

# **SUPPLEMENTAL MATERIAL**

**Table S1. Dose-response association between frequency of moderate to vigorous physical activity (MVPA) and lower respiratory tract infection outcomes (mortality and hospitalization)**

| Frequency of MVPA<br>(times/week) | Age- and sex-adjusted |         | Multivariate-adjusted <sup>*</sup> |         | Multivariate-adjusted <sup>†</sup> |         |
|-----------------------------------|-----------------------|---------|------------------------------------|---------|------------------------------------|---------|
|                                   | HR (95% CI)           | P-value | HR (95% CI)                        | P-value | HR (95% CI)                        | P-value |
| <b>Mortality</b>                  |                       |         |                                    |         |                                    |         |
| 0                                 | 1 (reference)         | -       | 1 (reference)                      | -       | 1 (reference)                      | -       |
| 1-2                               | 0.71 (0.65-0.76)      | <0.001  | 0.73 (0.68-0.79)                   | <0.001  | 0.74 (0.69-0.81)                   | <0.001  |
| 3-4                               | 0.58 (0.53-0.64)      | <0.001  | 0.60 (0.55-0.66)                   | <0.001  | 0.62 (0.56-0.68)                   | <0.001  |
| ≥5                                | 0.57 (0.53-0.61)      | <0.001  | 0.59 (0.55-0.63)                   | <0.001  | 0.61 (0.56-0.65)                   | <0.001  |
| <b>Hospitalization</b>            |                       |         |                                    |         |                                    |         |
| 0                                 | 1 (reference)         | -       | 1 (reference)                      | -       | 1 (reference)                      | -       |
| 1-2                               | 0.82 (0.81-0.84)      | <0.001  | 0.85 (0.83-0.87)                   | <0.001  | 0.86 (0.84-0.87)                   | <0.001  |
| 3-4                               | 0.73 (0.71-0.75)      | <0.001  | 0.76 (0.74-0.77)                   | <0.001  | 0.77 (0.75-0.78)                   | <0.001  |
| ≥5                                | 0.74 (0.73-0.75)      | <0.001  | 0.76 (0.75-0.78)                   | <0.001  | 0.77 (0.76-0.79)                   | <0.001  |

Abbreviations: CI, confidence interval; HR, hazard ratio; MET, metabolic equivalents of task.

<sup>\*</sup>HRs were calculated by Cox models, after adjusting for age at baseline, sex, smoking status, alcohol consumption frequency, and household income.

<sup>†</sup>HRs were calculated by Cox models, after adjusting for age at baseline, sex, smoking status, alcohol consumption frequency, household income, blood pressure status, fasting glucose status, body mass index, known chronic obstructive lung disease, and previous history of admission due to lower respiratory tract infection.

