)	2986 (2122-3831)	813.00 (577.68-1042.96)	19.32 (13.31-24.97)	25 (17-32)	6.78 (4.67-8.76)
Amasya	22.61 (16.52-28.41)	2161 (1579-2715)	949.64 (693.86-1193.04)	21.88 (15.68-27.73)	17 (13-22)	7.68 (5.50-9.73)	16.90 (11.70-21.98)	1671 (1157-2173)	709.99 (491.51-923.12)	17.25 (11.63-22.75)	14 (10-19)	6.06 (4.08-7.99)
Trabzon	18.37 (12.92-23.71)	4073 (2864-5255)	771.69 (542.71-995.75)	18.51 (12.64-24.11)	34 (23-45)	6.50 (4.44-8.46)	13.63 (9.1-18.21)	3192 (2131-4266)	572.32 (382.03-764.90)	14.32 (9.29-19.39)	28 (18-38)	5.03 (3.26-6.80)
Ordu	22.79 (16.67-28.59)	4859 (3554-6097)	957.07 (700.05-1200.81)	22.01 (15.8-27.88)	39 (28-50)	7.73 (5.55-9.78)	18.37 (12.92-23.7)	4195 (2950-5413)	771.43 (542.49-995.44)	18.50 (12.64-24.1)	35 (24-46)	6.49 (4.43-8.46)
Giresun	18.98 (13.43-24.4)	2471 (1749-3177)	797.00 (564.08-1024.79)	19.01 (13.05-24.64)	21 (14-27)	6.67 (4.58-8.65)	11.64 (7.55-15.88)	1624 (1054-2216)	488.88 (317.23-666.96)	12.44 (7.82-17.2)	15 (9-20)	4.37 (2.74-6.04)
Rize	12.01 (7.83-16.33)	1156 (754-1572)	504.24 (329.04-685.71)	12.79 (8.08-17.6)	10 (7-14)	4.49 (2.84-6.18)	8.36 (5.10-11.87)	855 (522-1214)	350.96 (214.31-498.53)	9.18 (5.44-13.14)	8 (5-11)	3.22 (1.91-4.61)
Artvin	8.73 (5.37-12.33)	436 (268-616)	366.46 (225.64-517.74)	9.56 (5.72-13.62)	4 (2-6)	3.36 (2.01-4.78)	5.92 (3.36-8.79)	306 (174-454)	248.51 (141.27-368.98)	6.64 (3.6-9.84)	3 (2-4)	2.33 (1.26-3.45)
Gümüşhane	19.52 (13.9-25.02)	841 (599-1078)	820.05 (583.70-1050.95)	19.46 (13.43-25.11)	7 (5-9)	6.83 (4.71-8.82)	21.49 (15.58-27.19)	879 (637-1113)	902.39 (654.29-1141.94)	21.02 (14.85-26.76)	7 (5-9)	7.38 (5.21-9.39)
Erzurum	20.5 (14.73-26.12)	3588 (2579-4573)	860.80 (618.77-1097.23)	20.24 (14.14-25.93)	30 (21-38)	7.10 (4.96-9.10)	N/A	N/A	N/A	N/A	N/A	N/A
Erzincan	23.51 (17.27-29.38)	1456 (1069-1819)	987.46 (725.15-1233.85)	22.55 (16.27-28.48)	12 (8-15)	7.91 (5.71-10.00)	N/A	N/A	N/A	N/A	N/A	N/A
Bayburt	14.92 (10.12-19.68)	306 (208-403)	626.71 (425.17-826.47)	15.5 (10.21-20.78)	5 (2-4)	5.44 (3.58-7.29)	11.39 (7.36-15.57)	253 (164-346)	478.19 (309.08-653.94)	12.20 (7.63-16.91)	2 (1-3)	4.28 (2.68-5.93)
Ağrı	31.54 (24.53-38.37)	3303 (2413-3775)	1324.88 (1030.28-1611.49)	27.8 (20.8-34.04)	23 (17-28)	9.76 (7.30-11.95)	19.85 (14.18-25.4)	2045 (1460-2615)	833.79 (595.46-1066.61)	19.72 (13.67-25.39)	35 (25-46)	6.92 (4.80-8.91)
Kars	23.47 (17.24-29.34)	1508 (1108-1885)	985.93 (723.89-1232.14)	22.52 (16.25-28.45)	12 (9-15)	7.91 (5.70-9.99)	15.7 (10.74-20.58)	1048 (717-1374)	659.52 (451.19-864.21)	16.2 (10.75-21.58)	9 (6-12)	5.69 (3.77-7.57)
