



**APPENDIX AVAILABLE ON REQUEST**

**Research Report 97**

**Identifying Subgroups of the General Population That May Be  
Susceptible to Short-Term Increases in Particulate Air Pollution:  
A Time-Series Study in Montreal, Quebec**

**Appendix N. Results of Analyses: Particulate Effects  
on Combined Health Conditions**

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**Table N.1.** Distribution of Daily Nonaccidental Mortality for each Combined Subgroup, Montreal, 1984-1993

| Index of Disease Status   | Total number of nonaccidental deaths | Number of days in which there were no deaths | Mean | Variance | Percentiles      |                  |                  |                   |  |
|---|--------------------------------------|--|------|----------|------------------|------------------|------------------|-------------------|--|
|   |                                      |  |      |          | 25 <sup>th</sup> | 50 <sup>th</sup> | 75 <sup>th</sup> | 100 <sup>th</sup> |  |
| No history of cardiovascular and respiratory diseases, including respiratory cancer | 47321                                | 0  | 13.0 | 15.9     | 10               | 13               | 16               | 46                |  |
| No cancer, no cardiovascular and no lower respiratory                               | 39133                                | 0  | 10.7 | 13.7     | 8                | 10               | 13               | 42                |  |
| Cancer only   | 22468                                | 8  | 6.2  | 6.4      | 4                | 6                | 8                | 15                |  |
| Lower respiratory only  | 10880                                | 206  | 3.0  | 3.2      | 2                | 3                | 4                | 12                |  |
| Lower respiratory and cancer  | 8826                                 | 371  | 2.4  | 2.7      | 1                | 2                | 3                | 10                |  |
| Cardiovascular only   | 26793                                | 0  | 7.3  | 7.7      | 5                | 7                | 9                | 21                |  |
| Cardiovascular and cancer   | 7732                                 | 456  | 2.1  | 2.2      | 1                | 2                | 3                | 9                 |  |
| Cardiovascular and lower respiratory  | 13330                                | 142  | 3.6  | 4.3      | 2                | 3                | 5                | 17                |  |
| Lower respiratory and cardiovascular and cancer                                     | 4742                                 | 1123   | 1.3  | 1.6      | 0                | 1                | 2                | 10                |  |

**Table N.2.** Summary Estimates of Mean Percent Change in Daily Nonaccidental Mortality for Combinations of Subgroups Defined using Billing and Prescription Data Obtained from the Quebec Health Insurance Plan for their Respective Time Period Prior to Death, across the Interquartile Range of Lagged Exposure to Coefficient of Haze, Montreal, 1984-1993<sup>a</sup>

| Combined subgroup   | Lag 0                            |              | Lag 1                            |              | 3-day mean                       |              |
|---|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|   | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| No history of cardiovascular and respiratory diseases, including respiratory cancer | 1.87                             | 0.72 - 3.03  | 0.09                             | -1.06 - 1.25 | 1.10                             | -0.40 - 2.61 |
| No cancer, no cardiovascular, no lower respiratory                                  | 1.73                             | 0.47 - 3.00  | -0.42                            | -1.68 - 0.85 | 0.31                             | -1.33 - 1.97 |
| Cancer only   | 1.23                             | -0.39 - 2.88 | 0.73                             | -0.91 - 2.39 | 1.60                             | -0.54 - 3.78 |
| Lower respiratory only  | 0.34                             | -1.89 - 2.62 | 0.12                             | -2.13 - 2.42 | 1.59                             | -1.35 - 4.61 |
| Lower respiratory and cancer  | 1.39                             | -1.19 - 4.03 | 1.62                             | -0.99 - 4.29 | 3.51                             | 0.07 - 7.07  |
| Cardiovascular only   | 2.19                             | 0.73 - 3.67  | 2.73                             | 1.25 - 4.23  | 4.16                             | 2.22 - 6.14  |
| Cardiovascular and cancer   | 0.65                             | -2.09 - 3.47 | 2.29                             | -0.50 - 5.15 | 2.18                             | -1.44 - 5.93 |
| Cardiovascular and lower respiratory  | 1.92                             | -0.14 - 4.04 | 4.00                             | 1.89 - 6.15  | 3.31                             | 0.56 - 6.13  |
| Cardiovascular and lower respiratory and cancer                                     | 1.20                             | -2.42 - 4.95 | 1.59                             | -2.08 - 5.38 | 2.84                             | -1.97 - 7.88 |

<sup>a</sup>The statistical model was  $E(\log(y_i)) = \alpha + \text{loess}(i, \text{span}=2.49\%) + \text{loess}(\text{year}) + \text{loess}(\text{Mean temperature}_0) + \text{loess}(\text{Change in barometric pressure from the previous 24 hours}_0) + \beta * \text{pollutant}$ , where  $y_i$  is the number of nonaccidental deaths on day  $i$  for subjects included in each subgroup. CI, confidence interval.

<sup>b</sup> MPCs calculated for an increase of exposure equal to the interquartile range.

**Table N.3.** Mean Percent Change in Daily Nonaccidental Mortality for the Coefficient of Haze, Adjusted for Sulfur Dioxide and Ozone Separately, according to Combinations of Subgroups Defined using Billing and Prescription Data from the Quebec Health Insurance Plan, by Age Group, Montreal, 1984-1993<sup>a</sup>

| Combined subgroup  | Age <65 years                    |              | Age ≥ 65 years                   |              | Total                            |              |
|--|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|  | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| <b>LAG 0</b>   |                                  |              |                                  |              |                                  |              |
| <b>No history of cardiovascular and respiratory diseases, including respiratory cancer</b> |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.56                             | 1.21 - 3.93  | 1.87                             | 0.72 - 3.03  |
| SO <sub>2</sub>  | N/A                              |              | 2.44                             | 0.77 - 4.15  | 1.57                             | 0.16 - 3.00  |
| O <sub>3</sub>   | N/A                              |              | 3.09                             | 1.69 - 4.51  | 2.04                             | 0.85 - 3.24  |
| <b>No cancer, no cardiovascular, no lower respiratory</b>                                  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | -0.10                            | -2.70 - 2.56 | 2.19                             | 0.77 - 3.64  | 1.73                             | 0.47 - 3.00  |
| SO <sub>2</sub>  | -0.68                            | -3.85 - 2.61 | 1.86                             | 0.10 - 3.64  | 1.31                             | -0.24 - 2.88 |
| O <sub>3</sub>   | -1.43                            | -4.08 - 1.29 | 2.26                             | 0.78 - 3.75  | 1.51                             | 0.21 - 2.83  |
| <b>Cancer only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | -0.03                            | -2.55 - 2.55 | 2.00                             | -0.10 - 4.14 | 1.23                             | -0.39 - 2.88 |
| SO <sub>2</sub>  | 0.15                             | -2.94 - 3.34 | 2.10                             | -0.49 - 4.76 | 1.35                             | -0.66 - 3.39 |
| O <sub>3</sub>   | -0.07                            | -2.67 - 2.60 | 3.19                             | 1.01 - 5.42  | 1.87                             | 0.19 - 3.59  |
| <b>Lower respiratory only</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 0.25                             | -2.30 - 2.86 | 0.34                             | -1.89 - 2.62 |
| SO <sub>2</sub>  | N/A                              |              | -0.19                            | -3.35 - 3.07 | -0.15                            | -2.93 - 2.70 |
| O <sub>3</sub>   | N/A                              |              | -0.23                            | -2.86 - 2.48 | -0.09                            | -2.40 - 2.28 |
| <b>Lower respiratory and cancer</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 0.20                             | -3.01 - 3.52 | 1.39                             | -1.19 - 4.03 |
| SO <sub>2</sub>  | N/A                              |              | 0.56                             | -3.42 - 4.69 | 0.90                             | -2.27 - 4.17 |
| O <sub>3</sub>   | N/A                              |              | 1.15                             | -2.19 - 4.59 | 2.04                             | -0.63 - 4.78 |
| <b>Cardiovascular only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | -0.27                            | -3.74 - 3.32 | 2.63                             | 1.04 - 4.24  | 2.19                             | 0.73 - 3.67  |
| SO <sub>2</sub>  | 0.71                             | -3.63 - 5.25 | 2.05                             | 0.08 - 4.04  | 1.84                             | 0.03 - 3.68  |
| O <sub>3</sub>   | -1.00                            | -4.57 - 2.71 | 3.74                             | 2.08 - 5.42  | 2.94                             | 1.41 - 4.48  |
| <b>Cardiovascular and cancer</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 0.54                             | -2.52 - 3.69 | 0.65                             | -2.09 - 3.47 |
| SO <sub>2</sub>  | N/A                              |              | -1.83                            | -5.50 - 1.98 | -1.01                            | -4.33 - 2.43 |
| O <sub>3</sub>   | N/A                              |              | 0.51                             | -2.64 - 3.77 | 0.81                             | -2.01 - 3.72 |
| <b>Cardiovascular and lower respiratory</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.94                             | -0.31 - 4.25 | 1.92                             | -0.14 - 4.04 |
| SO <sub>2</sub>  | N/A                              |              | 1.89                             | -0.91 - 4.78 | 1.51                             | -1.06 - 4.14 |
| O <sub>3</sub>   | N/A                              |              | 1.05                             | -1.28 - 3.43 | 1.30                             | -0.84 - 3.48 |
| <b>Cardiovascular and lower respiratory and cancer</b>                                     |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.22                             | -2.79 - 5.39 | 1.20                             | -2.42 - 4.95 |
| SO <sub>2</sub>  | N/A                              |              | 1.56                             | -3.40 - 6.77 | 0.34                             | -4.08 - 4.96 |
| O <sub>3</sub>   | N/A                              |              | 1.38                             | -2.76 - 5.70 | 1.17                             | -2.56 - 5.05 |

