SUPPLEMENTARY MATERIAL

for

Goren AY, Genisoglu, M., Okten HE, Sofuoglu SC (2021) Effect of COVID-19 pandemic on ambient air quality and excess risk of particulate matter in Turkey, Environmental Challenges, doi: 10.1016/j.envc.2021.100239

Figure SM1. Uludağ mountain could be seen from Istanbul after the partial curfew period [1]
Table SM1. Descriptive statistics of atmospheric PM$_{2.5}$ and PM$_{10}$ concentrations.

| Parameter | City       | Number of AQMS | Year | Median | Mean | Min | Max |
|-----------|------------|----------------|------|--------|------|-----|-----|
| PM$_{2.5}$ (μg/m$^3$) | Ankara     | 4              | 2019 | 10.2   | 14.7 | 0.82| 46.0|
|          |            |                | 2020 | 17.3   | 22.1 | 3.43| 134 |
|          | Bursa      | 2              | 2019 | 23.7   | 26.7 | 6.87| 73.9|
|          |            |                | 2020 | 25.6   | 27.8 | 8.08| 63.9|
|          | Istanbul   | 4              | 2019 | 20.5   | 23.1 | 5.34| 71.5|
|          |            |                | 2020 | 19.9   | 20.9 | 5.20| 48.3|
|          | Kocaeli    | 4              | 2019 | 16.6   | 19.6 | 2.56| 61.0|
|          |            |                | 2020 | 17.9   | 20.3 | 4.42| 56.5|
|          | Kutahya    | 1              | 2019 | 10.9   | 12.7 | 1.73| 43.2|
|          |            |                | 2020 | 19.2   | 20.1 | 1.99| 42.88|
|          | Trabzon    | 1              | 2019 | 20.0   | 20.5 | 6.68| 40.6|
|          |            |                | 2020 | 24.8   | 26.0 | 9.46| 54.9|
|          | Zonguldak  | 1              | 2019 | 20.3   | 21.8 | 3.47| 50.1|
|          |            |                | 2020 | 30.4   | 30.7 | 3.23| 62.5|
| PM$_{10}$ (μg/m$^3$) | Corum      | 3              | 2019 | 45.1   | 49.1 | 7.6 | 176 |
|          |            |                | 2020 | 39.2   | 45.0 | 10.3| 131 |
|          | Ankara     | 7              | 2019 | 33.0   | 43.1 | 4.82| 196 |
|          |            |                | 2020 | 43.5   | 47.8 | 2.95| 237 |
|          | Bursa      | 4              | 2019 | 55.2   | 59.6 | 10.9| 171 |
|          |            |                | 2020 | 46.9   | 49.3 | 9.2 | 133 |
|          | Istanbul   | 11             | 2019 | 39.0   | 44.6 | 6.1 | 185 |
|          |            |                | 2020 | 37.9   | 44.9 | 9.4 | 184 |
|          | Izmir      | 1              | 2019 | 30.7   | 33.7 | 11.7| 58.6|
|          |            |                | 2020 | 42.6   | 44.5 | 17.4| 81.8|
|          | Kars       | 1              | 2019 | 31.0   | 34.9 | 7.6 | 80.0|
|          |            |                | 2020 | 27.6   | 34.3 | 7.72| 89.2|
|          | Kocaeli    | 11             | 2019 | 32.5   | 39.1 | 4.55| 136 |
|          |            |                | 2020 | 31.6   | 36.7 | 6.07| 409 |
|          | Konya      | 2              | 2019 | 30.7   | 34.0 | 9.83| 928 |
|          |            |                | 2020 | 28.0   | 32.9 | 8.48| 102 |
|          | Kutahya    | 1              | 2019 | 55.1   | 57.3 | 14.05| 119 |
|          |            |                | 2020 | 60.5   | 60.0 | 14.7| 129 |
|          | Trabzon    | 5              | 2019 | 34.5   | 37.6 | 11.5| 101 |
|          |            |                | 2020 | 38.50  | 42.3 | 17.6| 117 |
|          | Zonguldak  | 1              | 2019 | 24.2   | 26.1 | 4.63| 55.9|
|          |            |                | 2020 | 76.5   | 77.2 | 8.11| 157 |
Table SM2. Descriptive statistics of atmospheric NO and NO\textsubscript{2} concentrations.