**Table S2. Association between physical activity and mortality from lower respiratory tract infection by subgroup**

| Subgroups              | Amount of physical activity (MET min/week) | No. of events | Event rate, n/100,000 person-year | Age- and sex-adjusted |         | Multivariate-adjusted* |         | Multivariate-adjusted† |         |
|------------------------|--|---------------|-----------------------------------|-----------------------|---------|------------------------|---------|------------------------|---------|
|                        |  |               |                                   | HR (95% CI)           | P-value | HR (95% CI)            | P-value | HR (95% CI)            | P-value |
| <b>Age strata, yrs</b> |  |               |                                   |                       |         |                        |         |                        |         |
| 18-64                  | 0  | 195           | 16                                | 1 (reference)         | -       | 1 (reference)          | -       | 1 (reference)          | -       |
|                        | <500                                       | 155           | 11                                | 0.75 (0.61-0.93)      | 0.009   | 0.83 (0.67-1.03)       | 0.089   | 0.85 (0.69-1.06)       | 0.145   |
|                        | 500-999                                    | 152           | 12                                | 0.70 (0.57-0.87)      | 0.001   | 0.79 (0.64-0.98)       | 0.029   | 0.80 (0.65-0.99)       | 0.040   |
|                        | 1,000-1,499                                | 61            | 11                                | 0.62 (0.46-0.82)      | 0.001   | 0.71 (0.53-0.95)       | 0.023   | 0.75 (0.56-1.00)       | 0.048   |
|                        | ≥1,500                                     | 48            | 15                                | 0.73 (0.53-1.00)      | 0.052   | 0.82 (0.60-1.13)       | 0.230   | 0.84 (0.61-1.15)       | 0.274   |
| 65-74                  | 0  | 1193          | 143                               | 1 (reference)         | -       | 1 (reference)          | -       | 1 (reference)          | -       |
|                        | <500                                       | 709           | 102                               | 0.71 (0.65-0.78)      | <0.001  | 0.74 (0.67-0.81)       | <0.001  | 0.74 (0.68-0.82)       | <0.001  |
|                        | 500-999                                    | 686           | 97                                | 0.63 (0.57-0.69)      | <0.001  | 0.65 (0.59-0.71)       | <0.001  | 0.65 (0.60-0.72)       | <0.001  |
|                        | 1,000-1,499                                | 218           | 81                                | 0.50 (0.43-0.58)      | <0.001  | 0.53 (0.46-0.62)       | <0.001  | 0.54 (0.47-0.62)       | <0.001  |
|                        | ≥1,500                                     | 163           | 83                                | 0.47 (0.40-0.56)      | <0.001  | 0.50 (0.42-0.59)       | <0.001  | 0.51 (0.43-0.60)       | <0.001  |
| 75-99                  | 0  | 2363          | 606                               | 1 (reference)         | -       | 1 (reference)          | -       | 1 (reference)          | -       |
|                        | <500                                       | 1104          | 429                               | 0.70 (0.65-0.75)      | <0.001  | 0.71 (0.66-0.76)       | <0.001  | 0.72 (0.67-0.78)       | <0.001  |
|                        | 500-999                                    | 869           | 407                               | 0.62 (0.57-0.67)      | <0.001  | 0.63 (0.58-0.68)       | <0.001  | 0.65 (0.60-0.70)       | <0.001  |
|                        | 1,000-1,499                                | 168           | 287                               | 0.43 (0.36-0.50)      | <0.001  | 0.44 (0.37-0.51)       | <0.001  | 0.46 (0.39-0.54)       | <0.001  |
|                        | ≥1,500                                     | 153           | 365                               | 0.50 (0.42-0.59)      | <0.001  | 0.51 (0.44-0.61)       | <0.001  | 0.53 (0.45-0.63)       | <0.001  |
| <b>Sex</b>             |  |               |                                   |                       |         |                        |         |                        |         |
| Men                    | 0  | 1979          | 193                               | 1 (reference)         | -       | 1 (reference)          | -       | 1 (reference)          | -       |
|                        | <500                                       | 1213          | 110                               | 0.74 (0.69-0.80)      | <0.001  | 0.77 (0.72-0.83)       | <0.001  | 0.78 (0.73-0.84)       | <0.001  |