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**Table N.3. continued**

| Combined subgroup  | Age <65 years                    |               | Age ≥ 65 years                   |              | Total                            |              |
|--|----------------------------------|---------------|----------------------------------|--------------|----------------------------------|--------------|
|  | Mean percent change <sup>b</sup> | 95% CI        | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| <b>LAG 1</b>   |                                  |               |                                  |              |                                  |              |
| <b>No history of cardiovascular and respiratory diseases, including respiratory cancer</b> |                                  |               |                                  |              |                                  |              |
| Unadjusted   | N/A                              |               | 0.51                             | -0.85 - 1.88 | 0.09                             | -1.06 - 1.25 |
| SO <sub>2</sub>  | N/A                              |               | 0.02                             | -1.40 - 1.46 | -0.31                            | -1.51 - 0.91 |
| O <sub>3</sub>   | N/A                              |               | 0.40                             | -0.96 - 1.78 | -0.08                            | -1.24 - 1.09 |
| <b>No cancer, no cardiovascular , no lower respiratory</b>                                 |                                  |               |                                  |              |                                  |              |
| Unadjusted   | -2.24                            | -4.82 - 0.42  | 0.08                             | -1.35 - 1.52 | -0.42                            | -1.68 - 0.85 |
| SO <sub>2</sub>  | -2.53                            | -5.25 - 0.26  | -0.49                            | -1.98 - 1.03 | -0.90                            | -2.22 - 0.43 |
| O <sub>3</sub>   | -2.78                            | -5.37 - -0.11 | -0.18                            | -1.61 - 1.28 | -0.71                            | -1.98 - 0.57 |
| <b>Cancer only</b>   |                                  |               |                                  |              |                                  |              |
| Unadjusted   | 0.40                             | -2.14 - 3.01  | 0.89                             | -1.22 - 3.04 | 0.73                             | -0.91 - 2.39 |
| SO <sub>2</sub>  | 0.55                             | -2.14 - 3.30  | 0.66                             | -1.55 - 2.93 | 0.64                             | -1.08 - 2.39 |
| O <sub>3</sub>   | 0.35                             | -2.21 - 2.98  | 1.11                             | -1.02 - 3.29 | 0.83                             | -0.82 - 2.51 |
| <b>Lower respiratory only</b>  |                                  |               |                                  |              |                                  |              |
| Unadjusted   | N/A                              |               | 1.39                             | -1.19 - 4.05 | 0.12                             | -2.13 - 2.42 |
| SO <sub>2</sub>  | N/A                              |               | 1.31                             | -1.42 - 4.11 | -0.03                            | -2.41 - 2.40 |
| O <sub>3</sub>   | N/A                              |               | 1.27                             | -1.34 - 3.96 | -0.09                            | -2.36 - 2.24 |
| <b>Lower respiratory and cancer</b>  |                                  |               |                                  |              |                                  |              |
| Unadjusted   | N/A                              |               | 2.60                             | -0.68 - 5.99 | 1.62                             | -0.99 - 4.29 |
| SO <sub>2</sub>  | N/A                              |               | 2.90                             | -0.57 - 6.48 | 1.40                             | -1.34 - 4.21 |
| O <sub>3</sub>   | N/A                              |               | 3.04                             | -0.28 - 6.47 | 1.77                             | -0.86 - 4.47 |
| <b>Cardiovascular only</b>   |                                  |               |                                  |              |                                  |              |
| Unadjusted   | 0.91                             | -2.62 - 4.56  | 3.02                             | 1.41 - 4.65  | 2.73                             | 1.25 - 4.23  |
| SO <sub>2</sub>  | 1.31                             | -2.43 - 5.19  | 2.64                             | 0.95 - 4.36  | 2.45                             | 0.89 - 4.03  |
| O <sub>3</sub>   | 0.66                             | -2.89 - 4.34  | 3.27                             | 1.65 - 4.92  | 2.89                             | 1.40 - 4.41  |
| <b>Cardiovascular and cancer</b>   |                                  |               |                                  |              |                                  |              |
| Unadjusted   | N/A                              |               | 3.22                             | 0.09 - 6.45  | 2.29                             | -0.50 - 5.15 |
| SO <sub>2</sub>  | N/A                              |               | 2.69                             | -0.59 - 6.09 | 1.90                             | -1.03 - 4.92 |
| O <sub>3</sub>   | N/A                              |               | 3.30                             | 0.14 - 6.56  | 2.34                             | -0.48 - 5.23 |
| <b>Cardiovascular and lower respiratory</b>  |                                  |               |                                  |              |                                  |              |
| Unadjusted   | N/A                              |               | 3.96                             | 1.66 - 6.31  | 4.00                             | 1.89 - 6.15  |
| SO <sub>2</sub>  | N/A                              |               | 3.93                             | 1.50 - 6.42  | 3.84                             | 1.62 - 6.12  |
| O <sub>3</sub>   | N/A                              |               | 3.53                             | 1.21 - 5.90  | 3.70                             | 1.57 - 5.87  |
| <b>Cardiovascular and lower respiratory and cancer</b>                                     |                                  |               |                                  |              |                                  |              |
| Unadjusted   | N/A                              |               | 1.72                             | -2.34 - 5.95 | 1.59                             | -2.08 - 5.38 |
| SO <sub>2</sub>  | N/A                              |               | 1.88                             | -2.39 - 6.34 | 1.37                             | -2.47 - 5.36 |
| O <sub>3</sub>   | N/A                              |               | 1.71                             | -2.38 - 5.97 | 1.51                             | -2.18 - 5.34 |

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**Table N.3. continued**

| Combined subgroup  | Age <65 years                    |              | Age ≥ 65 years                   |              | Total                            |              |
|--|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|  | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| <b>3-DAY MEAN</b>  |                                  |              |                                  |              |                                  |              |
| <b>No history of cardiovascular and respiratory diseases, including respiratory cancer</b> |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.67                             | -0.10 - 3.47 | 1.10                             | -0.40 - 2.61 |
| SO <sub>2</sub>  | N/A                              |              | 0.97                             | -0.97 - 2.94 | 0.41                             | -1.23 - 2.07 |
| O <sub>3</sub>   | N/A                              |              | 1.76                             | -0.04 - 3.59 | 0.96                             | -0.56 - 2.50 |
| <b>No cancer, no cardiovascular , no lower respiratory</b>                                 |                                  |              |                                  |              |                                  |              |
| Unadjusted   | -1.25                            | -4.60 - 2.22 | 0.74                             | -1.12 - 2.63 | 0.31                             | -1.33 - 1.97 |
| SO <sub>2</sub>  | -1.87                            | -5.55 - 1.94 | -0.31                            | -2.34 - 1.76 | -0.52                            | -2.31 - 1.30 |
| O <sub>3</sub>   | -2.48                            | -5.85 - 1.01 | 0.27                             | -1.62 - 2.19 | -0.28                            | -1.93 - 1.41 |
| <b>Cancer only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 0.49                             | -2.80 - 3.89 | 2.26                             | -0.51 - 5.10 | 1.60                             | -0.54 - 3.78 |
| SO <sub>2</sub>  | 0.78                             | -2.86 - 4.55 | 2.04                             | -1.00 - 5.17 | 1.57                             | -0.78 - 3.98 |
| O <sub>3</sub>   | 0.46                             | -2.89 - 3.92 | 2.98                             | 0.16 - 5.88  | 1.99                             | -0.19 - 4.21 |
| <b>Lower respiratory only</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.17                             | -1.20 - 5.65 | 1.59                             | -1.35 - 4.61 |
| SO <sub>2</sub>  | N/A                              |              | 2.11                             | -1.62 - 5.98 | 1.48                             | -1.78 - 4.84 |
| O <sub>3</sub>   | N/A                              |              | 1.97                             | -1.47 - 5.52 | 1.39                             | -1.60 - 4.48 |
| <b>Lower respiratory and cancer</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 3.50                             | -0.81 - 7.99 | 3.51                             | 0.07 - 7.07  |
| SO <sub>2</sub>  | N/A                              |              | 4.50                             | -0.29 - 9.53 | 3.44                             | -0.36 - 7.38 |
| O <sub>3</sub>   | N/A                              |              | 4.64                             | 0.23 - 9.24  | 4.10                             | 0.59 - 7.74  |
| <b>Cardiovascular only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | -0.40                            | -4.91 - 4.33 | 4.98                             | 2.86 - 7.13  | 4.16                             | 2.22 - 6.14  |
| SO <sub>2</sub>  | 0.34                             | -4.69 - 5.63 | 4.52                             | 2.19 - 6.90  | 3.86                             | 1.72 - 6.05  |
| O <sub>3</sub>   | -1.07                            | -5.64 - 3.73 | 5.83                             | 3.66 - 8.04  | 4.75                             | 2.76 - 6.77  |
| <b>Cardiovascular and cancer</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 3.11                             | -0.96 - 7.36 | 2.18                             | -1.44 - 5.93 |
| SO <sub>2</sub>  | N/A                              |              | 1.77                             | -2.67 - 6.41 | 1.15                             | -2.81 - 5.27 |
| O <sub>3</sub>   | N/A                              |              | 3.34                             | -0.81 - 7.66 | 2.35                             | -1.33 - 6.17 |
| <b>Cardiovascular and lower respiratory</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 3.64                             | 0.64 - 6.73  | 3.31                             | 0.56 - 6.13  |
| SO <sub>2</sub>  | N/A                              |              | 3.56                             | 0.24 - 6.98  | 2.92                             | -0.11 - 6.04 |
| O <sub>3</sub>   | N/A                              |              | 2.75                             | -0.28 - 5.88 | 2.65                             | -0.14 - 5.52 |
| <b>Cardiovascular and lower respiratory and cancer</b>                                     |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.65                             | -2.68 - 8.26 | 2.84                             | -1.97 - 7.88 |
| SO <sub>2</sub>  | N/A                              |              | 2.85                             | -3.01 - 9.06 | 2.22                             | -3.03 - 7.76 |
| O <sub>3</sub>   | N/A                              |              | 2.69                             | -2.71 - 8.39 | 2.80                             | -2.08 - 7.92 |

<sup>a</sup> The statistical model was  $E(\log(y_i)) = \alpha + \text{loess}(i, \text{span}=2.49\%) + \text{loess}(\text{year}) + \text{loess}(\text{Mean temperature}_0, \text{Change in barometric pressure from the previous 24 hours}_0) + \text{loess}(\text{gaseous pollutant}_0) + \beta * \text{particle pollutant}$ , where  $i$  is an indicator for day. CI, confidence interval. N/A, not analyzed.

<sup>b</sup> MPCs calculated for an increase of exposure equal to the interquartile range.

**Table N.4.** Summary Estimates of Mean Percent Change in Daily Nonaccidental Mortality for Combinations of Subgroups Defined using Billing and Prescription Data Obtained from the Quebec Health Insurance Plan for their Respective Time Period Prior to Death, across the Interquartile Range of Lagged Exposure to Extinction Coefficient, Montreal, 1984-1993<sup>a</sup>

| Combined subgroup   | Lag 0                            |              | Lag 1                            |              | 3-day mean                       |              |
|---|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|   | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| No history of cardiovascular and respiratory diseases, including respiratory cancer | 1.16                             | 0.11 - 2.22  | 1.14                             | 0.09 - 2.20  | 1.87                             | 0.44 - 3.32  |
| No cancer, no cardiovascular, no lower respiratory                                  | 1.22                             | 0.07 - 2.38  | 1.09                             | -0.06 - 2.25 | 2.57                             | 1.00 - 4.16  |
| Cancer only   | 0.86                             | -0.61 - 2.36 | 0.82                             | -0.65 - 2.31 | 0.48                             | -1.53 - 2.54 |
| Lower respiratory only  | 0.80                             | -1.20 - 2.84 | 0.94                             | -1.06 - 2.98 | 2.56                             | -0.15 - 5.35 |
| Lower respiratory and cancer  | 1.84                             | -0.39 - 4.12 | -1.16                            | -3.45 - 1.18 | 1.29                             | -1.76 - 4.44 |
| Cardiovascular only   | 0.29                             | -1.06 - 1.67 | 0.64                             | -0.71 - 2.01 | 0.97                             | -0.86 - 2.83 |
| Cardiovascular and cancer   | 2.83                             | 0.44 - 5.29  | 2.12                             | -0.30 - 4.59 | 4.26                             | 0.94 - 7.69  |
| Cardiovascular and lower respiratory  | 1.65                             | -0.17 - 3.50 | 1.48                             | -0.33 - 3.33 | 1.86                             | -0.64 - 4.43 |
| Cardiovascular and lower respiratory and cancer                                     | 0.62                             | -2.55 - 3.89 | 1.31                             | -1.81 - 4.54 | 0.71                             | -3.56 - 5.17 |

<sup>a</sup> The statistical model was  $E(\log(y_i)) = \alpha + \text{loess}(i, \text{span}=2.49\%) + \text{loess}(\text{year}) + \text{loess}(\text{Mean temperature}_0) + \text{loess}(\text{Change in barometric pressure from the previous 24 hours}_0) + \beta * \text{pollutant}$ , where  $y_i$  is the number of nonaccidental deaths on day  $i$  for subjects included in each subgroup. CI, confidence interval.