| Parameter | City     | Number of AQMS | Year | Median | Mean  | Min  | Max  |
|-----------|----------|----------------|------|--------|-------|------|------|
| NO (μg/m\textsuperscript{3}) | Ankara  | 5              | 2019 | 14.7   | 25.3  | 0.19 | 155  |
|           |          |                | 2020 | 12.6   | 24.6  | 1.90 | 164  |
|           |          |                | 2019 | 10.9   | 21.9  | 0.29 | 178  |
|           | Bursa    | 4              | 2020 | 11.1   | 18.8  | 1.50 | 139  |
|           |          |                | 2019 | 19.1   | 28.9  | 0.28 | 229  |
|           | Istanbul | 11             | 2020 | 18.2   | 25.5  | 0.49 | 210  |
|           | Kars     | 1              | 2019 | 13.1   | 13.9  | 4.56 | 31.0 |
|           |          |                | 2020 | 8.57   | 10.2  | 2.98 | 27.8 |
|           | Kocaeli  | 11             | 2019 | 6.24   | 15.8  | 0.24 | 170  |
|           |          |                | 2020 | 11.9   | 35.3  | 0.40 | 376  |
|           | Kutahya  | 1              | 2019 | 6.84   | 10.6  | 2.46 | 35.5 |
|           |          |                | 2020 | 9.75   | 13.2  | 2.18 | 38.5 |
|           | Trabzon  | 5              | 2019 | 18.5   | 22.3  | 1.42 | 115  |
|           |          |                | 2020 | 10.6   | 19.8  | 1.02 | 158  |
|           | Zonguldak| 1              | 2019 | 31.8   | 33.0  | 11.8 | 60.7 |
|           |          |                | 2020 | 20.9   | 25.4  | 9.52 | 73.6 |
| NO\textsubscript{2} (μg/m\textsuperscript{3}) | Corum   | 1              | 2019 | 77.9   | 85.9  | 40.1 | 167  |
|           |          |                | 2020 | 59.1   | 57.9  | 34.3 | 90.3 |
|           | Ankara  | 5              | 2019 | 49.2   | 48.8  | 3.95 | 110  |
|           |          |                | 2020 | 38.0   | 40.9  | 10.8 | 90.1 |
|           | Bursa    | 4              | 2019 | 37.8   | 44.0  | 1.20 | 132  |
|           |          |                | 2020 | 31.5   | 33.3  | 4.87 | 98.7 |
|           | Istanbul | 12             | 2019 | 32.9   | 40.0  | 0.84 | 164  |
|           |          |                | 2020 | 27.7   | 28.0  | 0.27 | 120  |
|           | Kars     | 1              | 2019 | 29.0   | 29.9  | 15.7 | 55.9 |
|           |          |                | 2020 | 25.2   | 27.4  | 12.9 | 53.5 |
|           | Kocaeli  | 11             | 2019 | 24.9   | 29.1  | 0.73 | 191  |
|           |          |                | 2020 | 23.2   | 26.8  | 0.20 | 78.3 |
|           | Kutahya  | 1              | 2019 | 29.4   | 30.0  | 13.0 | 53.5 |
|           |          |                | 2020 | 41.4   | 40.3  | 12.3 | 71.1 |
|           | Trabzon  | 5              | 2019 | 46.5   | 48.1  | 19.6 | 86.5 |
|           |          |                | 2020 | 27.5   | 38.5  | 8.94 | 99.7 |
|           | Zonguldak| 1              | 2019 | 41.3   | 44.6  | 24.4 | 65.1 |
Table SM3. Descriptive statistics of atmospheric NO\textsubscript{x} and SO\textsubscript{2} concentrations.

| Parameter | City         | Number of AQMS | Year | Median | Mean  | Min   | Max   |
|-----------|--------------|----------------|------|--------|-------|-------|-------|
| NO\textsubscript{x} (μg/m\textsuperscript{3}) | Corum        | 1              | 2019 | 89.6   | 106   | 46.2  | 234   |
|           |              |                | 2020 | 72.1   | 80.2  | 40.5  | 147   |
|           | Ankara       | 5              | 2019 | 63.3   | 74.1  | 4.62  | 254   |
|           |              |                | 2020 | 51.7   | 65.6  | 13.9  | 254   |
|           | Bursa        | 5              | 2019 | 49.9   | 74.8  | 1.19  | 405   |
|           |              |                | 2020 | 51.5   | 67.7  | 13.0  | 306   |
|           | Istanbul     | 12             | 2019 | 66.2   | 85.5  | 3.24  | 516   |
|           |              |                | 2020 | 43.9   | 59.7  | 1.08  | 438   |
|           | Kars         | 1              | 2019 | 41.8   | 43.7  | 22.7  | 86.8  |
|           |              |                | 2020 | 33.8   | 37.6  | 15.9  | 81.3  |
|           | Kocaeli      | 11             | 2019 | 36.8   | 55.3  | 0.83  | 337   |
|           |              |                | 2020 | 39.4   | 76.1  | 1.09  | 683   |
|           | Kutahya      | 1              | 2019 | 36.4   | 40.6  | 16.5  | 81.5  |
|           |              |                | 2020 | 53.8   | 53.5  | 14.4  | 103   |
|           | Trabzon      | 5              | 2019 | 66.3   | 70.3  | 22.7  | 195   |
|           |              |                | 2020 | 48.3   | 58.3  | 10.7  | 257   |
|           | Zonguldak    | 1              | 2019 | 74.6   | 78.1  | 41.3  | 126   |
|           |              |                | 2020 | 53.8   | 58.9  | 28.5  | 137   |
| SO\textsubscript{2} (μg/m\textsuperscript{3}) | Corum        | 1              | 2019 | 10.1   | 12.9  | 2.25  | 38.3  |
|           |              |                | 2020 | 7.52   | 10.6  | 5.88  | 24.6  |
|           | Ankara       | 6              | 2019 | 16.3   | 8.86  | 0.25  | 34.4  |
|           |              |                | 2020 | 4.52   | 5.32  | 0.73  | 20.4  |
|           | Bursa        | 5              | 2019 | 9.41   | 11.4  | 0.81  | 59.3  |
|           |              |                | 2020 | 7.08   | 9.95  | 0.79  | 83.2  |
|           | Istanbul     | 10             | 2019 | 4.90   | 6.48  | 0.66  | 43.2  |
|           |              |                | 2020 | 8.02   | 13.02 | 0.23  | 71.5  |
|           | Izmir        | 1              | 2019 | 9.25   | 10.3  | 3.71  | 30.4  |
|           |              |                | 2020 | 7.83   | 8.78  | 3.76  | 16.1  |
|           | Kars         | 1              | 2019 | 16.3   | 10.9  | 3.04  | 27.1  |
|           |              |                | 2020 | 4.37   | 5.08  | 2.12  | 11.4  |
|           | Kocaeli      | 7              | 2019 | 5.19   | 7.88  | 0.43  | 49.7  |
|           |              |                | 2020 | 7.44   | 11.4  | 0.69  | 75.0  |
|           | Konya        | 2              | 2019 | 13.9   | 14.6  | 5.47  | 39.8  |
|           |              |                | 2020 | 7.36   | 8.89  | 3.02  | 26.1  |
|           | Kutahya      | 1              | 2019 | 34.1   | 30.4  | 11.9  | 62.5  |
|           |              |                | 2020 | 12.6   | 13.1  | 4.28  | 31.5  |
|           | Trabzon      | 4              | 2019 | 11.3   | 16.2  | 2.56  | 66.3  |
|           |              |                | 2020 | 4.31   | 5.46  | 1.87  | 16.2  |
|           | Zonguldak    | 1              | 2019 | 12.8   | 15.4  | 1.83  | 36.7  |
|           |              |                | 2020 | 5.06   | 6.61  | 1.01  | 26.5  |
**Table SM4.** Descriptive statistics of atmospheric CO and O\textsubscript{3} concentrations.