|                    |             |      |     |                  |        |                  |        |                  |        |
|--------------------|-------------|------|-----|------------------|--------|------------------|--------|------------------|--------|
|                    | 500–999     | 1215 | 103 | 0.65 (0.61-0.70) | <0.001 | 0.68 (0.63-0.73) | <0.001 | 0.69 (0.64-0.75) | <0.001 |
|                    | 1,000–1,499 | 345  | 67  | 0.49 (0.44-0.55) | <0.001 | 0.52 (0.46-0.58) | <0.001 | 0.54 (0.48-0.61) | <0.001 |
|                    | ≥1,500      | 302  | 86  | 0.52 (0.46-0.58) | <0.001 | 0.55 (0.48-0.62) | <0.001 | 0.56 (0.50-0.63) | <0.001 |
| Women              | 0           | 1772 | 125 | 1 (reference)    | -      | 1 (reference)    | -      | 1 (reference)    | -      |
|                    | <500        | 755  | 63  | 0.66 (0.61-0.72) | <0.001 | 0.67 (0.61-0.73) | <0.001 | 0.68 (0.63-0.74) | <0.001 |
|                    | 500–999     | 492  | 48  | 0.60 (0.54-0.66) | <0.001 | 0.60 (0.54-0.66) | <0.001 | 0.61 (0.55-0.67) | <0.001 |
|                    | 1,000–1,499 | 102  | 28  | 0.46 (0.38-0.57) | <0.001 | 0.47 (0.38-0.57) | <0.001 | 0.48 (0.39-0.59) | <0.001 |
|                    | ≥1,500      | 62   | 30  | 0.50 (0.38-0.64) | <0.001 | 0.50 (0.39-0.65) | <0.001 | 0.51 (0.40-0.66) | <0.001 |
| <b>CVD subtype</b> |             |      |     |                  |        |                  |        |                  |        |
| IHD                | 0           | 996  | 113 | 1 (reference)    | -      | 1 (reference)    | -      | 1 (reference)    | -      |
|                    | <500        | 615  | 68  | 0.76 (0.69-0.85) | <0.001 | 0.79 (0.71-0.87) | <0.001 | 0.80 (0.72-0.89) | <0.001 |
|                    | 500–999     | 557  | 65  | 0.69 (0.62-0.77) | <0.001 | 0.71 (0.64-0.79) | <0.001 | 0.72 (0.65-0.80) | <0.001 |
|                    | 1,000–1,499 | 159  | 45  | 0.55 (0.46-0.65) | <0.001 | 0.57 (0.48-0.67) | <0.001 | 0.59 (0.50-0.70) | <0.001 |
|                    | ≥1,500      | 127  | 58  | 0.58 (0.48-0.69) | <0.001 | 0.60 (0.50-0.72) | <0.001 | 0.61 (0.51-0.74) | <0.001 |
| HF                 | 0           | 1216 | 143 | 1 (reference)    | -      | 1 (reference)    | -      | 1 (reference)    | -      |
|                    | <500        | 577  | 73  | 0.66 (0.60-0.73) | <0.001 | 0.67 (0.61-0.74) | <0.001 | 0.68 (0.62-0.75) | <0.001 |
|                    | 500–999     | 513  | 70  | 0.65 (0.58-0.72) | <0.001 | 0.66 (0.60-0.74) | <0.001 | 0.68 (0.61-0.75) | <0.001 |
|                    | 1,000–1,499 | 120  | 41  | 0.46 (0.38-0.55) | <0.001 | 0.47 (0.39-0.57) | <0.001 | 0.49 (0.41-0.60) | <0.001 |
|                    | ≥1,500      | 106  | 59  | 0.53 (0.43-0.65) | <0.001 | 0.55 (0.45-0.67) | <0.001 | 0.57 (0.47-0.70) | <0.001 |
| Stroke             | 0           | 1765 | 257 | 1 (reference)    | -      | 1 (reference)    | -      | 1 (reference)    | -      |
|                    | <500        | 839  | 146 | 0.68 (0.62-0.73) | <0.001 | 0.70 (0.64-0.76) | <0.001 | 0.72 (0.66-0.78) | <0.001 |
|                    | 500–999     | 700  | 123 | 0.56 (0.51-0.61) | <0.001 | 0.58 (0.53-0.63) | <0.001 | 0.60 (0.55-0.65) | <0.001 |
|                    | 1,000–1,499 | 170  | 79  | 0.42 (0.36-0.49) | <0.001 | 0.44 (0.37-0.51) | <0.001 | 0.46 (0.39-0.54) | <0.001 |

|        |     |    |                  |        |                  |        |                  |        |
|--------|-----|----|------------------|--------|------------------|--------|------------------|--------|
| ≥1,500 | 146 | 97 | 0.45 (0.38-0.53) | <0.001 | 0.47 (0.39-0.56) | <0.001 | 0.48 (0.41-0.57) | <0.001 |
|--------|-----|----|------------------|--------|------------------|--------|------------------|--------|

Abbreviations: CI, confidence interval; CVD, cardiovascular disease; HF, heart failure; HR, hazard ratio; IHD, ischemic heart disease; MET, metabolic equivalents of task; n/a, not applicable.

\*HRs were calculated by Cox models, after adjusting for age at baseline, sex, smoking status, alcohol consumption frequency, and household income.

†HRs were calculated by Cox models, after adjusting for age at baseline, sex, smoking status, alcohol consumption frequency, household income, blood pressure status, fasting glucose status, known chronic obstructive lung disease, and previous history of admission due to lower respiratory tract infection.

**Table S3. Association between physical activity and hospitalization from lower respiratory tract infection by subgroup**