<sup>b</sup> MPCs calculated for an increase of exposure equal to the interquartile range.

**Table N.5.** Mean Percent Change in Daily Nonaccidental Mortality for the Extinction Coefficient, Adjusted for Sulfur Dioxide and Ozone Separately, according to Combinations of Subgroups Defined using Billing and Prescription Data from the Quebec Health Insurance Plan, by Age Group, Montreal, 1984-1993<sup>a</sup>

| Combined subgroup  | Age <65 years                    |              | Age ≥ 65 years                   |              | Total                            |              |
|--|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|  | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| <b>LAG 0</b>   |                                  |              |                                  |              |                                  |              |
| <b>No history of cardiovascular and respiratory diseases, including respiratory cancer</b> |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.48                             | 0.26 - 2.72  | 1.16                             | 0.11 - 2.22  |
| SO <sub>2</sub>  | N/A                              |              | 1.31                             | 0.02 - 2.62  | 0.94                             | -0.17 - 2.06 |
| O <sub>3</sub>   | N/A                              |              | 1.32                             | 0.10 - 2.56  | 0.99                             | -0.06 - 2.05 |
| <b>No cancer, no cardiovascular , no lower respiratory</b>                                 |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 0.63                             | -1.79 - 3.11 | 1.34                             | 0.05 - 2.65  | 1.22                             | 0.07 - 2.38  |
| SO <sub>2</sub>  | 0.46                             | -2.10 - 3.09 | 1.05                             | -0.32 - 2.44 | 0.96                             | -0.26 - 2.19 |
| O <sub>3</sub>   | 0.12                             | -2.31 - 2.60 | 1.12                             | -0.18 - 2.44 | 0.98                             | -0.17 - 2.14 |
| <b>Cancer only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | -0.17                            | -2.50 - 2.23 | 1.49                             | -0.38 - 3.40 | 0.86                             | -0.61 - 2.36 |
| SO <sub>2</sub>  | -0.29                            | -2.75 - 2.24 | 1.60                             | -0.38 - 3.61 | 0.89                             | -0.67 - 2.47 |
| O <sub>3</sub>   | -0.45                            | -2.79 - 1.95 | 1.60                             | -0.28 - 3.51 | 0.80                             | -0.68 - 2.30 |
| <b>Lower respiratory only</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.03                             | -1.26 - 3.38 | 0.80                             | -1.20 - 2.84 |
| SO <sub>2</sub>  | N/A                              |              | 0.75                             | -1.67 - 3.24 | 0.53                             | -1.59 - 2.70 |
| O <sub>3</sub>   | N/A                              |              | 0.75                             | -1.54 - 3.09 | 0.50                             | -1.50 - 2.55 |
| <b>Lower respiratory and cancer</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | -0.31                            | -3.17 - 2.64 | 1.84                             | -0.39 - 4.12 |
| SO <sub>2</sub>  | N/A                              |              | 0.04                             | -2.99 - 3.16 | 1.78                             | -0.57 - 4.20 |
| O <sub>3</sub>   | N/A                              |              | -0.39                            | -3.26 - 2.56 | 1.73                             | -0.50 - 4.01 |
| <b>Cardiovascular only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 2.76                             | -0.43 - 6.06 | -0.26                            | -1.74 - 1.23 | 0.29                             | -1.06 - 1.67 |
| SO <sub>2</sub>  | 3.31                             | -0.10 - 6.83 | -0.57                            | -2.13 - 1.01 | 0.15                             | -1.28 - 1.61 |
| O <sub>3</sub>   | 2.82                             | -0.38 - 6.12 | -0.20                            | -1.68 - 1.30 | 0.37                             | -1.00 - 1.75 |
| <b>Cardiovascular and cancer</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 3.91                             | 1.27 - 6.61  | 2.83                             | 0.44 - 5.29  |
| SO <sub>2</sub>  | N/A                              |              | 3.41                             | 0.64 - 6.26  | 2.57                             | 0.04 - 5.16  |
| O <sub>3</sub>   | N/A                              |              | 3.85                             | 1.21 - 6.56  | 2.84                             | 0.43 - 5.30  |
| <b>Cardiovascular and lower respiratory</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.61                             | -0.37 - 3.62 | 1.65                             | -0.17 - 3.50 |
| SO <sub>2</sub>  | N/A                              |              | 1.47                             | -0.61 - 3.60 | 1.36                             | -0.56 - 3.32 |
| O <sub>3</sub>   | N/A                              |              | 0.95                             | -1.02 - 2.96 | 1.05                             | -0.77 - 2.90 |
| <b>Cardiovascular and lower respiratory and cancer</b>                                     |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.13                             | -2.38 - 4.76 | 0.62                             | -2.55 - 3.89 |
| SO <sub>2</sub>  | N/A                              |              | 1.18                             | -2.51 - 5.01 | 0.28                             | -3.05 - 3.73 |
| O <sub>3</sub>   | N/A                              |              | 1.15                             | -2.36 - 4.78 | 0.46                             | -2.72 - 3.75 |

Continued...



**Table N.5. continued**

| Combined subgroup  | Age <65 years                    |              | Age ≥ 65 years                   |              | Total                            |              |
|--|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|  | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| <b>LAG 1</b>   |                                  |              |                                  |              |                                  |              |
| <b>No history of cardiovascular and respiratory diseases, including respiratory cancer</b> |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.06                             | -0.16 - 2.30 | 1.14                             | 0.09 - 2.20  |
| SO <sub>2</sub>  | N/A                              |              | 1.06                             | -0.18 - 2.31 | 1.12                             | 0.07 - 2.19  |
| O <sub>3</sub>   | N/A                              |              | 1.03                             | -0.20 - 2.27 | 1.13                             | 0.08 - 2.18  |
| <b>No cancer, no cardiovascular , no lower respiratory</b>                                 |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 1.07                             | -1.35 - 3.55 | 1.09                             | -0.20 - 2.41 | 1.09                             | -0.06 - 2.25 |
| SO <sub>2</sub>  | 1.05                             | -1.40 - 3.56 | 1.03                             | -0.28 - 2.36 | 1.06                             | -0.10 - 2.23 |
| O <sub>3</sub>   | 0.98                             | -1.44 - 3.45 | 1.03                             | -0.27 - 2.34 | 1.07                             | -0.08 - 2.23 |
| <b>Cancer only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 2.03                             | -0.26 - 4.36 | 0.01                             | -1.89 - 1.95 | 0.82                             | -0.65 - 2.31 |
| SO <sub>2</sub>  | 2.05                             | -0.26 - 4.42 | 0.09                             | -1.84 - 2.05 | 0.88                             | -0.61 - 2.39 |
| O <sub>3</sub>   | 2.00                             | -0.28 - 4.34 | 0.05                             | -1.85 - 1.99 | 0.82                             | -0.65 - 2.32 |
| <b>Lower respiratory only</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.26                             | 0.01 - 4.56  | 0.94                             | -1.06 - 2.98 |
| SO <sub>2</sub>  | N/A                              |              | 2.30                             | 0.01 - 4.64  | 1.07                             | -0.96 - 3.14 |
| O <sub>3</sub>   | N/A                              |              | 2.20                             | -0.04 - 4.50 | 0.90                             | -1.10 - 2.93 |
| <b>Lower respiratory and cancer</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | -1.40                            | -4.29 - 1.57 | -1.16                            | -3.45 - 1.18 |
| SO <sub>2</sub>  | N/A                              |              | -1.21                            | -4.13 - 1.79 | -1.16                            | -3.46 - 1.20 |
| O <sub>3</sub>   | N/A                              |              | -1.37                            | -4.25 - 1.60 | -1.18                            | -3.47 - 1.16 |
| <b>Cardiovascular only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | -2.33                            | -5.69 - 1.15 | 1.21                             | -0.24 - 2.68 | 0.64                             | -0.71 - 2.01 |
| SO <sub>2</sub>  | -2.23                            | -5.64 - 1.29 | 1.29                             | -0.18 - 2.77 | 0.74                             | -0.62 - 2.13 |
| O <sub>3</sub>   | -2.45                            | -5.80 - 1.03 | 1.26                             | -0.19 - 2.73 | 0.66                             | -0.68 - 2.03 |
| <b>Cardiovascular and cancer</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.75                             | 0.11 - 5.46  | 2.12                             | -0.30 - 4.59 |
| SO <sub>2</sub>  | N/A                              |              | 2.35                             | -0.31 - 5.09 | 1.90                             | -0.53 - 4.40 |
| O <sub>3</sub>   | N/A                              |              | 2.71                             | 0.07 - 5.42  | 2.09                             | -0.33 - 4.56 |
| <b>Cardiovascular and lower respiratory</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.55                             | -0.42 - 3.56 | 1.48                             | -0.33 - 3.33 |
| SO <sub>2</sub>  | N/A                              |              | 1.48                             | -0.51 - 3.52 | 1.40                             | -0.43 - 3.27 |
| O <sub>3</sub>   | N/A                              |              | 1.38                             | -0.59 - 3.39 | 1.35                             | -0.46 - 3.20 |
| <b>Cardiovascular and lower respiratory and cancer</b>                                     |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.01                             | -2.46 - 4.60 | 1.31                             | -1.81 - 4.54 |
| SO <sub>2</sub>  | N/A                              |              | 0.95                             | -2.55 - 4.58 | 1.13                             | -2.03 - 4.39 |
| O <sub>3</sub>   | N/A                              |              | 1.01                             | -2.45 - 4.60 | 1.31                             | -1.82 - 4.53 |

Continued...