| Parameter | City       | Number of AQMS | Year | Median | Mean | Min | Max       |
|-----------|------------|-----------------|------|--------|------|-----|-----------|
| CO (\(\mu g/m^3\)) | Ankara | 2 | 2019 | 463 | 773 | 128 | 3833 |
|          |           |                 | 2020 | 655 | 795 | 200 | 2569 |
|          | Bursa     | 1               | 2019 | 926 | 1104 | 442 | 3284 |
|          |           |                 | 2020 | 2282 | 2386 | 1437 | 3905 |
|          | Istanbul  | 6               | 2019 | 564 | 608 | 177 | 2208 |
|          | Kars      | 2               | 2019 | 498 | 501 | 274 | 965 |
|          |           |                 | 2020 | 479 | 496 | 297 | 936 |
|          | Kocaeli   | 4               | 2019 | 612 | 794 | 409 | 2321 |
|          |           |                 | 2020 | 1.09 | 608 | 0.29 | 2721 |
|          | Kutahya   | 1               | 2019 | 822 | 861 | 552 | 1361 |
|          |           |                 | 2020 | 640 | 606 | 180 | 1002 |
|          | Trabzon   | 2               | 2019 | 752 | 768 | 379 | 1587 |
|          |           |                 | 2020 | 636 | 652 | 290 | 1130 |
|          | Zonguldak | 1               | 2019 | 870 | 904 | 378 | 1576 |
|          |           |                 | 2020 | 623 | 667 | 151 | 1793 |
| O\textsubscript{3} (\(\mu g/m^3\)) | Corum | 1 | 2019 | 23.9 | 26.9 | 17.5 | 43.1 |
|          |           |                 | 2020 | 36.5 | 32.3 | 6.58 | 44.4 |
|          | Ankara    | 2               | 2019 | 57.5 | 57.6 | 43.5 | 79.4 |
|          |           |                 | 2020 | 22.5 | 29.8 | 4.88 | 83.6 |
|          | Bursa     | 4               | 2019 | 45.5 | 47.4 | 11.4 | 97.9 |
|          |           |                 | 2020 | 44.1 | 46.6 | 13.0 | 91.7 |

**Table SM5.** Hypothesis and p-values of Mann-Whitney tests of PM\textsubscript{2.5}.

| AQMS         | Null hypothesis | Alternative Hypothesis | p-value |
|--------------|-----------------|------------------------|---------|
| Bahcelievler-Ankara | 2019=2020 | 2019>2020 | 1       |
| Uludag-Bursa | 2019=2020 | 2019≠2020 | 0.533   |
| City Center-Bursa | 2019=2020 | 2019≠2020 | 0.438   |
| Umranie-Istanbul | 2019=2020 | 2019≠2020 | 0.289   |
| Kagithane-Istanbul | 2019=2020 | 2019>2020 | 0.004   |
| Sultangazi-Istanbul | 2019=2020 | 2019≠2020 | 0.656   |
| Silivri-Istanbul | 2019=2020 | 2019≠2020 | 0.637   |
| City Center-Kocaeli | 2019=2020 | 2019≠2020 | 0.067   |
| Kandira-Kocaeli | 2019=2020 | 2019≠2020 | 0.836   |
| Golcuk-Kocaeli | 2019=2020 | 2019≠2020 | 0.860   |
| Korfez-Kocaeli | 2019=2020 | 2019≠2020 | 0.901   |
| Kentpark-Kutahya | 2019=2020 | 2019>2020 | 0.999   |
| Besirli-Trabzon | 2019=2020 | 2019>2020 | 0.999   |
| Trafik-Zonguldak | 2019=2020 | 2019>2020 | 0.998   |
Table SM6. Hypothesis and p-values of Mann-Whitney tests of PM$_{10}$.

