A GIS-Based Approach to Assess the Influence of the Urban Built Environment on Cardiac and Respiratory Outcomes in Older Adults

Hélène Niculita-Hirzel, Alexandre H. Hirzel, Pascal Wild

****

**Figure S1.** Geospatial localization of dwellings considered in the study.



**Figure S2**. Dendrogram of agglomerative hierarchical cluster analysis

****

 ****

 ****

**Figure S3.** Marginal predicted mean of health outcomes by built environment descriptor, with 95% confidence intervals. **A**. Proportion of heart medication by urban landscape cluster; **B**. Proportion of medication for asthma by quantile of proximity to the lake; **C**. Proportion of chronic lung disease by construction period of the building.

**Table S1**. Number of participants residing in buildings from each construction period

|  |  |
| --- | --- |
| Building constuction period | Participants |
| before 1925 | 258 |
| 1925-1934 | 256 |
| 1935-1944 | 102 |
| 1945-1954 | 257 |
| 1955-1964 | 447 |
| 1965-1974 | 423 |
| 1975-2014 | 258 |
|  |  |

**Table S2**. Descriptive statistics of road density variable in the five urban landscape clusters.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Cluster | Q1 | Q2 | Q3 | Q4 | Q5 | Total |
| 1 (N) | 213 | 155 | 74 | 31 | 0 | 473 |
| 1 (%) | 45.03 | 32.77 | 15.64 | 6.55 | 0 | 100 |
| 2 (N) | 183 | 219 | 277 | 203 | 34 | 916 |
| 2 (%) | 19.98 | 23.91 | 30.24 | 22.16 | 3.71 | 100 |
| 3 (N) | 0 | 35 | 61 | 106 | 307 | 509 |
| 3 (%) | 0 | 6.88 | 11.98 | 20.83 | 60.31 | 100 |
| 4 (N) | 0 | 0 | 3 | 37 | 98 | 138 |
| 4 (%) | 0 | 0 | 2.17 | 26.81 | 71.01 | 100 |
| 5 (N) | 28 | 11 | 8 | 28 | 6 | 81 |
| 5 (%) | 34.57 | 13.58 | 9.88 | 34.57 | 7.41 | 100 |
| Total (N) | 424 | 420 | 423 | 405 | 445 | 2117 |
| Total (%) | 20.03 | 19.84 | 19.98 | 19.13 | 21.02 | 100 |

**Table S3**. Descriptive statistics of building density variable in the five urban landscape clusters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Cluster | Q1 | Q2 | Q3 | Q4 | Q5 | Total |
| 1 (N) | 295 | 165 | 13 | 0 | 0 | 473 |
| 1 (%) | 62.37 | 34.88 | 2.75 | 0 | 0 | 100 |
| 2 (N) | 97 | 251 | 319 | 211 | 38 | 916 |
| 2 (%) | 10.59 | 27.4 | 34.83 | 23.03 | 4.15 | 100 |
| 3 (N) | 0 | 0 | 30 | 136 | 343 | 509 |
| 3 (%) | 0 | 0 | 5.89 | 26.72 | 67.39 | 100 |
| 4 (N) | 1 | 5 | 36 | 85 | 11 | 138 |
| 4 (%) | 0.72 | 3.62 | 26.09 | 61.59 | 7.97 | 100 |
| 5 (N) | 33 | 18 | 29 | 1 | 0 | 81 |
| 5 (%) | 40.74 | 22.22 | 35.8 | 1.23 | 0 | 100 |
| Total (N) | 426 | 439 | 427 | 433 | 392 | 2117 |
| Total (%) | 20.12 | 20.74 | 20.17 | 20.45 | 18.52 | 100 |