**Table N.5. continued**

| Combined subgroup  | Age <65 years                    |              | Age ≥ 65 years                   |              | Total                            |              |
|--|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|  | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| <b>3-DAY MEAN</b>  |                                  |              |                                  |              |                                  |              |
| <b>No history of cardiovascular and respiratory diseases, including respiratory cancer</b> |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.40                             | 0.73 - 4.10  | 1.87                             | 0.44 - 3.32  |
| SO <sub>2</sub>  | N/A                              |              | 2.33                             | 0.60 - 4.08  | 1.77                             | 0.30 - 3.27  |
| O <sub>3</sub>   | N/A                              |              | 2.32                             | 0.65 - 4.02  | 1.77                             | 0.34 - 3.21  |
| <b>No cancer, no cardiovascular, no lower respiratory</b>                                  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 1.23                             | -2.06 - 4.63 | 2.86                             | 1.09 - 4.66  | 2.57                             | 1.00 - 4.16  |
| SO <sub>2</sub>  | 1.18                             | -2.22 - 4.69 | 2.74                             | 0.92 - 4.60  | 2.44                             | 0.82 - 4.08  |
| O <sub>3</sub>   | 0.92                             | -2.36 - 4.32 | 2.65                             | 0.88 - 4.45  | 2.37                             | 0.81 - 3.96  |
| <b>Cancer only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 0.62                             | -2.55 - 3.89 | 0.38                             | -2.20 - 3.02 | 0.48                             | -1.53 - 2.54 |
| SO <sub>2</sub>  | 0.76                             | -2.51 - 4.14 | 0.34                             | -2.31 - 3.07 | 0.52                             | -1.56 - 2.64 |
| O <sub>3</sub>   | 0.51                             | -2.65 - 3.78 | 0.36                             | -2.21 - 3.01 | 0.41                             | -1.60 - 2.47 |
| <b>Lower respiratory only</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 3.50                             | 0.39 - 6.71  | 2.56                             | -0.15 - 5.35 |
| SO <sub>2</sub>  | N/A                              |              | 3.54                             | 0.31 - 6.87  | 2.75                             | -0.07 - 5.64 |
| O <sub>3</sub>   | N/A                              |              | 3.28                             | 0.17 - 6.48  | 2.40                             | -0.31 - 5.18 |
| <b>Lower respiratory and cancer</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 0.96                             | -2.88 - 4.94 | 1.29                             | -1.76 - 4.44 |
| SO <sub>2</sub>  | N/A                              |              | 1.34                             | -2.63 - 5.47 | 1.25                             | -1.90 - 4.49 |
| O <sub>3</sub>   | N/A                              |              | 1.10                             | -2.74 - 5.08 | 1.26                             | -1.78 - 4.41 |
| <b>Cardiovascular only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | -0.22                            | -4.64 - 4.40 | 1.18                             | -0.79 - 3.20 | 0.97                             | -0.86 - 2.83 |
| SO <sub>2</sub>  | 0.21                             | -4.37 - 5.00 | 1.02                             | -1.01 - 3.10 | 0.95                             | -0.94 - 2.87 |
| O <sub>3</sub>   | -0.39                            | -4.80 - 4.23 | 1.25                             | -0.72 - 3.27 | 1.01                             | -0.82 - 2.87 |
| <b>Cardiovascular and cancer</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 6.19                             | 2.48 - 10.02 | 4.26                             | 0.94 - 7.69  |
| SO <sub>2</sub>  | N/A                              |              | 5.40                             | 1.60 - 9.34  | 3.83                             | 0.42 - 7.37  |
| O <sub>3</sub>   | N/A                              |              | 6.11                             | 2.41 - 9.94  | 4.23                             | 0.91 - 7.66  |
| <b>Cardiovascular and lower respiratory</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.73                             | -0.99 - 4.53 | 1.86                             | -0.64 - 4.43 |
| SO <sub>2</sub>  | N/A                              |              | 1.66                             | -1.15 - 4.54 | 1.73                             | -0.85 - 4.39 |
| O <sub>3</sub>   | N/A                              |              | 1.20                             | -1.51 - 3.99 | 1.45                             | -1.05 - 4.02 |
| <b>Cardiovascular and lower respiratory and cancer</b>                                     |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | -0.60                            | -5.34 - 4.37 | 0.71                             | -3.56 - 5.17 |
| SO <sub>2</sub>  | N/A                              |              | -0.78                            | -5.64 - 4.34 | 0.35                             | -4.03 - 4.93 |
| O <sub>3</sub>   | N/A                              |              | -0.80                            | -5.53 - 4.16 | 0.52                             | -3.74 - 4.97 |

<sup>a</sup> The statistical model was  $E(\log(y_i)) = \alpha + \text{loess}(i, \text{span}=2.49\%) + \text{loess}(\text{year}) + \text{loess}(\text{Mean temperature}_0, \text{Change in barometric pressure from the previous 24 hours}_0) + \text{loess}(\text{gaseous pollutant}_0) + \beta * \text{particle pollutant}$ , where  $i$  is an indicator for day. CI, confidence interval. N/A, not analyzed.

<sup>b</sup> MPCs calculated for an increase of exposure equal to the interquartile range.

**Table N.6.** Summary Estimates of Mean Percent Change in Daily Nonaccidental Mortality for Combinations of Subgroups Defined using Billing and Prescription Data Obtained from the Quebec Health Insurance Plan for their Respective Time Period Prior to Death, across the Interquartile Range of Lagged Exposure to Predicted PM<sub>2.5</sub>, Montreal, 1984-1993<sup>a</sup>

| Combined subgroup   | Lag 0                            |              | Lag 1                            |              | 3-day mean                       |              |
|---|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|   | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| No history of cardiovascular and respiratory diseases, including respiratory cancer | 2.37                             | 1.10 - 3.65  | 1.39                             | 0.12 - 2.68  | 2.45                             | 0.91 - 4.01  |
| No cancer, no cardiovascular, no lower respiratory                                  | 2.51                             | 1.12 - 3.91  | 1.11                             | -0.27 - 2.52 | 2.27                             | 0.59 - 3.97  |
| Cancer only   | 1.25                             | -0.48 - 3.00 | 0.76                             | -0.96 - 2.52 | 1.03                             | -1.07 - 3.17 |
| Lower respiratory only  | 0.53                             | -1.86 - 2.98 | 1.34                             | -1.08 - 3.81 | 3.39                             | 0.45 - 6.42  |
| Lower respiratory and cancer  | 2.46                             | -0.22 - 5.21 | 0.98                             | -1.69 - 3.71 | 2.66                             | -0.58 - 6.01 |
| Cardiovascular only   | 1.78                             | 0.20 - 3.39  | 2.25                             | 0.67 - 2.87  | 2.83                             | 0.91 - 4.78  |
| Cardiovascular and cancer   | 1.46                             | -1.36 - 4.35 | 1.91                             | -0.94 - 4.85 | 1.76                             | -1.65 - 5.28 |
| Cardiovascular and lower respiratory  | 2.36                             | 0.22 - 4.54  | 2.92                             | 0.76 - 5.12  | 2.79                             | 0.17 - 5.48  |
| Cardiovascular and lower respiratory and cancer                                     | 2.24                             | -1.41 - 6.02 | 2.71                             | -0.97 - 6.52 | 3.07                             | -1.36 - 7.71 |

<sup>a</sup> The statistical model was  $E(\log(y_i)) = \alpha + \text{loess}(i, \text{span}=2.49\%) + \text{loess}(\text{year}) + \text{loess}(\text{Mean temperature}_0) + \text{loess}(\text{Change in barometric pressure from the previous 24 hours}_0) + \beta * \text{pollutant}$ , where  $y_i$  is the number of nonaccidental deaths on day  $i$  for subjects included in each subgroup. CI, confidence interval.

<sup>b</sup> MPCs calculated for an increase of exposure equal to the interquartile range.

**Table N.7.** Mean Percent Change in Daily Nonaccidental Mortality for the Predicted PM<sub>2.5</sub>, Adjusted for Sulfur Dioxide and Ozone Separately, according to Combinations of Subgroups Defined using Billing and Prescription Data from the Quebec Health Insurance Plan, by Age Group, Montreal, 1984-1993<sup>a</sup>

| Combined subgroup  | Age <65 years                    |              | Age ≥ 65 years                   |              | Total                            |              |
|--|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|  | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| <b>LAG 0</b>   |                                  |              |                                  |              |                                  |              |
| <b>No history of cardiovascular and respiratory diseases, including respiratory cancer</b> |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.89                             | 1.41 - 4.40  | 2.37                             | 1.10 - 3.65  |
| SO <sub>2</sub>  | N/A                              |              | 3.35                             | 1.60 - 5.14  | 2.55                             | 1.05 - 4.06  |
| O <sub>3</sub>   | N/A                              |              | 3.04                             | 1.55 - 4.55  | 2.28                             | 1.01 - 3.57  |
| <b>No cancer, no cardiovascular, no lower respiratory</b>                                  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 1.43                             | -1.44 - 4.39 | 2.73                             | 1.17 - 4.32  | 2.51                             | 1.12 - 3.91  |
| SO <sub>2</sub>  | 1.40                             | -1.97 - 4.88 | 2.84                             | 1.00 - 4.73  | 2.53                             | 0.90 - 4.19  |
| O <sub>3</sub>   | 0.14                             | -2.73 - 3.08 | 2.72                             | 1.15 - 4.32  | 2.22                             | 0.83 - 3.63  |
| <b>Cancer only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | -0.02                            | -2.70 - 2.74 | 1.93                             | -0.29 - 4.20 | 1.25                             | -0.48 - 3.00 |
| SO <sub>2</sub>  | -0.08                            | -3.23 - 3.17 | 2.53                             | -0.08 - 5.21 | 1.53                             | -0.50 - 3.60 |
| O <sub>3</sub>   | 0.11                             | -2.59 - 2.89 | 2.17                             | -0.05 - 4.45 | 1.36                             | -0.38 - 3.13 |
| <b>Lower respiratory only</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 0.82                             | -1.91 - 3.63 | 0.53                             | -1.86 - 2.98 |
| SO <sub>2</sub>  | N/A                              |              | 1.37                             | -1.90 - 4.74 | 0.59                             | -2.25 - 3.52 |
| O <sub>3</sub>   | N/A                              |              | 0.38                             | -2.35 - 3.19 | -0.03                            | -2.42 - 2.41 |
| <b>Lower respiratory and cancer</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.88                             | -1.49 - 5.36 | 2.46                             | -0.22 - 5.21 |
| SO <sub>2</sub>  | N/A                              |              | 3.19                             | -0.82 - 7.36 | 2.85                             | -0.31 - 6.12 |
| O <sub>3</sub>   | N/A                              |              | 1.62                             | -1.74 - 5.10 | 1.95                             | -0.72 - 4.69 |
| <b>Cardiovascular only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 3.85                             | -0.14 - 8.01 | 1.34                             | -0.36 - 3.07 | 1.78                             | 0.20 - 3.39  |
| SO <sub>2</sub>  | 5.15                             | 0.37 - 10.15 | 1.12                             | -0.88 - 3.16 | 1.80                             | -0.06 - 3.70 |
| O <sub>3</sub>   | 4.37                             | 0.37 - 8.54  | 1.78                             | 0.07 - 3.52  | 2.25                             | 0.66 - 3.86  |
| <b>Cardiovascular and cancer</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.59                             | -1.54 - 4.82 | 1.46                             | -1.36 - 4.35 |
| SO <sub>2</sub>  | N/A                              |              | 1.94                             | -1.73 - 5.76 | 1.62                             | -1.69 - 5.03 |
| O <sub>3</sub>   | N/A                              |              | 1.13                             | -2.00 - 4.37 | 1.06                             | -1.76 - 3.97 |
| <b>Cardiovascular and lower respiratory</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.08                             | -0.23 - 4.45 | 2.36                             | 0.22 - 4.54  |
| SO <sub>2</sub>  | N/A                              |              | 1.98                             | -0.76 - 4.79 | 1.87                             | -0.66 - 4.46 |
| O <sub>3</sub>   | N/A                              |              | 0.42                             | -1.86 - 2.75 | 0.82                             | -1.29 - 2.98 |
| <b>Cardiovascular and lower respiratory and cancer</b>                                     |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.40                             | -2.66 - 5.62 | 2.24                             | -1.41 - 6.02 |
| SO <sub>2</sub>  | N/A                              |              | 0.81                             | -3.94 - 5.80 | 1.16                             | -3.09 - 5.59 |
| O <sub>3</sub>   | N/A                              |              | 1.90                             | -2.18 - 6.14 | 2.33                             | -1.34 - 6.13 |

Continued...