| AQMS                  | Null hypothesis | Alternative Hypothesis | p-value |
|-----------------------|-----------------|------------------------|---------|
| Kecioren-Ankara       | 2019=2020       | 2019≠2020              | 0.552   |
| Kayas-Ankara          | 2019=2020       | 2019>2020              | 0.0004  |
| Bahcelievler-Ankara   | 2019=2020       | 2019>2020              | 1       |
| Inegol-Bursa          | 2019=2020       | 2019≠2020              | 0.582   |
| Kestel-Bursa          | 2019=2020       | 2019≠2020              | 0.128   |
| Beyazit-Bursa         | 2019=2020       | 2019≠2020              | 0.072   |
| Bahabey-Corum         | 2019=2020       | 2019≠2020              | 0.498   |
| MimarSinan-Corum      | 2019=2020       | 2019≠2020              | 0.069   |
| Kandilli-Istanbul     | 2019=2020       | 2019≠2020              | 0.616   |
| Uskudar-Istanbul      | 2019=2020       | 2019≠2020              | 0.842   |
| Sirinevler-Istanbul   | 2019=2020       | 2019≠2020              | 0.609   |
| Mecidiyekoy-Istanbul  | 2019=2020       | 2019≠2020              | 0.009   |
| Umranliye-Istanbul    | 2019=2020       | 2019≠2020              | 0.542   |
| Basaksehir-Istanbul   | 2019=2020       | 2019≠2020              | 0.516   |
| Esenyurt-Istanbul     | 2019=2020       | 2019≠2020              | 0.512   |
| Sultanbeyli-Istanbul  | 2019=2020       | 2019≠2020              | 0.630   |
| Sultangazi-Istanbul   | 2019=2020       | 2019≠2020              | 0.227   |
| Silivri-Istanbul      | 2019=2020       | 2019≠2020              | 0.749   |
| Sile-Istanbul         | 2019=2020       | 2019≠2020              | 0.063   |
| Gazienir-Izmir        | 2019=2020       | 2019≠2020              | 0.999   |
| Istasyon-Kars         | 2019=2020       | 2019≠2020              | 0.739   |
| Gebze-Kocaeli         | 2019=2020       | 2019≠2020              | 0.759   |
| Dilovasi-2-Kocaeli    | 2019=2020       | 2019≠2020              | 0.308   |
| Dilovasi-1-Kocaeli    | 2019=2020       | 2019≠2020              | 0.699   |
| City Center-Kocaeli   | 2019=2020       | 2019≠2020              | 0.394   |
| Yenikoy-Kocaeli       | 2019=2020       | 2019≠2020              | 0.296   |
| Golcuk-Kocaeli        | 2019=2020       | 2019≠2020              | 0.062   |
| Alkalya-Kocaeli       | 2019=2020       | 2019≠2020              | 0.896   |
| Korfez-Kocaeli        | 2019=2020       | 2019≠2020              | 0.604   |
| Izmit-Kocaeli         | 2019=2020       | 2019≠2020              | 0.495   |
| Kentpark-Kutahya      | 2019=2020       | 2019≠2020              | 0.250   |
| Fatih-Trabzon         | 2019=2020       | 2019≠2020              | 0.311   |
| Akcaabat-Trabzon      | 2019=2020       | 2019≠2020              | 0.234   |
| Besirli-Trabzon       | 2019=2020       | 2019≠2020              | 0.999   |
| Trafik-Zonguldak      | 2019=2020       | 2019≠2020              | 1       |
Table SM7. Hypothesis and p-values of Mann-Whitney tests of NO.