| Subgroups              | Amount of physical activity (MET min/week) | No. of events | Event rate, n/10,000 person-year | Age- and sex-adjusted |         | Multivariate-adjusted* |         | Multivariate-adjusted† |         |
|------------------------|--|---------------|----------------------------------|-----------------------|---------|------------------------|---------|------------------------|---------|
|                        |  |               |                                  | HR (95% CI)           | P-value | HR (95% CI)            | P-value | HR (95% CI)            | P-value |
| <b>Age strata, yrs</b> |  |               |                                  |                       |         |                        |         |                        |         |
| 18-64                  | 0  | 10,531        | 80                               | 1 (reference)         | -       | 1 (reference)          | -       | 1 (reference)          | -       |
|                        | <500                                       | 9,129         | 62                               | 0.81 (0.79-0.83)      | <0.001  | 0.84 (0.82-0.87)       | <0.001  | 0.85 (0.83-0.87)       | <0.001  |
|                        | 500-999                                    | 8,321         | 60                               | 0.77 (0.75-0.79)      | <0.001  | 0.81 (0.79-0.83)       | <0.001  | 0.82 (0.79-0.84)       | <0.001  |
|                        | 1,000-1,499                                | 3,416         | 57                               | 0.72 (0.70-0.75)      | <0.001  | 0.77 (0.74-0.80)       | <0.001  | 0.78 (0.75-0.81)       | <0.001  |
|                        | ≥1,500                                     | 2,095         | 61                               | 0.75 (0.72-0.79)      | <0.001  | 0.79 (0.76-0.83)       | <0.001  | 0.80 (0.76-0.83)       | <0.001  |
| 65-74                  | 0  | 17,133        | 199                              | 1 (reference)         | -       | 1 (reference)          | -       | 1 (reference)          | -       |
|                        | <500                                       | 11,774        | 163                              | 0.82 (0.80-0.84)      | <0.001  | 0.84 (0.82-0.86)       | <0.001  | 0.84 (0.82-0.86)       | <0.001  |
|                        | 500-999                                    | 11,309        | 152                              | 0.75 (0.73-0.77)      | <0.001  | 0.77 (0.75-0.79)       | <0.001  | 0.77 (0.75-0.79)       | <0.001  |
|                        | 1,000-1,499                                | 3,927         | 138                              | 0.67 (0.65-0.69)      | <0.001  | 0.70 (0.67-0.72)       | <0.001  | 0.71 (0.68-0.73)       | <0.001  |
|                        | ≥1,500                                     | 2,924         | 141                              | 0.66 (0.64-0.69)      | <0.001  | 0.69 (0.66-0.72)       | <0.001  | 0.70 (0.67-0.73)       | <0.001  |
| 75-99                  | 0  | 16,484        | 435                              | 1 (reference)         | -       | 1 (reference)          | -       | 1 (reference)          | -       |
|                        | <500                                       | 9,089         | 358                              | 0.81 (0.79-0.84)      | <0.001  | 0.82 (0.80-0.84)       | <0.001  | 0.83 (0.81-0.86)       | <0.001  |
|                        | 500-999                                    | 7,030         | 329                              | 0.72 (0.70-0.74)      | <0.001  | 0.73 (0.71-0.75)       | <0.001  | 0.74 (0.72-0.76)       | <0.001  |
|                        | 1,000-1,499                                | 1,810         | 308                              | 0.66 (0.63-0.69)      | <0.001  | 0.67 (0.64-0.70)       | <0.001  | 0.69 (0.66-0.72)       | <0.001  |
|                        | ≥1,500                                     | 1,309         | 312                              | 0.64 (0.60-0.67)      | <0.001  | 0.65 (0.61-0.69)       | <0.001  | 0.66 (0.63-0.70)       | <0.001  |
| <b>Sex</b>             |  |               |                                  |                       |         |                        |         |                        |         |
| Men                    | 0  | 19,248        | 179                              | 1 (reference)         | -       | 1 (reference)          | -       | 1 (reference)          | -       |
|                        | <500                                       | 13,858        | 118                              | 0.78 (0.76-0.80)      | <0.001  | 0.81 (0.79-0.83)       | <0.001  | 0.83 (0.81-0.84)       | <0.001  |