**Table N.7. continued**

| Combined subgroup  | Age <65 years                    |              | Age ≥ 65 years                   |              | Total                            |              |
|--|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|  | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| <b>LAG 1</b>   |                                  |              |                                  |              |                                  |              |
| <b>No history of cardiovascular and respiratory diseases, including respiratory cancer</b> |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.47                             | -0.02 - 2.97 | 1.39                             | 0.12 - 2.68  |
| SO <sub>2</sub>  | N/A                              |              | 1.49                             | -0.04 - 3.04 | 1.34                             | 0.03 - 2.66  |
| O <sub>3</sub>   | N/A                              |              | 1.35                             | -0.13 - 2.86 | 1.21                             | -0.06 - 2.50 |
| <b>No cancer, no cardiovascular , no lower respiratory</b>                                 |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 1.01                             | -1.87 - 3.97 | 1.05                             | -0.50 - 2.63 | 1.11                             | -0.27 - 2.52 |
| SO <sub>2</sub>  | 0.70                             | -2.25 - 3.74 | 1.02                             | -0.58 - 2.64 | 0.99                             | -0.43 - 2.43 |
| O <sub>3</sub>   | 0.48                             | -2.39 - 3.44 | 0.92                             | -0.63 - 2.50 | 0.86                             | -0.52 - 2.26 |
| <b>Cancer only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 1.70                             | -1.03 - 4.51 | 0.14                             | -2.08 - 2.40 | 0.76                             | -0.96 - 2.52 |
| SO <sub>2</sub>  | 1.88                             | -0.94 - 4.78 | 0.24                             | -2.05 - 2.58 | 0.87                             | -0.91 - 2.68 |
| O <sub>3</sub>   | 1.74                             | -0.99 - 4.55 | -0.04                            | -2.26 - 2.22 | 0.65                             | -1.08 - 2.41 |
| <b>Lower respiratory only</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.87                             | 0.10 - 5.71  | 1.34                             | -1.08 - 3.81 |
| SO <sub>2</sub>  | N/A                              |              | 3.16                             | 0.30 - 6.10  | 1.60                             | -0.90 - 4.16 |
| O <sub>3</sub>   | N/A                              |              | 2.83                             | 0.06 - 5.67  | 1.15                             | -1.26 - 3.63 |
| <b>Lower respiratory and cancer</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.64                             | -1.73 - 5.13 | 0.98                             | -1.69 - 3.71 |
| SO <sub>2</sub>  | N/A                              |              | 1.90                             | -1.58 - 5.51 | 1.03                             | -1.71 - 3.86 |
| O <sub>3</sub>   | N/A                              |              | 1.60                             | -1.78 - 5.09 | 0.73                             | -1.93 - 3.46 |
| <b>Cardiovascular only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 1.88                             | -2.12 - 6.04 | 2.25                             | 0.55 - 3.99  | 2.25                             | 0.67 - 2.87  |
| SO <sub>2</sub>  | 2.06                             | -2.07 - 6.37 | 2.37                             | 0.61 - 4.17  | 2.36                             | 0.72 - 4.02  |
| O <sub>3</sub>   | 1.88                             | -2.12 - 6.05 | 2.43                             | 0.72 - 4.17  | 2.36                             | 0.77 - 3.97  |
| <b>Cardiovascular and cancer</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 3.34                             | 0.19 - 6.60  | 1.91                             | -0.94 - 4.85 |
| SO <sub>2</sub>  | N/A                              |              | 3.34                             | 0.09 - 6.70  | 1.96                             | -0.98 - 4.99 |
| O <sub>3</sub>   | N/A                              |              | 3.08                             | -0.07 - 6.34 | 1.66                             | -1.20 - 4.59 |
| <b>Cardiovascular and lower respiratory</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.77                             | 0.43 - 5.17  | 2.92                             | 0.76 - 5.12  |
| SO <sub>2</sub>  | N/A                              |              | 2.74                             | 0.32 - 5.22  | 2.77                             | 0.54 - 5.05  |
| O <sub>3</sub>   | N/A                              |              | 2.08                             | -0.25 - 4.46 | 2.29                             | 0.15 - 4.49  |
| <b>Cardiovascular and lower respiratory and cancer</b>                                     |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.23                             | -1.85 - 6.48 | 2.71                             | -0.97 - 6.52 |
| SO <sub>2</sub>  | N/A                              |              | 2.48                             | -1.73 - 6.87 | 2.67                             | -1.12 - 6.60 |
| O <sub>3</sub>   | N/A                              |              | 2.33                             | -1.75 - 6.58 | 2.80                             | -0.89 - 6.63 |

Continued...

**Table N.7. continued**

| Combined subgroup  | Age <65 years                    |              | Age ≥ 65 years                   |              | Total                            |              |
|--|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|  | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| <b>3-DAY MEAN</b>  |                                  |              |                                  |              |                                  |              |
| <b>No history of cardiovascular and respiratory diseases, including respiratory cancer</b> |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 3.23                             | 1.44 - 5.06  | 2.45                             | 0.91 - 4.01  |
| SO <sub>2</sub>  | N/A                              |              | 3.40                             | 1.49 - 5.34  | 2.42                             | 0.79 - 4.08  |
| O <sub>3</sub>   | N/A                              |              | 3.23                             | 1.43 - 5.05  | 2.35                             | 0.82 - 3.91  |
| <b>No cancer, no cardiovascular , no lower respiratory</b>                                 |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 0.74                             | -2.73 - 4.33 | 2.64                             | 0.76 - 4.56  | 2.27                             | 0.59 - 3.97  |
| SO <sub>2</sub>  | 0.25                             | -3.42 - 4.06 | 2.61                             | 0.61 - 4.66  | 2.17                             | 0.39 - 3.98  |
| O <sub>3</sub>   | -0.20                            | -3.65 - 3.38 | 2.59                             | 0.70 - 4.51  | 2.09                             | 0.41 - 3.79  |
| <b>Cancer only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 1.13                             | -2.17 - 4.55 | 0.83                             | -1.84 - 3.58 | 1.03                             | -1.07 - 3.17 |
| SO <sub>2</sub>  | 1.16                             | -2.35 - 4.80 | 0.94                             | -1.91 - 3.87 | 1.05                             | -1.18 - 3.33 |
| O <sub>3</sub>   | 1.17                             | -2.15 - 4.59 | 0.51                             | -2.16 - 3.25 | 0.80                             | -1.30 - 2.94 |
| <b>Lower respiratory only</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 4.61                             | 1.24 - 8.09  | 3.39                             | 0.45 - 6.42  |
| SO <sub>2</sub>  | N/A                              |              | 5.07                             | 1.45 - 8.82  | 3.66                             | 0.51 - 6.91  |
| O <sub>3</sub>   | N/A                              |              | 4.61                             | 1.24 - 8.10  | 3.26                             | 0.32 - 6.28  |
| <b>Lower respiratory and cancer</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 3.67                             | -0.43 - 7.93 | 2.66                             | -0.58 - 6.01 |
| SO <sub>2</sub>  | N/A                              |              | 4.51                             | 0.12 - 9.10  | 2.83                             | -0.63 - 6.41 |
| O <sub>3</sub>   | N/A                              |              | 3.87                             | -0.23 - 8.14 | 2.53                             | -0.71 - 5.87 |
| <b>Cardiovascular only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 1.36                             | -3.40 - 6.37 | 2.93                             | 0.86 - 5.04  | 2.83                             | 0.91 - 4.78  |
| SO <sub>2</sub>  | 1.38                             | -3.70 - 6.73 | 2.93                             | 0.73 - 5.18  | 2.78                             | 0.73 - 4.86  |
| O <sub>3</sub>   | 1.63                             | -3.14 - 6.64 | 3.21                             | 1.13 - 5.33  | 3.03                             | 1.10 - 4.99  |
| <b>Cardiovascular and cancer</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 3.43                             | -0.39 - 7.39 | 1.76                             | -1.65 - 5.28 |
| SO <sub>2</sub>  | N/A                              |              | 3.22                             | -0.83 - 7.44 | 1.61                             | -2.01 - 5.37 |
| O <sub>3</sub>   | N/A                              |              | 3.11                             | -0.71 - 7.07 | 1.34                             | -2.07 - 4.86 |
| <b>Cardiovascular and lower respiratory</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 3.06                             | 0.21 - 5.99  | 2.79                             | 0.17 - 5.48  |
| SO <sub>2</sub>  | N/A                              |              | 2.83                             | -0.20 - 5.96 | 2.38                             | -0.41 - 5.25 |
| O <sub>3</sub>   | N/A                              |              | 1.90                             | -0.92 - 4.80 | 1.84                             | -0.76 - 4.51 |
| <b>Cardiovascular and lower respiratory and cancer</b>                                     |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.86                             | -3.06 - 7.02 | 3.07                             | -1.36 - 7.71 |
| SO <sub>2</sub>  | N/A                              |              | 1.72                             | -3.50 - 7.23 | 2.62                             | -2.08 - 7.54 |
| O <sub>3</sub>   | N/A                              |              | 1.80                             | -3.11 - 6.96 | 2.99                             | -1.45 - 7.64 |

<sup>a</sup> The statistical model was  $E(\log(y_i)) = \alpha + \text{loess}(i, \text{span}=2.49\%) + \text{loess}(\text{year}) + \text{loess}(\text{Mean temperature}_0, \text{Change in barometric pressure from the previous 24 hours}_0) + \text{loess}(\text{gaseous pollutant}_0) + \beta * \text{particle pollutant}$ , where  $i$  is an indicator for day. CI, confidence interval. N/A, not analyzed.

<sup>b</sup> MPCs calculated for an increase of exposure equal to the interquartile range.