| AQMS               | Null hypothesis | Alternative Hypothesis | p-value |
|--------------------|-----------------|------------------------|---------|
| Demetevler-Ankara  | 2019=2020       | 2019>2020              | 0.021   |
| Bahcelievler-Ankara| 2019=2020       | 2019>2020              | 0.010   |
| Inegol-Bursa       | 2019=2020       | 2019≠2020              | 0.919   |
| Kestel-Bursa       | 2019=2020       | 2019>2020              | <0.001  |
| Uludag-Bursa       | 2019=2020       | 2019>2020              | 1       |
| Beyazit-Bursa      | 2019=2020       | 2019≠2020              | 0.144   |
| Kandilli-Istanbul  | 2019=2020       | 2019≠2020              | 0.102   |
| Uskudar-Istanbul   | 2019=2020       | 2019>2020              | 0.998   |
| Sirinevler-Istanbul| 2019=2020       | 2019≠2020              | 0.103   |
| Mecidiyekoy-Istanbul| 2019=2020     | 2019≠2020              | <0.001  |
| Umranliye-Istanbul | 2019=2020       | 2019>2020              | 0.001   |
| Basaksehir-Istanbul| 2019=2020       | 2019≠2020              | 0.745   |
| Esenyurt-Istanbul  | 2019=2020       | 2019≠2020              | 0.014   |
| Sultangazi-Istanbul| 2019=2020       | 2019≠2020              | 0.166   |
| Silivri-Istanbul   | 2019=2020       | 2019≠2020              | 0.953   |
| Trafik-Kars        | 2019=2020       | 2019≠2020              | 0.001   |
| Gebze-Kocaeli      | 2019=2020       | 2019>2020              | <0.001  |
| Dilovasi 1-Kocaeli | 2019=2020       | 2019>2020              | 0.999   |
| Dilovasi 2-Kocaeli | 2019=2020       | 2019>2020              | 1       |
| City Center-Kocaeli| 2019=2020       | 2019>2020              | <0.001  |
| Fatih-Trabzon      | 2019=2020       | 2019>2020              | 0.024   |
| Akcaabat-Trabzon   | 2019=2020       | 2019>2020              | <0.001  |
| Besirli-Trabzon    | 2019=2020       | 2019>2020              | <0.001  |
| City Square-Trabzon| 2019=2020       | 2019≠2020              | 0.267   |
### Table SM8. Hypothesis and p-values of Mann-Whitney tests of NO$_2$ at significance value of 0.05.

| AQMS                  | Null hypothesis | Alternative Hypothesis | p-value  |
|-----------------------|-----------------|------------------------|----------|
| Demetevler-Ankara     | 2019=2020       | 2019>2020              | 0.014    |
| Bahcelievler-Ankara   | 2019=2020       | 2019>2020              | 0.041    |
| Inegol-Bursa          | 2019=2020       | 2019≠2020              | 0.820    |
| Kestel-Bursa          | 2019=2020       | 2019>2020              | <0.001   |
| Uludag-Bursa          | 2019=2020       | 2019>2020              | <0.001   |
| Beyazit-Bursa         | 2019=2020       | 2019>2020              | <0.001   |
| Kandilli-Istanbul     | 2019=2020       | 2019>2020              | <0.001   |
| Uskudar-Istanbul      | 2019=2020       | 2019≠2020              | 0.131    |
| Sirinevler-Istanbul   | 2019=2020       | 2019>2020              | <0.001   |
| Mecidiyekoy-Istanbul  | 2019=2020       | 2019>2020              | <0.001   |
| Umraniye-Istanbul     | 2019=2020       | 2019>2020              | <0.001   |
| Basaksehir-Istanbul   | 2019=2020       | 2019>2020              | <0.001   |
| Esenyurt-Istanbul     | 2019=2020       | 2019>2020              | <0.001   |
| Sultanbeyli-Istanbul  | 2019=2020       | 2019>2020              | 0.398    |
| Kagithane-Istanbul    | 2019=2020       | 2019>2020              | <0.001   |
| Sultangazi-Istanbul   | 2019=2020       | 2019>2020              | <0.001   |
| Silivri-Istanbul      | 2019=2020       | 2019>2020              | 0.010    |
| Trafik-Kars           | 2019=2020       | 2019>2020              | 0.013    |
| Dilovasi 1-Kocaeli    | 2019=2020       | 2019>2020              | 0.998    |
| Dilovasi 2-Kocaeli    | 2019=2020       | 2019>2020              | 0.799    |
| Dilovasi 3-Kocaeli    | 2019=2020       | 2019>2020              | 0.968    |
| City Center-Kocaeli   | 2019=2020       | 2019>2020              | <0.001   |
| Korfez-Kocaeli        | 2019=2020       | 2019>2020              | 0.103    |
| Izmit-Kocaeli         | 2019=2020       | 2019>2020              | 0.195    |
| Fatih-Trabzon         | 2019=2020       | 2019>2020              | 0.211    |
| Akcaabat-Trabzon      | 2019=2020       | 2019>2020              | <0.001   |
| Besirli-Trabzon       | 2019=2020       | 2019>2020              | <0.001   |
| City Square-Trabzon   | 2019=2020       | 2019>2020              | <0.001   |
| Trafik-Zonguldak      | 2019=2020       | 2019>2020              | <0.001   |
Table SM9. Hypothesis and p-values of Mann-Whitney tests of NOx.