**Table S4**. Descriptive statistics of elevation variable in the five urban landscape clusters

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Cluster | Q1 | Q2 | Q3 | Q4 | Q5 | Total |
| 1 (N) | 27 | 55 | 43 | 48 | 300 | 473 |
| 1 (%) | 5.71 | 11.63 | 9.09 | 10.15 | 63.42 | 100 |
| 2 (N) | 112 | 84 | 224 | 397 | 99 | 916 |
| 2 (%) | 12.23 | 9.17 | 24.45 | 43.34 | 10.81 | 100 |
| 3 (N) | 130 | 226 | 151 | 2 | 0 | 509 |
| 3 (%) | 25.54 | 44.4 | 29.67 | 0.39 | 0 | 100 |
| 4 (N) | 77 | 61 | 0 | 0 | 0 | 138 |
| 4 (%) | 55.8 | 44.2 | 0 | 0 | 0 | 100 |
| 5 (N) | 81 | 0 | 0 | 0 | 0 | 81 |
| 5 (%) | 100 | 0 | 0 | 0 | 0 | 100 |
| Total (N) | 427 | 426 | 418 | 447 | 399 | 2117 |
| Total (%) | 20.17 | 20.12 | 19.74 | 21.11 | 18.85 | 100 |

**Table S5**. Descriptive statistics of proximity to Geneva Lake variable in the five urban landscape clusters.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Cluster | NA | Q1 | Q2 | Q3 | Q4 | Q5 | Total |
| 1 (N) | 440 | 3 | 0 | 30 | 0 | 0 | 473 |
| 1 (%) | 93.02 | 0.63 | 0 | 6.34 | 0 | 0 | 100 |
| 2 (N) | 912 | 2 | 1 | 1 | 0 | 0 | 916 |
| 2 (%) | 99.56 | 0.22 | 0.11 | 0.11 | 0 | 0 | 100 |
| 3 (N) | 443 | 63 | 3 | 0 | 0 | 0 | 509 |
| 3 (%) | 87.03 | 12.38 | 0.59 | 0 | 0 | 0 | 100 |
| 4 (N) | 0 | 1 | 60 | 29 | 24 | 24 | 138 |
| 4 (%) | 0 | 0.72 | 43.48 | 21.01 | 17.39 | 17.39 | 100 |
| 5 (N) | 0 | 0 | 0 | 2 | 38 | 41 | 81 |
| 5 (%) | 0 | 0 | 0 | 2.47 | 46.91 | 50.62 | 100 |
| Total (N) | 1,795 | 69 | 64 | 62 | 62 | 65 | 2117 |
| Total (%) | 84.79 | 3.26 | 3.02 | 2.93 | 2.93 | 3.07 | 100 |

**Table S6**. Descriptive statistics of proximity to water other than lake variable in the five urban landscape clusters.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Cluster | NA | Q1 | Q2 | Q3 | Q4 | Q5 | Total |
| 1 (N) | 0 | 0 | 49 | 82 | 129 | 213 | 473 |
| 1 (%) | 0 | 0 | 10.36 | 17.34 | 27.27 | 45.03 | 100 |
| 2 (N) | 531 | 109 | 103 | 101 | 72 | 0 | 916 |
| 2 (%) | 57.97 | 11.9 | 11.24 | 11.03 | 7.86 | 0 | 100 |
| 3 (N) | 348 | 84 | 40 | 31 | 6 | 0 | 509 |
| 3 (%) | 68.37 | 16.5 | 7.86 | 6.09 | 1.18 | 0 | 100 |
| 4 (N) | 137 | 1 | 0 | 0 | 0 | 0 | 138 |
| 4 (%) | 99.28 | 0.72 | 0 | 0 | 0 | 0 | 100 |
| 5 (N) | 27 | 1 | 21 | 10 | 13 | 9 | 81 |
| 5 (%) | 33.33 | 1.23 | 25.93 | 12.35 | 16.05 | 11.11 | 100 |
| Total (N) | 1,043 | 195 | 213 | 224 | 220 | 222 | 2117 |
| Total (%) | 49.27 | 9.21 | 10.06 | 10.58 | 10.39 | 10.49 | 100 |