Iğdır	32.38 (25.34-39.31)	1387 (1085-1684)	1360.14 (1064.46-1651.18)	28.27 (21.12-34.56)	10 (8-12)	9.92 (7.41-12.13)	N/A	N/A	N/A	N/A	N/A	N/A
Ardahan	17.73 (12.39-22.96)	450 (314-583)	744.81 (520.22-964.16)	17.97 (12.21-23.53)	4 (3-5)	6.31 (4.29-8.26)	18.27 (12.84-23.59)	468 (329-604)	767.51 (539.20-990.84)	18.42 (12.57-24.02)	4 (3-5)	6.47 (4.41-8.43)
Malatya	26.13 (19.6-32.17)	5341 (4005-6575)	1097.43 (823.06-1351.06)	24.41 (17.97-30.44)	42 (31-52)	8.57 (6.31-10.68)	32.33 (25.29-39.25)	6450 (5046-7831)	1357.77 (1062.15-1648.53)	28.24 (21.1-34.52)	47 (35-58)	9.91 (7.41-12.12)
Elazığ	24.54 (18.17-30.44)	3713 (2750-4607)	1030.49 (763.15-1278.63)	23.29 (16.9-29.33)	29 (21-37)	8.18 (5.93-10.30)	16.06 (11.03-20.99)	2595 (1782-3391)	674.50 (463.07-881.43)	16.52 (11-21.94)	22 (15-30)	5.80 (3.86-7.70)
Bingöl	17.41 (12.12-22.57)	1123 (781-1456)	731.16 (508.87-948.12)	17.69 (11.99-23.23)	10 (6-13)	6.21 (4.21-8.15)	21.27 (15.4-26.96)	1507 (1091-1910)	893.42 (646.73-1132.32)	20.85 (14.69-26.58)	12 (9-16)	7.32 (5.16-9.33)
Tunceli	18.52 (13.05-23.88)	466 (328-601)	777.95 (547.97-1003.07)	18.63 (12.47-24.24)	4 (3-5)	6.54 (4.47-8.51)	16.68 (11.52-21.71)	422 (291-549)	700.39 (483.69-911.74)	17.06 (11.46-22.53)	4 (2-5)	5.99 (4.02-7.91)
Van	18.27 (12.84-23.59)	3960 (2782-5112)	767.51 (539.20-990.84)	18.42 (12.57-24.02)	33 (23-43)	6.47 (4.41-8.43)	17.23 (11.97-22.36)	4063 (2822-5274)	723.61 (502.62-939.24)	17.54 (11.87-23.06)	35 (23-45)	6.15 (4.17-8.09)
Muş	42.35 (35.12-49.63)	3255 (2699-3815)	1778.75 (1475.08-2084.42)	32.67 (24.68-40.02)	21 (16-26)	11.47 (8.66-14.05)	29.09 (22.26-35.52)	2369 (1813-2894)	1221.57 (934.86-1491.73)	26.34 (19.61-32.55)	18 (13-22)	9.24 (6.88-11.43)
Bitlis	9.01 (5.58-12.68)	619 (383-871)	378.35 (234.35-532.41)	9.85 (5.93-13.98)	6 (3-8)	3.46 (2.08-4.91)	8.23 (5.01-11.71)	628 (383-894)	345.61 (210.44-491.83)	9.05 (5.34-12.97)	6 (3-8)	3.18 (1.88-4.55)
Hakkari	5.32 (2.95-8.02)	294 (163-444)	223.59 (123.72-336.87)	6 (3.15-9.01)	3 (1-4)	2.11 (1.10-3.16)	28.78 (21.99-35.16)	11897 (8839-14721)	1045.18 (776.54-1293.35)	26.14 (19.45-32.35)	26 (20-33)	9.18 (6.83-11.35)
Gaziantep	21.16 (15.3-26.84)	9280 (6712-11772)	888.68 (642.71-1127.26)	20.76 (14.61-26.49)	76 (54-97)	7.29 (5.13-9.30)	24.89 (18.49-30.79)	1,784 (1,226-2,208)	156.78 (116.48-194.03)	23.54 (17.11-29.59)	94 (68-118)	8.26 (6.01-10.38)