|                    |             |        |     |                  |        |                  |        |                  |        |
|--------------------|-------------|--------|-----|------------------|--------|------------------|--------|------------------|--------|
|                    | 500–999     | 14,806 | 118 | 0.72 (0.71-0.74) | <0.001 | 0.76 (0.74-0.78) | <0.001 | 0.77 (0.76-0.79) | <0.001 |
|                    | 1,000–1,499 | 5,414  | 98  | 0.64 (0.62-0.66) | <0.001 | 0.68 (0.66-0.70) | <0.001 | 0.70 (0.68-0.71) | <0.001 |
|                    | ≥1,500      | 4,195  | 112 | 0.63 (0.61-0.65) | <0.001 | 0.67 (0.65-0.69) | <0.001 | 0.68 (0.66-0.71) | <0.001 |
| Women              | 0           | 24,900 | 168 | 1 (reference)    | -      | 1 (reference)    | -      | 1 (reference)    | -      |
|                    | <500        | 16,134 | 126 | 0.84 (0.82-0.85) | <0.001 | 0.84 (0.83-0.86) | <0.001 | 0.85 (0.83-0.86) | <0.001 |
|                    | 500–999     | 11,854 | 109 | 0.75 (0.73-0.76) | <0.001 | 0.75 (0.73-0.77) | <0.001 | 0.76 (0.74-0.77) | <0.001 |
|                    | 1,000–1,499 | 3,739  | 95  | 0.71 (0.69-0.74) | <0.001 | 0.72 (0.69-0.74) | <0.001 | 0.73 (0.70-0.75) | <0.001 |
|                    | ≥1,500      | 2,133  | 97  | 0.71 (0.68-0.74) | <0.001 | 0.72 (0.68-0.75) | <0.001 | 0.72 (0.69-0.76) | <0.001 |
| <b>CVD subtype</b> |             |        |     |                  |        |                  |        |                  |        |
| IHD                | 0           | 14,844 | 161 | 1 (reference)    | -      | 1 (reference)    | -      | 1 (reference)    | -      |
|                    | <500        | 11,099 | 116 | 0.82 (0.80-0.84) | <0.001 | 0.84 (0.82-0.86) | <0.001 | 0.85 (0.83-0.87) | <0.001 |
|                    | 500–999     | 10,259 | 113 | 0.77 (0.75-0.79) | <0.001 | 0.80 (0.78-0.82) | <0.001 | 0.80 (0.78-0.82) | <0.001 |
|                    | 1,000–1,499 | 3,727  | 98  | 0.71 (0.68-0.73) | <0.001 | 0.74 (0.71-0.77) | <0.001 | 0.75 (0.72-0.78) | <0.001 |
|                    | ≥1,500      | 2,542  | 109 | 0.72 (0.69-0.75) | <0.001 | 0.74 (0.71-0.78) | <0.001 | 0.75 (0.72-0.78) | <0.001 |
| HF                 | 0           | 13,953 | 157 | 1 (reference)    | -      | 1 (reference)    | -      | 1 (reference)    | -      |
|                    | <500        | 9,601  | 114 | 0.86 (0.84-0.88) | <0.001 | 0.87 (0.85-0.90) | <0.001 | 0.88 (0.86-0.91) | <0.001 |
|                    | 500–999     | 8,150  | 103 | 0.78 (0.76-0.81) | <0.001 | 0.80 (0.78-0.82) | <0.001 | 0.82 (0.80-0.84) | <0.001 |
|                    | 1,000–1,499 | 2,679  | 84  | 0.70 (0.67-0.73) | <0.001 | 0.73 (0.70-0.76) | <0.001 | 0.75 (0.72-0.78) | <0.001 |
|                    | ≥1,500      | 1,776  | 93  | 0.69 (0.66-0.73) | <0.001 | 0.72 (0.68-0.75) | <0.001 | 0.73 (0.70-0.77) | <0.001 |
| Stroke             | 0           | 16,578 | 235 | 1 (reference)    | -      | 1 (reference)    | -      | 1 (reference)    | -      |
|                    | <500        | 9,798  | 162 | 0.78 (0.76-0.80) | <0.001 | 0.79 (0.77-0.81) | <0.001 | 0.81 (0.79-0.83) | <0.001 |
|                    | 500–999     | 8,796  | 147 | 0.70 (0.68-0.72) | <0.001 | 0.71 (0.69-0.73) | <0.001 | 0.73 (0.71-0.75) | <0.001 |
|                    | 1,000–1,499 | 2,845  | 124 | 0.64 (0.61-0.67) | <0.001 | 0.66 (0.64-0.69) | <0.001 | 0.68 (0.65-0.71) | <0.001 |

|              |       |     |                  |        |                  |        |                  |        |
|--------------|-------|-----|------------------|--------|------------------|--------|------------------|--------|
| $\geq 1,500$ | 2,061 | 129 | 0.61 (0.58-0.64) | <0.001 | 0.63 (0.60-0.66) | <0.001 | 0.64 (0.61-0.67) | <0.001 |
|--------------|-------|-----|------------------|--------|------------------|--------|------------------|--------|

Abbreviations: CI, confidence interval; CVD, cardiovascular disease; HF, heart failure; HR, hazard ratio; IHD, ischemic heart disease; MET, metabolic equivalents of task.

\*HRs were calculated by Cox models, after adjusting for age at baseline, sex, smoking status, alcohol consumption frequency, and household income.