**Table N.8.** Summary Estimates of Mean Percent Change in Daily Nonaccidental Mortality for Combinations of Subgroups Defined using Billing and Prescription Data Obtained from the Quebec Health Insurance Plan for their Respective Time Period Prior to Death, across the Interquartile Range of Lagged Exposure to Sulfate measured at the Sutton Acid Rain Monitoring Station, Montreal, 1984-1993<sup>a</sup>

|   | Lag 0                            |              |                                  | Lag 1        |                                  |              | 3-day mean                       |        |  |
|---|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------|--|
|   | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI |  |
| Combined subgroup   |                                  |              |                                  |              |                                  |              |                                  |        |  |
| No history of cardiovascular and respiratory diseases, including respiratory cancer | 1.43                             | 0.61 - 2.25  | 1.28                             | 0.47 - 2.10  | 2.23                             | 1.20 - 3.28  |                                  |        |  |
| No cancer, no cardiovascular, no lower respiratory                                  | 1.21                             | 0.31 - 2.12  | 1.23                             | 0.34 - 2.12  | 2.17                             | 1.04 - 3.32  |                                  |        |  |
| Cancer only   | 1.07                             | -0.05 - 2.21 | 0.32                             | -0.79 - 1.44 | 0.84                             | -0.57 - 2.28 |                                  |        |  |
| Lower respiratory only  | -0.89                            | -2.50 - 0.74 | 1.83                             | 0.25 - 3.43  | 1.52                             | -0.51 - 3.58 |                                  |        |  |
| Lower respiratory and cancer  | 1.05                             | -0.70 - 2.82 | 0.12                             | -1.61 - 1.88 | 0.85                             | -1.34 - 3.09 |                                  |        |  |
| Cardiovascular only   | 0.82                             | -0.21 - 1.87 | 0.98                             | -0.03 - 2.01 | 1.22                             | -0.08 - 2.54 |                                  |        |  |
| Cardiovascular and cancer   | 1.33                             | -0.47 - 3.16 | 0.31                             | -1.48 - 2.12 | 0.84                             | -1.43 - 3.16 |                                  |        |  |
| Cardiovascular and lower respiratory  | 0.22                             | -1.20 - 1.66 | 1.28                             | -0.13 - 2.71 | 1.18                             | -0.62 - 3.02 |                                  |        |  |
| Cardiovascular and lower respiratory and cancer                                     | 0.18                             | -2.20 - 2.61 | 2.33                             | -0.01 - 4.72 | 1.28                             | -1.72 - 4.38 |                                  |        |  |

<sup>a</sup> The statistical model was  $E(\log(y_i)) = \alpha + \text{loess}(i, \text{span}=2.49\%) + \text{loess}(\text{year}) + \text{loess}(\text{Mean temperature}_0) + \text{loess}(\text{barometric pressure from the previous 24 hours}_0) + \beta * \text{pollutant}$ , where  $y_i$  is the number of nonaccidental deaths on day  $i$  for subjects included in each subgroup. CI, confidence interval.

<sup>b</sup> MPCs calculated for an increase of exposure equal to the interquartile range.

**Table N.9.** Mean Percent Change in Daily Nonaccidental Mortality for the Sulfate Measured at the Sutton Acid Rain Station, Adjusted for Sulfur Dioxide and Ozone Separately, according to Combinations of Subgroups Defined using Billing and Prescription Data from the Quebec Health Insurance Plan, by Age Group, Montreal, 1984-1993<sup>a</sup>

| Combined subgroup  | Age <65 years                    |              | Age ≥ 65 years                   |              | Total                            |              |
|--|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|  | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| <b>LAG 0</b>   |                                  |              |                                  |              |                                  |              |
| <b>No history of cardiovascular and respiratory diseases, including respiratory cancer</b> |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.01                             | 1.05 - 2.97  | 1.43                             | 0.61 - 2.25  |
| SO <sub>2</sub>  | N/A                              |              | 1.90                             | 0.91 - 2.90  | 1.32                             | 0.47 - 2.18  |
| O <sub>3</sub>   | N/A                              |              | 1.94                             | 0.92 - 2.97  | 1.33                             | 0.46 - 2.22  |
| <b>No cancer, no cardiovascular , no lower respiratory</b>                                 |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 0.12                             | -1.73 - 2.01 | 1.52                             | 0.50 - 2.54  | 1.21                             | 0.31 - 2.12  |
| SO <sub>2</sub>  | 0.05                             | -1.88 - 2.03 | 1.36                             | 0.30 - 2.42  | 1.08                             | 0.14 - 2.02  |
| O <sub>3</sub>   | -0.53                            | -2.52 - 1.50 | 1.57                             | 0.48 - 2.66  | 1.11                             | 0.15 - 2.08  |
| <b>Cancer only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | -0.84                            | -2.62 - 0.97 | 2.16                             | 0.73 - 3.60  | 1.07                             | -0.05 - 2.21 |
| SO <sub>2</sub>  | -1.00                            | -2.85 - 0.88 | 2.21                             | 0.72 - 3.72  | 1.01                             | -0.16 - 2.20 |
| O <sub>3</sub>   | -0.97                            | -2.86 - 0.97 | 1.61                             | 0.08 - 3.16  | 0.64                             | -0.56 - 1.86 |
| <b>Lower respiratory only</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | -0.15                            | -1.98 - 1.72 | -0.89                            | -2.50 - 0.74 |
| SO <sub>2</sub>  | N/A                              |              | -0.06                            | -1.97 - 1.88 | -0.98                            | -2.66 - 0.72 |
| O <sub>3</sub>   | N/A                              |              | -0.70                            | -2.64 - 1.27 | -1.37                            | -3.06 - 0.35 |
| <b>Lower respiratory and cancer</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.07                             | -1.13 - 3.31 | 1.05                             | -0.70 - 2.82 |
| SO <sub>2</sub>  | N/A                              |              | 1.24                             | -1.05 - 3.59 | 0.97                             | -0.84 - 2.82 |
| O <sub>3</sub>   | N/A                              |              | 0.47                             | -1.86 - 2.86 | 0.40                             | -1.45 - 2.29 |
| <b>Cardiovascular only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 3.03                             | 0.42 - 5.71  | 0.33                             | -0.78 - 1.45 | 0.82                             | -0.21 - 1.87 |
| SO <sub>2</sub>  | 3.31                             | 0.57 - 6.12  | 0.09                             | -1.07 - 1.26 | 0.62                             | -0.46 - 1.71 |
| O <sub>3</sub>   | 3.01                             | 0.25 - 5.85  | 0.10                             | -1.09 - 1.29 | 0.63                             | -0.47 - 1.74 |
| <b>Cardiovascular and cancer</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.32                             | -0.68 - 3.36 | 1.33                             | -0.47 - 3.16 |
| SO <sub>2</sub>  | N/A                              |              | 1.41                             | -0.68 - 3.54 | 1.38                             | -0.50 - 3.29 |
| O <sub>3</sub>   | N/A                              |              | 1.20                             | -0.95 - 3.39 | 1.21                             | -0.72 - 3.18 |
| <b>Cardiovascular and lower respiratory</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 0.28                             | -1.26 - 1.85 | 0.22                             | -1.20 - 1.66 |
| SO <sub>2</sub>  | N/A                              |              | 0.03                             | -1.58 - 1.66 | -0.17                            | -1.65 - 1.34 |
| O <sub>3</sub>   | N/A                              |              | -0.75                            | -2.36 - 0.90 | -0.72                            | -2.22 - 0.80 |
| <b>Cardiovascular and lower respiratory and cancer</b>                                     |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | -0.66                            | -3.33 - 2.08 | 0.18                             | -2.20 - 2.61 |
| SO <sub>2</sub>  | N/A                              |              | -1.01                            | -3.79 - 1.85 | -0.23                            | -2.70 - 2.30 |
| O <sub>3</sub>   | N/A                              |              | -1.11                            | -3.93 - 1.79 | -0.09                            | -2.61 - 2.50 |

Continued...



**Table N.9. continued**

| Combined subgroup  | Age <65 years                    |              | Age ≥ 65 years                   |              | Total                            |              |
|--|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|  | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| <b>LAG 1</b>   |                                  |              |                                  |              |                                  |              |
| <b>No history of cardiovascular and respiratory diseases, including respiratory cancer</b> |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.63                             | 0.68 - 2.58  | 1.28                             | 0.47 - 2.10  |
| SO <sub>2</sub>  | N/A                              |              | 1.73                             | 0.79 - 2.68  | 1.35                             | 0.54 - 2.17  |
| O <sub>3</sub>   | N/A                              |              | 1.52                             | 0.56 - 2.49  | 1.21                             | 0.39 - 2.05  |
| <b>No cancer, no cardiovascular , no lower respiratory</b>                                 |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 0.69                             | -1.14 - 2.55 | 1.35                             | 0.35 - 2.35  | 1.23                             | 0.34 - 2.12  |
| SO <sub>2</sub>  | 0.61                             | -1.23 - 2.48 | 1.46                             | 0.46 - 2.47  | 1.28                             | 0.39 - 2.17  |
| O <sub>3</sub>   | 0.58                             | -1.29 - 2.49 | 1.33                             | 0.31 - 2.36  | 1.19                             | 0.29 - 2.10  |
| <b>Cancer only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 0.43                             | -1.31 - 2.21 | 0.22                             | -1.19 - 1.66 | 0.32                             | -0.79 - 1.44 |
| SO <sub>2</sub>  | 0.52                             | -1.24 - 2.31 | 0.32                             | -1.11 - 1.76 | 0.41                             | -0.71 - 1.53 |
| O <sub>3</sub>   | 0.42                             | -1.36 - 2.23 | -0.04                            | -1.48 - 1.43 | 0.14                             | -0.98 - 1.29 |
| <b>Lower respiratory only</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.21                             | 0.41 - 4.05  | 1.83                             | 0.25 - 3.43  |
| SO <sub>2</sub>  | N/A                              |              | 2.20                             | 0.39 - 4.04  | 1.89                             | 0.31 - 3.50  |
| O <sub>3</sub>   | N/A                              |              | 2.21                             | 0.38 - 4.08  | 1.86                             | 0.25 - 3.50  |
| <b>Lower respiratory and cancer</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 0.00                             | -2.17 - 2.22 | 0.12                             | -1.61 - 1.88 |
| SO <sub>2</sub>  | N/A                              |              | 0.14                             | -2.04 - 2.38 | 0.21                             | -1.52 - 1.98 |
| O <sub>3</sub>   | N/A                              |              | -0.20                            | -2.41 - 2.06 | -0.11                            | -1.86 - 1.68 |
| <b>Cardiovascular only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 1.13                             | -1.47 - 3.79 | 0.95                             | -0.15 - 2.06 | 0.98                             | -0.03 - 2.01 |
| SO <sub>2</sub>  | 1.26                             | -1.35 - 3.94 | 1.06                             | -0.05 - 2.17 | 1.11                             | 0.08 - 2.14  |
| O <sub>3</sub>   | 1.08                             | -1.56 - 3.80 | 0.92                             | -0.20 - 2.05 | 0.96                             | -0.08 - 2.01 |
| <b>Cardiovascular and cancer</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 0.79                             | -1.18 - 2.80 | 0.31                             | -1.48 - 2.12 |
| SO <sub>2</sub>  | N/A                              |              | 0.78                             | -1.21 - 2.80 | 0.34                             | -1.45 - 2.17 |
| O <sub>3</sub>   | N/A                              |              | 0.64                             | -1.37 - 2.70 | 0.16                             | -1.66 - 2.02 |
| <b>Cardiovascular and lower respiratory</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.30                             | -0.23 - 2.86 | 1.28                             | -0.13 - 2.71 |
| SO <sub>2</sub>  | N/A                              |              | 1.35                             | -0.19 - 2.91 | 1.32                             | -0.10 - 2.76 |
| O <sub>3</sub>   | N/A                              |              | 0.99                             | -0.56 - 2.57 | 1.00                             | -0.43 - 2.46 |
| <b>Cardiovascular and lower respiratory and cancer</b>                                     |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.04                             | -0.57 - 4.73 | 2.33                             | -0.01 - 4.72 |
| SO <sub>2</sub>  | N/A                              |              | 2.14                             | -0.49 - 4.84 | 2.35                             | 0.00 - 4.76  |
| O <sub>3</sub>   | N/A                              |              | 1.93                             | -0.74 - 4.67 | 2.33                             | -0.06 - 4.79 |

Continued...