Adıyaman	22.85 (16.72-28.66)	3228 (2362-4048)	959.76 (702.30-1203.63)	22.06 (15.84-27.93)	26 (19-33)	7.74 (5.56-9.80)	11 (7.06-15.1)	1585 (1018-2175)	461.87 (296.66-634.03)	11.82 (7.36-16.45)	14 (9-20)	4.15 (2.58-5.77)
Kilis	22.44 (16.38-28.23)	707 (516-889)	942.61 (687.92-1185.60)	21.75 (15.56-27.59)	6 (4-7)	7.63 (5.46-9.68)	25.1 (18.68-31.01)	889 (662-1099)	1054.13 (784.71-1302.39)	23.69 (17.24-29.74)	7 (5-9)	8.32 (6.05-10.44)
Şanlıurfa	19.46 (13.84-24.95)	7048 (5014-9037)	817.28 (581.34-1047.82)	19.4 (13.38-25.06)	59 (41-76)	6.81 (4.70-8.80)	25.04 (18.63-30.95)	10167 (7565-12567)	1051.85 (782.62-1300.08)	23.65 (17.21-29.7)	80 (58-101)	8.30 (6.04-10.42)
Diyarbakır	17.68 (12.34-22.89)	6287 (4389-8141)	742.41 (518.22-961.35)	17.92 (12.17-23.47)	53 (36-70)	6.29 (4.27-8.24)	18.04 (12.64-23.32)	7075 (4958-9145)	757.79 (531.06-979.42)	18.23 (12.42-23.81)	60 (41-78)	6.40 (4.36-8.36)
Mardin	18.14 (12.72-23.43)	2987 (2095-3858)	761.74 (534.36-984.06)	18.31 (12.48-23.89)	25 (17-33)	5.43 (4.38-8.39)	23.22 (17.03-29.06)	4324 (3171-5410)	975.35 (715.22-1220.35)	22.34 (16.09-28.24)	35 (25-44)	7.84 (5.65-9.91)
Batman	19.47 (13.85-24.95)	2281 (1622-2924)	817.54 (581.55-1048.10)	19.41 (13.39-25.06)	19 (13-25)	6.81 (4.70-8.80)	28.72 (21.94-35.09)	3881 (2964-4742)	1206.26 (921.51-1473.91)	26.11 (19.42-32.31)	59 (44-73)	9.16 (6.82-11.34)
Şırnak	31.21 (24.21-37.99)	2823 (2190-3436)	1310.94 (1016.88-1595.96)	27.61 (20.67-33.86)	21 (16-26)	9.69 (7.26-11.88)	26.85 (20.24-33)	2910 (2193-3579)	1127.76 (849.93-1386.12)	24.90 (18.41-30.98)	23 (17-28)	8.74 (6.46-10.87)
Siirt	19.03 (13.48-24.46)	1151 (566.03-1027.41)	799.30 (566.03-1027.41)	19.05 (13.09-24.69)	10 (7-12)	6.69 (4.59-8.67)	19.19 (13.61-24.64)	1350 (957-1733)	805.92 (571.65-1034.94)	19.18 (13.2-24.83)	11 (8-15)	6.73 (4.63-8.71)

*attributed per 100,000 people, COPD: chronic obstructive pulmonary disease, N/A: non-applicable, NUTS: nomenclature of territorial units for statistics

Supplementary Table 5. Changes in the estimated proportion of chronic obstructive pulmonary disease mortality attributed to long-term (2019–2023) air pollution ($PM_{2.5}$) in Türkiye across COVID-19 periods

Era	**n**	**Mean**	**Standard deviation**	**Standard error**	**95% CI* for mean**		**P**
					Lower bound	**Upper bound**	
Pre	80	18.89	6.28	0.70	17.49	20.29	
Covid	80	19.34	5.38	0.60	18.14	20.54	0.687
Post-covid	80	18.58	5.09	0.56	17.45	19.70	
Total	240	18.93	5.59	0.36	18.22	19.64	

CI: confidence interval, COVID-19: coronavirus disease-2019