†HRs were calculated by Cox models, after adjusting for age at baseline, sex, smoking status, alcohol consumption frequency, household income, blood pressure status, fasting glucose status, known chronic obstructive lung disease, and previous history of admission due to lower respiratory tract infection



**Table S4. Association between physical activity and outcomes from lower respiratory tract infection by subgroups after excluding the first 2 years of follow-up (sensitivity analyses)**

| Subgroups                 | Amount of physical activity (MET min/week) | Mortality                |         | Hospitalization          |         |
|---------------------------|--|--------------------------|---------|--------------------------|---------|
|                           |  | MV-adjusted HR* (95% CI) | P-value | MV-adjusted HR* (95% CI) | P-value |
| <b>Overall population</b> |  |                          |         |                          |         |
|                           | 0  | 1 (reference)            | -       | 1 (reference)            | -       |
|                           | <500                                       | 0.77 (0.73-0.81)         | <0.001  | 0.86 (0.85-0.87)         | <0.001  |
|                           | 500-999                                    | 0.68 (0.64-0.72)         | <0.001  | 0.80 (0.78-0.81)         | <0.001  |
|                           | 1000-1499                                  | 0.54 (0.48-0.59)         | <0.001  | 0.74 (0.72-0.76)         | <0.001  |
|                           | ≥1500                                      | 0.57 (0.51-0.63)         | <0.001  | 0.73 (0.71-0.75)         | <0.001  |
| <b>Age strata, yrs</b>    |  |                          |         |                          |         |
| 18-64                     | 0  | 1 (reference)            | -       | 1 (reference)            | -       |
|                           | <500                                       | 0.91 (0.73-1.14)         | 0.409   | 0.86 (0.83-0.89)         | <0.001  |
|                           | 500-999                                    | 0.79 (0.63-0.99)         | 0.040   | 0.83 (0.81-0.86)         | <0.001  |
|                           | 1000-1499                                  | 0.77 (0.57-1.05)         | 0.095   | 0.79 (0.76-0.82)         | <0.001  |
|                           | ≥1500                                      | 0.87 (0.62-1.21)         | 0.398   | 0.81 (0.77-0.85)         | <0.001  |
| 65-74                     | 0  | 1 (reference)            | -       | 1 (reference)            | -       |
|                           | <500                                       | 0.76 (0.69-0.84)         | <0.001  | 0.86 (0.84-0.88)         |         |
|                           | 500-999                                    | 0.67 (0.60-0.74)         | <0.001  | 0.80 (0.77-0.82)         |         |
|                           | 1000-1499                                  | 0.56 (0.49-0.65)         | <0.001  | 0.73 (0.70-0.76)         |         |

|                    |           |                  |        |                  |        |
|--------------------|-----------|------------------|--------|------------------|--------|
|                    | ≥1500     | 0.53 (0.45-0.63) | <0.001 | 0.72 (0.69-0.75) | <0.001 |
| 75-99              | 0         | 1 (reference)    | -      | 1 (reference)    | -      |
|                    | <500      | 0.76 (0.71-0.82) | <0.001 | 0.86 (0.83-0.89) | <0.001 |
|                    | 500-999   | 0.68 (0.63-0.74) | <0.001 | 0.77 (0.75-0.80) | <0.001 |
|                    | 1000-1499 | 0.47 (0.39-0.55) | <0.001 | 0.72 (0.68-0.76) | <0.001 |
|                    | ≥1500     | 0.55 (0.46-0.66) | <0.001 | 0.70 (0.66-0.74) | <0.001 |
| <b>Sex</b>         |           |                  |        |                  |        |
| Men                | 0         | 1 (reference)    | -      | 1 (reference)    | -      |
|                    | <500      | 0.82 (0.76-0.88) | <0.001 | 0.85 (0.83-0.87) | <0.001 |
|                    | 500-999   | 0.71 (0.66-0.77) | <0.001 | 0.80 (0.78-0.82) | <0.001 |
|                    | 1000-1499 | 0.55 (0.49-0.63) | <0.001 | 0.73 (0.70-0.75) | <0.001 |
|                    | ≥1500     | 0.58 (0.52-0.66) | <0.001 | 0.71 (0.69-0.74) | <0.001 |
| Women              | 0         | 1 (reference)    | -      | 1 (reference)    | -      |
|                    | <500      | 0.71 (0.65-0.78) | <0.001 | 0.86 (0.84-0.88) | <0.001 |
|                    | 500-999   | 0.65 (0.58-0.72) | <0.001 | 0.78 (0.76-0.80) | <0.001 |
|                    | 1000-1499 | 0.52 (0.42-0.64) | <0.001 | 0.74 (0.71-0.77) | <0.001 |
|                    | ≥1500     | 0.54 (0.42-0.70) | <0.001 | 0.74 (0.70-0.77) | <0.001 |
| <b>CVD subtype</b> |           |                  |        |                  |        |
| IHD                | 0         | 1 (reference)    | -      | 1 (reference)    | -      |
|                    | <500      | 0.84 (0.75-0.93) | <0.001 | 0.86 (0.83-0.88) | <0.001 |
|                    | 500-999   | 0.73 (0.66-0.82) | <0.001 | 0.82 (0.79-0.84) | <0.001 |