**Table N.9. continued**

| Combined subgroup  | Age <65 years                    |              | Age ≥ 65 years                   |              | Total                            |              |
|--|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|  | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| <b>3-DAY MEAN</b>  |                                  |              |                                  |              |                                  |              |
| <b>No history of cardiovascular and respiratory diseases, including respiratory cancer</b> |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 3.29                             | 2.08 - 4.50  | 2.23                             | 1.20 - 3.28  |
| SO <sub>2</sub>  | N/A                              |              | 3.32                             | 2.10 - 4.55  | 2.25                             | 1.20 - 3.30  |
| O <sub>3</sub>   | N/A                              |              | 3.16                             | 1.91 - 4.42  | 2.18                             | 1.11 - 3.26  |
| <b>No cancer, no cardiovascular , no lower respiratory</b>                                 |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 0.06                             | -2.27 - 2.45 | 2.76                             | 1.48 - 4.05  | 2.17                             | 1.04 - 3.32  |
| SO <sub>2</sub>  | -0.10                            | -2.45 - 2.31 | 2.77                             | 1.49 - 4.08  | 2.16                             | 1.02 - 3.32  |
| O <sub>3</sub>   | -0.29                            | -2.72 - 2.19 | 2.75                             | 1.42 - 4.09  | 2.14                             | 0.96 - 3.32  |
| <b>Cancer only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | -0.29                            | -2.53 - 1.99 | 1.47                             | -0.34 - 3.31 | 0.84                             | -0.57 - 2.28 |
| SO <sub>2</sub>  | -0.27                            | -2.53 - 2.04 | 1.55                             | -0.28 - 3.42 | 0.87                             | -0.56 - 2.33 |
| O <sub>3</sub>   | -0.30                            | -2.61 - 2.07 | 0.93                             | -0.94 - 2.83 | 0.47                             | -1.00 - 1.96 |
| <b>Lower respiratory only</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.49                             | 0.17 - 4.87  | 1.52                             | -0.51 - 3.58 |
| SO <sub>2</sub>  | N/A                              |              | 2.45                             | 0.11 - 4.85  | 1.54                             | -0.52 - 3.63 |
| O <sub>3</sub>   | N/A                              |              | 2.34                             | -0.06 - 4.80 | 1.47                             | -0.63 - 3.62 |
| <b>Lower respiratory and cancer</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.09                             | -1.66 - 3.92 | 0.85                             | -1.34 - 3.09 |
| SO <sub>2</sub>  | N/A                              |              | 1.26                             | -1.53 - 4.14 | 0.91                             | -1.31 - 3.17 |
| O <sub>3</sub>   | N/A                              |              | 0.74                             | -2.10 - 3.66 | 0.48                             | -1.78 - 2.79 |
| <b>Cardiovascular only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 0.75                             | -2.56 - 4.18 | 1.30                             | -0.10 - 2.72 | 1.22                             | -0.08 - 2.54 |
| SO <sub>2</sub>  | 0.79                             | -2.58 - 4.27 | 1.32                             | -0.10 - 2.76 | 1.28                             | -0.04 - 2.61 |
| O <sub>3</sub>   | 0.54                             | -2.87 - 4.07 | 1.18                             | -0.27 - 2.65 | 1.10                             | -0.25 - 2.47 |
| <b>Cardiovascular and cancer</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.76                             | -0.77 - 4.34 | 0.84                             | -1.43 - 3.16 |
| SO <sub>2</sub>  | N/A                              |              | 1.68                             | -0.87 - 4.30 | 0.81                             | -1.49 - 3.16 |
| O <sub>3</sub>   | N/A                              |              | 1.52                             | -1.10 - 4.20 | 0.57                             | -1.78 - 2.98 |
| <b>Cardiovascular and lower respiratory</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.50                             | -0.46 - 3.49 | 1.18                             | -0.62 - 3.02 |
| SO <sub>2</sub>  | N/A                              |              | 1.49                             | -0.50 - 3.51 | 1.09                             | -0.74 - 2.95 |
| O <sub>3</sub>   | N/A                              |              | 0.87                             | -1.15 - 2.92 | 0.60                             | -1.26 - 2.49 |
| <b>Cardiovascular and lower respiratory and cancer</b>                                     |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 0.43                             | -2.93 - 3.91 | 1.28                             | -1.72 - 4.38 |
| SO <sub>2</sub>  | N/A                              |              | 0.39                             | -3.02 - 3.91 | 1.11                             | -1.94 - 4.24 |
| O <sub>3</sub>   | N/A                              |              | 0.16                             | -3.31 - 3.75 | 1.18                             | -1.94 - 4.40 |

<sup>a</sup> The statistical model was  $E(\log(y_i)) = \alpha + \text{loess}(i, \text{span}=2.49\%) + \text{loess}(\text{year}) + \text{loess}(\text{Mean temperature}_0, \text{Change in barometric pressure from the previous 24 hours}_0) + \text{loess}(\text{gaseous pollutant}_0) + \beta * \text{particle pollutant}$ , where  $i$  is an indicator for day. CI, confidence interval. N/A, not analyzed.

<sup>b</sup> MPCs calculated for an increase of exposure equal to the interquartile range.

**Table N.10.** Summary Estimates of Mean Percent Change in Daily Nonaccidental Mortality for Combinations of Subgroups Defined using Billing and Prescription Data Obtained from the Quebec Health Insurance Plan for their Respective Time Period Prior to Death, across the Interquartile Range of Lagged Exposure to Predicted Sulfates from PM<sub>2.5</sub>, Montreal, 1984-1993<sup>a</sup>

| Combined subgroup   | Lag 0                            |              | Lag 1                            |              | 3-day mean                       |              |
|---|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|   | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| No history of cardiovascular and respiratory diseases, including respiratory cancer | 1.67                             | 0.72 - 2.64  | 1.48                             | 0.53 - 2.44  | 2.28                             | 1.11 - 3.46  |
| No cancer, no cardiovascular, no lower respiratory                                  | 1.59                             | 0.54 - 2.64  | 1.45                             | 0.41 - 2.49  | 2.39                             | 1.11 - 3.69  |
| Cancer only   | 1.30                             | 0.00 - 2.62  | 0.46                             | -0.83 - 1.76 | 0.68                             | -0.92 - 2.31 |
| Lower respiratory only  | -0.27                            | -2.11 - 1.61 | 1.49                             | -0.34 - 3.35 | 2.48                             | 0.21 - 4.80  |
| Lower respiratory and cancer  | 1.61                             | -0.40 - 3.66 | 0.27                             | -1.72 - 2.30 | 1.46                             | -1.00 - 3.98 |
| Cardiovascular only   | 1.01                             | -0.19 - 2.22 | 1.30                             | 0.11 - 2.50  | 1.38                             | -0.09 - 2.87 |
| Cardiovascular and cancer   | 1.92                             | -0.19 - 4.07 | 1.12                             | -0.98 - 3.26 | 1.50                             | -1.07 - 4.13 |
| Cardiovascular and lower respiratory  | 1.01                             | -0.62 - 2.67 | 1.54                             | -0.08 - 3.19 | 1.65                             | -0.37 - 3.71 |
| Cardiovascular and lower respiratory and cancer                                     | 1.07                             | -1.67 - 3.90 | 2.39                             | -0.34 - 5.20 | 1.97                             | -1.40 - 5.45 |

<sup>a</sup> The statistical model was  $E(\log(y_i)) = \alpha + \text{loess}(i, \text{span}=2.49\%) + \text{loess}(\text{year}) + \text{loess}(\text{Mean temperature}_0, \text{Change in barometric pressure from the previous 24 hours}_0) + \beta * \text{pollutant}$ , where  $y_i$  is the number of nonaccidental deaths on day  $i$  for subjects included in each subgroup. CI, confidence interval.

<sup>b</sup> MPCs calculated for an increase of exposure equal to the interquartile range.

**Table N.11.** Mean Percent Change in Daily Nonaccidental Mortality for the Predicted Sulfate from PM<sub>2.5</sub>, Adjusted for Sulfur Dioxide and Ozone Separately, according to Combinations of Subgroups Defined using Billing and Prescription Data from the Quebec Health Insurance Plan, by Age Group, Montreal, 1984-1993<sup>a</sup>

| Combined subgroup  | Age <65 years                    |              | Age ≥ 65 years                   |              | Total                            |              |
|--|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|  | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| <b>LAG 0</b>   |                                  |              |                                  |              |                                  |              |
| <b>No history of cardiovascular and respiratory diseases, including respiratory cancer</b> |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.26                             | 1.15 - 3.39  | 1.67                             | 0.72 - 2.64  |
| SO <sub>2</sub>  | N/A                              |              | 2.24                             | 1.03 - 3.46  | 1.58                             | 0.55 - 2.62  |
| O <sub>3</sub>   | N/A                              |              | 2.19                             | 1.03 - 3.37  | 1.56                             | 0.56 - 2.57  |
| <b>No cancer, no cardiovascular , no lower respiratory</b>                                 |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 0.37                             | -1.80 - 2.59 | 1.87                             | 0.69 - 3.07  | 1.59                             | 0.54 - 2.64  |
| SO <sub>2</sub>  | 0.16                             | -2.17 - 2.55 | 1.70                             | 0.42 - 3.00  | 1.37                             | 0.24 - 2.52  |
| O <sub>3</sub>   | -0.51                            | -2.77 - 1.81 | 1.89                             | 0.65 - 3.14  | 1.41                             | 0.31 - 2.51  |
| <b>Cancer only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | -0.48                            | -2.52 - 1.61 | 2.31                             | 0.65 - 4.00  | 1.30                             | 0.00 - 2.62  |
| SO <sub>2</sub>  | -0.58                            | -2.78 - 1.67 | 2.61                             | 0.82 - 4.43  | 1.41                             | 0.00 - 2.83  |
| O <sub>3</sub>   | -0.50                            | -2.63 - 1.68 | 2.00                             | 0.27 - 3.76  | 1.05                             | -0.31 - 2.43 |
| <b>Lower respiratory only</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 0.32                             | -1.79 - 2.47 | -0.27                            | -2.11 - 1.61 |
| SO <sub>2</sub>  | N/A                              |              | 0.45                             | -1.84 - 2.80 | -0.41                            | -2.41 - 1.63 |
| O <sub>3</sub>   | N/A                              |              | -0.12                            | -2.30 - 2.10 | -0.72                            | -2.62 - 1.22 |
| <b>Lower respiratory and cancer</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.40                             | -1.14 - 4.01 | 1.61                             | -0.40 - 3.66 |
| SO <sub>2</sub>  | N/A                              |              | 1.86                             | -0.90 - 4.69 | 1.60                             | -0.57 - 3.83 |
| O <sub>3</sub>   | N/A                              |              | 0.80                             | -1.82 - 3.50 | 0.92                             | -1.16 - 3.05 |
| <b>Cardiovascular only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 3.98                             | 0.94 - 7.10  | 0.40                             | -0.89 - 1.71 | 1.01                             | -0.19 - 2.22 |
| SO <sub>2</sub>  | 4.49                             | 1.18 - 7.90  | 0.10                             | -1.30 - 1.51 | 0.83                             | -0.47 - 2.14 |
| O <sub>3</sub>   | 4.15                             | 1.02 - 7.39  | 0.25                             | -1.09 - 1.62 | 0.96                             | -0.29 - 2.22 |
| <b>Cardiovascular and cancer</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.31                             | -0.03 - 4.70 | 1.92                             | -0.19 - 4.07 |
| SO <sub>2</sub>  | N/A                              |              | 2.57                             | 0.05 - 5.16  | 2.04                             | -0.23 - 4.37 |
| O <sub>3</sub>   | N/A                              |              | 2.14                             | -0.30 - 4.65 | 1.73                             | -0.47 - 3.98 |
| <b>Cardiovascular and lower respiratory</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 0.92                             | -0.85 - 2.72 | 1.01                             | -0.62 - 2.67 |
| SO <sub>2</sub>  | N/A                              |              | 0.67                             | -1.25 - 2.62 | 0.50                             | -1.27 - 2.30 |
| O <sub>3</sub>   | N/A                              |              | -0.32                            | -2.13 - 1.53 | -0.16                            | -1.84 - 1.54 |
| <b>Cardiovascular and lower respiratory and cancer</b>                                     |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 0.42                             | -2.66 - 3.59 | 1.07                             | -1.67 - 3.90 |
| SO <sub>2</sub>  | N/A                              |              | -0.05                            | -3.37 - 3.38 | 0.35                             | -2.60 - 3.40 |
| O <sub>3</sub>   | N/A                              |              | 0.36                             | -2.83 - 3.65 | 0.97                             | -1.89 - 3.92 |

Continued...