| AQMS                  | Null hypothesis | Alternative Hypothesis | p-value |
|-----------------------|-----------------|------------------------|---------|
| Demetevler-Ankara     | 2019=2020       | 2019>2020              | 0.033   |
| Bahcelievler-Ankara   | 2019=2020       | 2019>2020              | 0.015   |
| Inegol-Bursa          | 2019=2020       | 2019≠2020              | 0.936   |
| Kestel-Bursa          | 2019=2020       | 2019>2020              | <0.001  |
| Beyazit-Bursa         | 2019=2020       | 2019>2020              | 0.003   |
| Kandilli-Istanbul     | 2019=2020       | 2019>2020              | 0.003   |
| Uskudar-Istanbul      | 2019=2020       | 2019≠2020              | 0.900   |
| Sirinevler-Istanbul   | 2019=2020       | 2019>2020              | 0.004   |
| Mecidiyekoy-Istanbul  | 2019=2020       | 2019>2020              | <0.001  |
| Umraniye-Istanbul     | 2019=2020       | 2019>2020              | <0.001  |
| Basaksehir-Istanbul   | 2019=2020       | 2019>2020              | 0.004   |
| Esenyurt-Istanbul     | 2019=2020       | 2019>2020              | <0.001  |
| Sultanbeyli-Istanbul  | 2019=2020       | 2019≠2020              | 0.131   |
| Kagithane-Istanbul    | 2019=2020       | 2019>2020              | <0.001  |
| Sultangazi-Istanbul   | 2019=2020       | 2019>2020              | <0.001  |
| Silivri-Istanbul      | 2019=2020       | 2019>2020              | 0.431   |
| Trafik-Kars           | 2019=2020       | 2019>2020              | 0.001   |
| Gebze-Kocaeli        | 2019=2020       | 2019>2020              | <0.001  |
| Dilovasi 1-Kocaeli    | 2019=2020       | 2019>2020              | <0.001  |
| Dilovasi 2-Kocaeli    | 2019=2020       | 2019≠2020              | 0.109   |
| City Center-Kocaeli   | 2019=2020       | 2019>2020              | 0.002   |
| Kandira-Kocaeli       | 2019=2020       | 2019≠2020              | 0.225   |
| Yenikoy-Kocaeli       | 2019=2020       | 2019>2020              | <0.001  |
| Korfez-Kocaeli        | 2019=2020       | 2019>2020              | 1       |
| Izmit-Kocaeli         | 2019=2020       | 2019>2020              | 1       |
Table SM10. Hypothesis and p-values of Mann-Whitney tests of SO₂.

| AQMS                | Null hypothesis | Alternative Hypothesis | p-value |
|---------------------|-----------------|------------------------|---------|
| Demetevler-Ankara   | 2019=2020       | 2019≠2020              | 0.169   |
| Bahcelievler-Ankara | 2019=2020       | 2019>2020              | 1       |
| Inegol-Bursa        | 2019=2020       | 2019≠2020              | 0.490   |
| Kestel-Bursa        | 2019=2020       | 2019≠2020              | 0.715   |
| Uludag-Bursa        | 2019=2020       | 2019≠2020              | 0.704   |
| Beyazıt-Bursa       | 2019=2020       | 2019>2020              | <0.001  |
| Kultur-Bursa        | 2019=2020       | 2019≠2020              | 0.868   |
| Corum               | 2019=2020       | 2019≠2020              | 0.354   |
| Kandilli-Istanbul   | 2019=2020       | 2019≠2020              | 0.944   |
| Sirinevler-Istanbul | 2019=2020       | 2019>2020              | 1       |
| Umranıye-Istanbul   | 2019=2020       | 2019≠2020              | 0.999   |
| Basaksehir-Istanbul | 2019=2020       | 2019≠2020              | 1       |
| Esenyurt-Istanbul   | 2019=2020       | 2019≠2020              | <0.001  |
| Sultanbeyli-Istanbul| 2019=2020       | 2019≠2020              | 1       |
| Sultangazi-Istanbul | 2019=2020       | 2019≠2020              | 1       |
| Sile-Istanbul       | 2019=2020       | 2019≠2020              | 0.002   |
| Silivri-Istanbul    | 2019=2020       | 2019≠2020              | 0.642   |
| Gazziemir-Izmir     | 2019=2020       | 2019≠2020              | 0.368   |
| Trafik-Station      | 2019=2020       | 2019≠2020              | <0.001  |
| City Center-Kocaeli | 2019=2020       | 2019≠2020              | 0.198   |
| Yeniköy-Kocaeli     | 2019=2020       | 2019≠2020              | 0.999   |
| Golcuk-Kocaeli      | 2019=2020       | 2019≠2020              | 0.995   |
| Korfz-Kocaeli       | 2019=2020       | 2019≠2020              | 0.414   |
| Akcaabat-Trabzon    | 2019=2020       | 2019≠2020              | <0.001  |
| Trafik-Zonguldak    | 2019=2020       | 2019≠2020              | <0.001  |
Table SM11. Hypothesis and p-values of Mann-Whitney tests of CO.

| AQMS                      | Null hypothesis | Alternative Hypothesis | p-value |
|---------------------------|-----------------|------------------------|---------|
| Bahcelievler-Ankara       | 2019=2020       | 2019≠2020              | 0.171   |
| Beyazıt-Bursa             | 2019=2020       | 2019>2020              | 1       |
| Kandilli-Istanbul         | 2019=2020       | 2019>2020              | 1       |
| Uskudar-Istanbul          | 2019=2020       | 2019>2020              | 1       |
| Sirinevler-Istanbul       | 2019=2020       | 2019>2020              | 1       |
| Umranıye-İstanbul         | 2019=2020       | 2019>2020              | 1       |
| Basaksehir-İstanbul       | 2019=2020       | 2019>2020              | 1       |
| Trafik-Kars              | 2019=2020       | 2019>2020              | <0.001  |
| Station-Kars             | 2019=2020       | 2019≠2020              | 0.142   |
| Dilovasi 1-Kocaeli       | 2019=2020       | 2019>2020              | <0.001  |
| Dilovasi 2-Kocaeli       | 2019=2020       | 2019>2020              | <0.001  |
| Dilovasi 3-Kocaeli       | 2019=2020       | 2019>2020              | 0.999   |
| İzmit-Kocaeli            | 2019=2020       | 2019>2020              | 0.999   |
| Akcaabat-Trabzon         | 2019=2020       | 2019>2020              | <0.001  |
| Besirli-Trabzon          | 2019=2020       | 2019>2020              | <0.001  |
| Trafik-Zonguldak         | 2019=2020       | 2019>2020              | <0.001  |