|        |           |                  |        |                  |        |
|--------|-----------|------------------|--------|------------------|--------|
|        | 1000-1499 | 0.60 (0.50-0.72) | <0.001 | 0.76 (0.73-0.79) | <0.001 |
|        | ≥1500     | 0.63 (0.52-0.76) | <0.001 | 0.76 (0.73-0.80) | <0.001 |
| HF     | 0         | 1 (reference)    | -      | 1 (reference)    | -      |
|        | <500      | 0.72 (0.65-0.79) | <0.001 | 0.90 (0.87-0.93) | <0.001 |
|        | 500-999   | 0.70 (0.63-0.78) | <0.001 | 0.84 (0.82-0.87) | <0.001 |
|        | 1000-1499 | 0.50 (0.41-0.61) | <0.001 | 0.77 (0.73-0.80) | <0.001 |
|        | ≥1500     | 0.59 (0.48-0.72) | <0.001 | 0.75 (0.71-0.80) | <0.001 |
| Stroke | 0         | 1 (reference)    | -      | 1 (reference)    | -      |
|        | <500      | 0.75 (0.68-0.81) | <0.001 | 0.84 (0.82-0.87) | <0.001 |
|        | 500-999   | 0.63 (0.57-0.69) | <0.001 | 0.77 (0.74-0.80) | <0.001 |
|        | 1000-1499 | 0.48 (0.41-0.57) | <0.001 | 0.70 (0.66-0.74) | <0.001 |
|        | ≥1500     | 0.51 (0.43-0.61) | <0.001 | 0.70 (0.66-0.74) | <0.001 |

Abbreviations: CI, confidence interval; CVD, cardiovascular disease; HF, heart failure; HR, hazard ratio; IHD, ischemic heart disease; n/a, non-applicable; MET, metabolic equivalents of task; MV, multivariate.

\*HRs were calculated by Cox models, after adjusting for age at baseline, sex, smoking status, alcohol consumption frequency, household income, blood pressure status, fasting glucose status, known chronic obstructive lung disease, and previous history of admission due to lower respiratory tract infection.

**Table S5. Dose-response association between the amount of physical activity and lower respiratory tract infection mortality and hospitalization rates (sensitivity analysis)**

| Amount of physical activity<br>(MET-min/week) | No. of events | Event rate,<br>n/10,000 person-<br>year | Multivariate-adjusted* |         | Multivariate-adjusted† |         |
|---|---------------|---|------------------------|---------|------------------------|---------|
|   |               |   | (Main analysis)        |         | (Sensitivity analysis) |         |
|   |               |   | HR (95% CI)            | P-value | HR (95% CI)            | P-value |
| <b>Mortality</b>                              |               |   |                        |         |                        |         |
| 0   | 3,751         | 15.4                                    | 1 (reference)          | -       | 1 (reference)          | -       |
| <500  | 1,968         | 8.5                                     | 0.74 (0.70-0.78)       | <0.001  | 0.74 (0.70-0.78)       | <0.001  |
| 500–999                                       | 1,707         | 7.8                                     | 0.66 (0.62-0.70)       | <0.001  | 0.66 (0.62-0.70)       | <0.001  |
| 1,000–1,499                                   | 447           | 5.1                                     | 0.52 (0.47-0.57)       | <0.001  | 0.52 (0.47-0.57)       | <0.001  |
| ≥1,500  | 364           | 6.6                                     | 0.54 (0.49-0.60)       | <0.001  | 0.54 (0.49-0.61)       | <0.001  |
| <b>Hospitalization</b>                        |               |   |                        |         |                        |         |
| 0   | 44,148        | 172.8                                   | 1 (reference)          | -       | 1 (reference)          | -       |
| <500  | 29,992        | 122.1                                   | 0.84 (0.83-0.85)       | <0.001  | 0.84 (0.83-0.85)       | <0.001  |
| 500–999                                       | 26,660        | 113.7                                   | 0.77 (0.76-0.79)       | <0.001  | 0.78 (0.76-0.79)       | <0.001  |
| 1,000–1,499                                   | 9,153         | 96.6                                    | 0.72 (0.70-0.73)       | <0.001  | 0.72 (0.70-0.73)       | <0.001  |
| ≥1,500  | 6,328         | 106.7                                   | 0.71 (0.69-0.73)       | <0.001  | 0.71 (0.69-0.73)       | <0.001  |