**Table N.11. continued**

| Combined subgroup  | Age <65 years                    |              | Age ≥ 65 years                   |              | Total                            |              |
|--|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|  | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| <b>LAG 1</b>   |                                  |              |                                  |              |                                  |              |
| <b>No history of cardiovascular and respiratory diseases, including respiratory cancer</b> |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.75                             | 0.64 - 2.87  | 1.48                             | 0.53 - 2.44  |
| SO <sub>2</sub>  | N/A                              |              | 1.87                             | 0.75 - 3.00  | 1.54                             | 0.58 - 2.51  |
| O <sub>3</sub>   | N/A                              |              | 1.63                             | 0.51 - 2.76  | 1.43                             | 0.47 - 2.40  |
| <b>No cancer, no cardiovascular , no lower respiratory</b>                                 |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 0.96                             | -1.19 - 3.15 | 1.54                             | 0.37 - 2.72  | 1.45                             | 0.41 - 2.49  |
| SO <sub>2</sub>  | 0.78                             | -1.39 - 2.99 | 1.63                             | 0.45 - 2.82  | 1.47                             | 0.43 - 2.53  |
| O <sub>3</sub>   | 0.74                             | -1.43 - 2.97 | 1.47                             | 0.29 - 2.67  | 1.33                             | 0.29 - 2.39  |
| <b>Cancer only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 1.10                             | -0.93 - 3.17 | 0.02                             | -1.64 - 1.71 | 0.46                             | -0.83 - 1.76 |
| SO <sub>2</sub>  | 1.23                             | -0.82 - 3.33 | 0.15                             | -1.53 - 1.86 | 0.57                             | -0.73 - 1.89 |
| O <sub>3</sub>   | 1.11                             | -0.94 - 3.21 | -0.20                            | -1.88 - 1.50 | 0.31                             | -0.99 - 1.63 |
| <b>Lower respiratory only</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.33                             | 0.25 - 4.46  | 1.49                             | -0.34 - 3.35 |
| SO <sub>2</sub>  | N/A                              |              | 2.35                             | 0.25 - 4.51  | 1.62                             | -0.24 - 3.50 |
| O <sub>3</sub>   | N/A                              |              | 2.32                             | 0.21 - 4.47  | 1.46                             | -0.39 - 3.34 |
| <b>Lower respiratory and cancer</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 0.25                             | -2.27 - 2.83 | 0.27                             | -1.72 - 2.30 |
| SO <sub>2</sub>  | N/A                              |              | 0.45                             | -2.10 - 3.07 | 0.40                             | -1.61 - 2.45 |
| O <sub>3</sub>   | N/A                              |              | 0.08                             | -2.46 - 2.69 | 0.03                             | -1.98 - 2.08 |
| <b>Cardiovascular only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 0.49                             | -2.55 - 3.62 | 1.45                             | 0.18 - 2.75  | 1.30                             | 0.11 - 2.50  |
| SO <sub>2</sub>  | 0.58                             | -2.49 - 3.75 | 1.61                             | 0.31 - 2.91  | 1.46                             | 0.26 - 2.68  |
| O <sub>3</sub>   | 0.39                             | -2.67 - 3.55 | 1.49                             | 0.19 - 2.79  | 1.32                             | 0.12 - 2.53  |
| <b>Cardiovascular and cancer</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.90                             | -0.41 - 4.26 | 1.12                             | -0.98 - 3.26 |
| SO <sub>2</sub>  | N/A                              |              | 1.87                             | -0.47 - 4.26 | 1.14                             | -0.98 - 3.31 |
| O <sub>3</sub>   | N/A                              |              | 1.72                             | -0.62 - 4.10 | 0.96                             | -1.16 - 3.13 |
| <b>Cardiovascular and lower respiratory</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.60                             | -0.16 - 3.40 | 1.54                             | -0.08 - 3.19 |
| SO <sub>2</sub>  | N/A                              |              | 1.63                             | -0.16 - 3.45 | 1.53                             | -0.11 - 3.20 |
| O <sub>3</sub>   | N/A                              |              | 1.17                             | -0.61 - 2.97 | 1.14                             | -0.50 - 2.80 |
| <b>Cardiovascular and lower respiratory and cancer</b>                                     |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.92                             | -1.12 - 5.05 | 2.39                             | -0.34 - 5.20 |
| SO <sub>2</sub>  | N/A                              |              | 2.05                             | -1.03 - 5.23 | 2.39                             | -0.37 - 5.22 |
| O <sub>3</sub>   | N/A                              |              | 1.85                             | -1.22 - 5.02 | 2.40                             | -0.37 - 5.24 |

Continued...

**Table N.11. continued**

| Combined subgroup  | Age <65 years                    |              | Age ≥ 65 years                   |              | Total                            |              |
|--|----------------------------------|--------------|----------------------------------|--------------|----------------------------------|--------------|
|  | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       | Mean percent change <sup>b</sup> | 95% CI       |
| <b>3-DAY MEAN</b>  |                                  |              |                                  |              |                                  |              |
| <b>No history of cardiovascular and respiratory diseases, including respiratory cancer</b> |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 3.23                             | 1.86 - 4.61  | 2.28                             | 1.11 - 3.46  |
| SO <sub>2</sub>  | N/A                              |              | 3.36                             | 1.96 - 4.78  | 2.29                             | 1.09 - 3.50  |
| O <sub>3</sub>   | N/A                              |              | 3.13                             | 1.75 - 4.54  | 2.19                             | 0.99 - 3.39  |
| <b>No cancer, no cardiovascular , no lower respiratory</b>                                 |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 0.25                             | -2.40 - 2.97 | 2.91                             | 1.47 - 4.37  | 2.39                             | 1.11 - 3.69  |
| SO <sub>2</sub>  | -0.02                            | -2.73 - 2.76 | 2.95                             | 1.46 - 4.45  | 2.33                             | 1.01 - 3.66  |
| O <sub>3</sub>   | -0.25                            | -2.94 - 2.52 | 2.86                             | 1.39 - 4.36  | 2.26                             | 0.95 - 3.58  |
| <b>Cancer only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 0.13                             | -2.39 - 2.71 | 0.94                             | -1.10 - 3.02 | 0.68                             | -0.92 - 2.31 |
| SO <sub>2</sub>  | 0.15                             | -2.44 - 2.80 | 1.05                             | -1.05 - 3.20 | 0.72                             | -0.92 - 2.39 |
| O <sub>3</sub>   | 0.11                             | -2.45 - 2.75 | 0.44                             | -1.63 - 2.55 | 0.34                             | -1.29 - 1.99 |
| <b>Lower respiratory only</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 3.67                             | 1.07 - 6.34  | 2.48                             | 0.21 - 4.80  |
| SO <sub>2</sub>  | N/A                              |              | 3.76                             | 1.09 - 6.51  | 2.56                             | 0.22 - 4.95  |
| O <sub>3</sub>   | N/A                              |              | 3.55                             | 0.91 - 6.26  | 2.40                             | 0.09 - 4.76  |
| <b>Lower respiratory and cancer</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.89                             | -1.21 - 5.08 | 1.46                             | -1.00 - 3.98 |
| SO <sub>2</sub>  | N/A                              |              | 2.26                             | -0.94 - 5.55 | 1.57                             | -0.96 - 4.16 |
| O <sub>3</sub>   | N/A                              |              | 1.68                             | -1.46 - 4.92 | 1.14                             | -1.36 - 3.69 |
| <b>Cardiovascular only</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | 0.55                             | -3.16 - 4.40 | 1.50                             | -0.07 - 3.11 | 1.38                             | -0.09 - 2.87 |
| SO <sub>2</sub>  | 0.56                             | -3.26 - 4.53 | 1.53                             | -0.09 - 3.18 | 1.43                             | -0.07 - 2.97 |
| O <sub>3</sub>   | 0.48                             | -3.28 - 4.39 | 1.48                             | -0.12 - 3.12 | 1.36                             | -0.14 - 2.87 |
| <b>Cardiovascular and cancer</b>   |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 2.81                             | -0.05 - 5.74 | 1.50                             | -1.07 - 4.13 |
| SO <sub>2</sub>  | N/A                              |              | 2.64                             | -0.29 - 5.66 | 1.42                             | -1.22 - 4.12 |
| O <sub>3</sub>   | N/A                              |              | 2.57                             | -0.34 - 5.57 | 1.20                             | -1.41 - 3.89 |
| <b>Cardiovascular and lower respiratory</b>  |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 1.98                             | -0.21 - 4.22 | 1.65                             | -0.37 - 3.71 |
| SO <sub>2</sub>  | N/A                              |              | 1.94                             | -0.32 - 4.24 | 1.49                             | -0.59 - 3.61 |
| O <sub>3</sub>   | N/A                              |              | 1.20                             | -1.01 - 3.46 | 0.95                             | -1.09 - 3.03 |
| <b>Cardiovascular and lower respiratory and cancer</b>                                     |                                  |              |                                  |              |                                  |              |
| Unadjusted   | N/A                              |              | 0.93                             | -2.83 - 4.83 | 1.97                             | -1.40 - 5.45 |
| SO <sub>2</sub>  | N/A                              |              | 0.87                             | -2.99 - 4.88 | 1.68                             | -1.77 - 5.26 |
| O <sub>3</sub>   | N/A                              |              | 0.70                             | -3.11 - 4.67 | 1.86                             | -1.58 - 5.41 |

<sup>a</sup> The statistical model was  $E(\log(y_i)) = \alpha + \text{loess}(i, \text{span}=2.49\%) + \text{loess}(\text{year}) + \text{loess}(\text{Mean temperature}_0, \text{Change in barometric pressure from the previous 24 hours}_0) + \text{loess}(\text{gaseous pollutant}_0) + \beta * \text{particle pollutant}$ , where  $i$  is an indicator for day. CI, confidence interval. N/A, not analyzed.

<sup>b</sup> MPCs calculated for an increase of exposure equal to the interquartile range.