Table SM12. Hypothesis and p-values of Mann-Whitney tests of O₃.

| AQMS                      | Null hypothesis | Alternative Hypothesis | p-value |
|---------------------------|-----------------|------------------------|---------|
| Kestel-Bursa              | 2019=2020       | 2019>2020              | <0.001  |
| Uludag-Bursa              | 2019=2020       | 2019≠2020              | 0.248   |
| City Center-Bursa         | 2019=2020       | 2019≠2020              | 0.061   |
**Figure SM2.** PM$_{2.5}$ concentrations in Ankara

**Figure SM3.** PM$_{2.5}$ concentrations in Istanbul
Figure SM4. PM$_{2.5}$ concentrations in Kocaeli
Figure SM5. PM$_{2.5}$ concentrations in Bursa, Kutahya, and Zonguldak

Figure SM6. PM$_{10}$ concentrations in Ankara
Figure SM7. PM$_{10}$ concentrations in Bursa

Figure SM8. PM$_{10}$ concentrations in Corum
Figure SM9. PM$_{10}$ concentrations in Izmir, Kars, Konya, Kutahya, and Zonguldak
Figure SM10. PM$_{10}$ concentrations in Istanbul
Figure SM11. PM$_{10}$ concentrations in Kocaeli
Figure SM12. NO₂ concentrations in Ankara

Figure SM13. NO₂ concentrations in Bursa
Figure SM14. NO$_2$ concentrations in Corum, Kars, Kutahya, and Zonguldak

Figure SM15. NO$_2$ concentrations in Trabzon
Figure SM16. NO$_2$ concentrations in Istanbul
Figure SM17. NO$_2$ concentrations in Kocaeli
Figure SM18. NO concentrations in Ankara

Figure SM19. NO concentrations in Bursa
Figure SM20. NO concentrations in Kars, Kutahya, and Zonguldak

Figure SM21. NO concentrations in Trabzon
Figure SM2. NO concentrations in Istanbul
Figure SM23. NO concentrations in Kocaeli
Figure SM24. NO\textsubscript{x} concentrations in Ankara

Figure SM25. NO\textsubscript{x} concentrations in Bursa
**Figure SM26.** NO\textsubscript{x} concentrations in Corum, Kars, Kutahya, and Zonguldak

**Figure SM27.** NO\textsubscript{x} concentrations in Trabzon
Figure SM28. NO$_x$ concentrations in Istanbul
Figure SM29. NOx concentrations in Kocaeli
Figure SM30. SO\textsubscript{2} concentrations in Ankara

Figure SM31. SO\textsubscript{2} concentrations in Bursa
Figure SM32. SO$_2$ concentrations in Konya and Zonguldak

Figure SM33. SO$_2$ concentrations in Trabzon
Figure SM34. SO$_2$ concentrations in Istanbul
Figure SM35. SO₂ concentrations in Kocaeli
Figure SM36. SO$_2$ concentrations in Corum, Izmir, Kars, and Kutahya

Figure SM37. CO concentrations in Ankara and Bursa
Figure SM38. CO concentrations in Istanbul

Figure SM39. CO concentrations in Kocaeli
Figure SM40. CO concentrations in Kars and Kutahya

Figure SM41. CO concentrations in Trabzon and Zonguldak
**Figure SM42.** $O_3$ concentrations in Ankara and Trabzon

| A-Sitele | A-Kecioren | T-Uzungol | T-Akcaabat | T-Valllik |
|----------|------------|-----------|------------|----------|
|          |            |           |            |          |

**Figure SM43.** $O_3$ concentrations in Bursa

| B-Kestel | B-Uludag | B-Kultur | B-Center |
|----------|----------|----------|----------|
|          |          |          |          |
Figure SM44. O$_3$ concentrations in Istanbul

Figure SM45. O$_3$ concentrations in Kocaeli
Variation in concentrations during 2016 – 2020