Abbreviations: CI, confidence interval; HR, hazard ratio; MET, metabolic equivalents of task.

\*HRs were calculated by Cox models, after adjusting for age at baseline, sex, smoking status, alcohol consumption frequency, household income, blood pressure status, fasting glucose status, body mass index, known chronic obstructive lung disease, and previous history of admission due to lower respiratory tract infection.

†HRs were calculated by Cox models, after adjusting for all variables in main analysis, prevalent asthma, outpatient clinic visit due to influenza and pneumonia, and steroid use within 1 year before the health examination date.

**Table S6. Association of a 500 MET-min/week increase in physical activity and lower respiratory tract infection outcomes among individuals with  $\leq 2000$  MET-min/week**

|                        | Age- and sex-adjusted |         |                         | Multivariate-adjusted* |         |                         | Multivariate-adjusted† |         |                         |
|------------------------|-----------------------|---------|-------------------------|------------------------|---------|-------------------------|------------------------|---------|-------------------------|
|                        | HR (95% CI)           | P-value | P for interaction (age) | HR (95% CI)            | P-value | P for interaction (age) | HR (95% CI)            | P-value | P for interaction (age) |
| <b>Mortality</b>       |                       |         |                         |                        |         |                         |                        |         |                         |
| Overall population     | 0.75 (0.73-0.77)      | <0.001  |                         | 0.77 (0.75-0.79)       | <0.001  |                         | 0.78 (0.75-0.80)       | <0.001  |                         |
| Age strata, yrs        |                       |         |                         |                        |         |                         |                        |         |                         |
| 18-64                  | 0.84 (0.77-0.92)      | <0.001  | 0.027                   | 0.89 (0.81-0.97)       | 0.009   | 0.002                   | 0.90 (0.82-0.98)       | 0.017   | 0.003                   |
| 65-74                  | 0.76 (0.72-0.79)      | <0.001  |                         | 0.77 (0.74-0.81)       | <0.001  |                         | 0.78 (0.74-0.81)       | <0.001  |                         |
| 75-99                  | 0.73 (0.70-0.77)      | <0.001  |                         | 0.74 (0.71-0.77)       | <0.001  |                         | 0.75 (0.72-0.79)       | <0.001  |                         |
| <b>Hospitalization</b> |                       |         |                         |                        |         |                         |                        |         |                         |
| Overall population     | 0.85 (0.85-0.86)      | <0.001  |                         | 0.87 (0.86-0.87)       | <0.001  |                         | 0.87 (0.87-0.88)       | <0.001  |                         |
| Age strata, yrs        |                       |         |                         |                        |         |                         |                        |         |                         |
| 18-64                  | 0.89 (0.88-0.90)      | <0.001  | <0.001                  | 0.91 (0.90-0.92)       | <0.001  | <0.001                  | 0.91 (0.90-0.92)       | <0.001  | <0.001                  |
| 65-74                  | 0.85 (0.84-0.86)      | <0.001  |                         | 0.87 (0.86-0.88)       | <0.001  |                         | 0.87 (0.86-0.88)       | <0.001  |                         |
| 75-99                  | 0.83 (0.82-0.84)      | <0.001  |                         | 0.83 (0.82-0.85)       | <0.001  |                         | 0.84 (0.83-0.86)       | <0.001  |                         |

Abbreviations: CI, confidence interval; HR, hazard ratio; MET, metabolic equivalents of task.

\*HRs were calculated by Cox models, after adjusting for age at baseline, sex, smoking status, alcohol consumption frequency, and household income.

†HRs were calculated by Cox models, after adjusting for age at baseline, sex, smoking status, alcohol consumption frequency, household income, blood pressure status, fasting glucose status, body mass index, prevalent chronic obstructive lung disease, and previous history of admission due to lower respiratory tract infection.