**Table S7**. Descriptive statistics of proximity to forest variable in the five urban landscape clusters.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Cluster | NA | Q1 | Q2 | Q3 | Q4 | Q5 | Total |
| 1 (N) | 0 | 0 | 0 | 47 | 168 | 258 | 473 |
| 1 (%) | 0 | 0 | 0 | 9.94 | 35.52 | 54.55 | 100 |
| 2 (N) | 14 | 51 | 188 | 274 | 246 | 143 | 916 |
| 2 (%) | 1.53 | 5.57 | 20.52 | 29.91 | 26.86 | 15.61 | 100 |
| 3 (N) | 47 | 239 | 153 | 65 | 5 | 0 | 509 |
| 3 (%) | 9.23 | 46.95 | 30.06 | 12.77 | 0.98 | 0 | 100 |
| 4 (N) | 30 | 76 | 32 | 0 | 0 | 0 | 138 |
| 4 (%) | 21.74 | 55.07 | 23.19 | 0 | 0 | 0 | 100 |
| 5 (N) | 14 | 19 | 32 | 8 | 8 | 0 | 81 |
| 5 (%) | 17.28 | 23.46 | 39.51 | 9.88 | 9.88 | 0 | 100 |
| Total (N) | 105 | 385 | 405 | 394 | 427 | 401 | 2117 |
| Total (%) | 4.96 | 18.19 | 19.13 | 18.61 | 20.17 | 18.94 | 100 |

**Table S8**. Descriptive statistics of proximity to garden variable in the five urban landscape clusters.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Cluster | NA | Q2 | Q3 | Q4 | Q5 | Total |
| 1 (N) | 41 | 106 | 104 | 93 | 129 | 473 |
| 1 (%) | 8.67 | 22.41 | 21.99 | 19.66 | 27.27 | 100 |
| 2 (N) | 1 | 66 | 261 | 297 | 291 | 916 |
| 2 (%) | 0.11 | 7.21 | 28.49 | 32.42 | 31.77 | 100 |
| 3 (N) | 319 | 170 | 19 | 1 | 0 | 509 |
| 3 (%) | 62.67 | 33.4 | 3.73 | 0.2 | 0 | 100 |
| 4 (N) | 37 | 61 | 25 | 15 | 0 | 138 |
| 4 (%) | 26.81 | 44.2 | 18.12 | 10.87 | 0 | 100 |
| 5 (N) | 5 | 18 | 24 | 15 | 19 | 81 |
| 5 (%) | 6.17 | 22.22 | 29.63 | 18.52 | 23.46 | 100 |
| Total (N) | 403 | 421 | 433 | 421 | 439 | 2117 |
| Total (%) | 19.04 | 19.89 | 20.45 | 19.89 | 20.74 | 100 |

**Table S9**. Descriptive statistics of proximity to field variable in the five urban landscape clusters.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Cluster | NA | Q1 | Q2 | Q3 | Q4 | Q5 | Total |
| 1 (N) | 42 | 6 | 65 | 109 | 104 | 147 | 473 |
| 1 (%) | 8.88 | 1.27 | 13.74 | 23.04 | 21.99 | 31.08 | 100 |
| 2 (N) | 540 | 93 | 51 | 49 | 110 | 73 | 916 |
| 2 (%) | 58.95 | 10.15 | 5.57 | 5.35 | 12.01 | 7.97 | 100 |
| 3 (N) | 269 | 72 | 76 | 82 | 10 | 0 | 509 |
| 3 (%) | 52.85 | 14.15 | 14.93 | 16.11 | 1.96 | 0 | 100 |
| 4 (N) | 99 | 37 | 2 | 0 | 0 | 0 | 138 |
| 4 (%) | 71.74 | 26.81 | 1.45 | 0 | 0 | 0 | 100 |
| 5 (N) | 23 | 35 | 14 | 1 | 5 | 3 | 81 |
| 5 (%) | 28.4 | 43.21 | 17.28 | 1.23 | 6.17 | 3.7 | 100 |
| Total (N) | 973 | 243 | 208 | 241 | 229 | 223 | 2117 |
| Total (%) | 45.96 | 11.48 | 9.83 | 11.38 | 10.82 | 10.53 | 100 |