The median concentrations of PM$_{2.5}$ were in the range of 19.0-28.8 $\mu$g/m$^3$ (2016), 16.7-38.5 $\mu$g/m$^3$ (2017), 18.3-25.3 (2018), 10.2-23.7 $\mu$g/m$^3$ (2019), and 17.3-30.4 $\mu$g/m$^3$ (2020). In COVID-19 period, the median values showed a reduction between 8.95 and 14.5 % in Ankara, Istanbul, Kocaeli, and Trabzon compared with 2016. The highest reduction was in Istanbul, with 14.5 % (2016: 23.3 $\mu$g/m$^3$; 2020: 19.9 $\mu$g/m$^3$), while the lowest reduction was in Ankara with 8.95% (2016: 19.0 $\mu$g/m$^3$; 2020: 17.3 $\mu$g/m$^3$). Results showed a significant decrease in COVID-19 pandemic period (March 1 to April 21 in 2020) compared with the same period (March 1 to April 21) in 2017. The reduction values were 19.6 %, 32.5 %, and 35.5 % at Istanbul, Kocaeli, and Trabzon, respectively. On the other hand, PM$_{2.5}$ concentrations did not considerably change from 2017 to 2020 in Ankara. Results also showed that the PM$_{2.5}$ concentrations were significantly decreased when COVID-19 pandemic period compared with the same period in 2018. The highest reduction was 15.6 % in Kocaeli, while the lowest reduction was 1.97 % in Trabzon. The median

Figure SM46. O$_3$ concentrations in Corum and Kutahya
concentrations of PM$_{10}$ were in the range of 31.3-86.3 µg/m$^3$ (2016), 30.9-91.4 µg/m$^3$ (2017), 26.1-83.3 (2018), 24.2-55.2 µg/m$^3$ (2019), and 27.6-76.5 µg/m$^3$ (2020). PM$_{10}$ level decreased sharply, from 52.1 to 27.6 µg/m$^3$ for Kars (47.0 % reduction), in particular, Konya had the lowest reduction (10.5 % from 31.3 to 28.0 µg/m$^3$) when we compared the PM$_{10}$ concentrations during COVID-19 period and the same period in 2016. However, the PM$_{10}$ concentrations were increased with the increment of 7.67 % and 10.7 % in Izmir and Zonguldak, respectively. Similar trend observed for the comparison of COVID-19 period and the same period in both 2017 and 2018. The highest reductions were found to be 48.7 % and 43.7 % in Bursa from 2017 to 2020 and 2018 to 2020, respectively.

The median concentrations of NO$_2$ for seven cities were in the range of 25.6-55.6 µg/m$^3$ (2016), 21.9-66.4 µg/m$^3$ (2017), 25.5-51.2 µg/m$^3$ (2018), 24.9-77.9 µg/m$^3$ (2019), and 23.2-59.1 µg/m$^3$ (2020). Reduction in overall median NO$_2$ concentrations were 25.6 %, 34.8 %, 42.3 %, 1.56 %, 38.6 %, and 44.0 % in Ankara, Bursa, Istanbul, Kars, Kocaeli, and Trabzon, respectively, during COVID-19 period from the same period in 2016. On the other hand, NO$_2$ concentration increased from 55.6 to 59.1 %, with 6.29 % increment in Corum. The highest reductions in NO$_2$ concentrations were also found to be 34.9 % in Bursa and 39.8 % in Istanbul during the COVID-19 pandemic period compared with the same period in years 2017 and 2018 respectively. Furthermore, the lowest reduction values in NO$_2$ concentration were observed to be 22.9 % in Corum and 25.5 % in Konya.

The overall median concentrations of SO$_2$ were 4.21-18.4 µg/m$^3$ (2016), 6.15-19.0 µg/m$^3$ (2017), 4.61-21.7 µg/m$^3$ (2018), 4.52-34.1 µg/m$^3$ (2019), and 4.31-12.6 µg/m$^3$ (2020) for nine cities. The highest reduction in SO$_2$ concentrations were observed to be 80.2 % (2016: 22.1 µg/m$^3$; 2020: 4.37 µg/m$^3$) in Kars, 80.5 % (2018: 21.7 µg/m$^3$; 2020: 5.06 µg/m$^3$) in Zonguldak, and 79.3 % (2018: 21.1 µg/m$^3$; 2020: 4.37 µg/m$^3$) in Kars. The lowest reduction was found to be 5.03 % in Konya during the COVID-19 pandemic period compared with the same period in years 2018. On the other hand, the SO$_2$ concentrations increased by 13.4 %, 26.9 %, and 74.0 % in Istanbul from 2016 to 2020, 2017 to 2020, and 2018 to 2020, respectively.

An increase was observed in CO concentrations in Bursa and Izmir. The highest increment was in Istanbul with 123 % (2018: 603 µg/m$^3$; 2020: 1342 µg/m$^3$), while the lowest increment was in Ankara with 18.8 % (2018: 560 µg/m$^3$; 2020: 665 µg/m$^3$). On the other hand, the highest reduction was observed in Trabzon with 46.2 % (2016: 1183 µg/m$^3$; 2020: 636 µg/m$^3$). For O$_3$ concentration,
the lowest and highest reduction values were in Ankara with 29.0 % (2016: 31.7 µg/m³; 2020: 22.5 µg/m³) and 36.6 % (2017: 35.5 µg/m³; 2020: 22.5 µg/m³), respectively, while it was increased by 134 % in Corum (2018: 15.6 µg/m³; 2020: 36.5 µg/m³).

SM Reference

[1] Newspaper headline,  https://www.takvim.com.tr/yasam/2020/04/18/istanbul-evlere-kapandi-uludagin-zirvesi-gorundu (retrieved date: 25.04.2020)