**Introduction**

“Transit desert” is a term used to refer to areas of a city where residents have a high need for public transit due to various factors yet lack good access to it. By identifying such areas, transportation planners can see where additional construction of transit infrastructure can benefit those who need it most. Advanced age, poverty, and lack of alternative transportation are often used as identifiers for areas with a high need for public transit access. In this analysis, “transit desert” study is brought into the context of urban sustainability by including measurement of ground-level air pollution as a contributing factor.

**Methodology**

The criteria used to assess need for transportation infrastructure were based on three sets of factors: distance to existing transit, air quality, and demographics. Distance to existing transit was based on a simple proximity analysis to existing subway and express bus lines; block groups with access to only one or the other and situated at a distance of more than three-quarters of a mile (or about 15 minutes walking) were ranked as most in need. Particulate matter (2.5) data measured by the City of New York was used as the basis for air quality, as its health effects are among the most pernicious of urban air pollutants and it is a common product of traffic emissions, which public transit is optimally suited to curb. For demographic factors, data from the American Community Survey 2015 was used at the census-block level to identify areas with the highest overall population, lowest median household income, and highest proportion of elderly (65 and older) residents; these areas were then ranked as most in need. Vehicle ownership was deliberately not included in the main analysis: in the spirit of transit-oriented development, vehicles are conceptualized here not as an alternative and equally good means of transportation, but rather as a negative externality of inadequate public transit.

**Results**

The analysis identifies several neighborhoods with high public transit need. Northern Manhattan, the Lower East Side, and the central Bronx, despite being relatively close to subway corridors, are nonetheless priority areas largely due to poverty and the elevated levels of particulate matter measured there, showing that densely populated areas in particular need intensively developed public transit. Meanwhile, areas more on the city’s periphery, especially eastern and northern Queens as well as most of Staten Island and central Brooklyn, are high priority more because of their physical distance from stops and their larger elderly population.

Although vehicle ownership is not factored into the final analysis, an important note here is its distribution across the city, which shows that despite the express bus service implemented by the City over the past decade, peripheral areas still have high rates of car ownership.

**Demographic Need Factors by Borough**

<table>
<thead>
<tr>
<th>Borough</th>
<th>Population</th>
<th>Median Household Income</th>
<th>Houses with at least 1 person over 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronx</td>
<td>1,428,357</td>
<td>$34,299</td>
<td>23.90%</td>
</tr>
<tr>
<td>Manhattan</td>
<td>2,595,259</td>
<td>$72,871</td>
<td>23.70%</td>
</tr>
<tr>
<td>Queens</td>
<td>1,629,507</td>
<td>$57,720</td>
<td>28%</td>
</tr>
<tr>
<td>Brooklyn</td>
<td>2,301,139</td>
<td>$48,201</td>
<td>25%</td>
</tr>
<tr>
<td>Staten Island</td>
<td>472,481</td>
<td>$73,197</td>
<td>29%</td>
</tr>
</tbody>
</table>

Spatial analysis makes it clear that in general, the highest-priority areas for additional transit infrastructure are relatively small pockets of the city. These findings suggest that many currently underserved areas in the city could benefit from minor expansions of existing subway lines and express bus corridors, while eastern Queens’ demographically needy population could benefit from a major expansion of subway lines, which in turn could spur higher-density development, increasing the efficiency of transit and reducing dependence on cars.

**Sources**

NYC Environment & Health Data Portal
NYC OpenData
2015 American Community Survey
NJ Office of Information Technology