Social equity in transport: measuring equity using (Auckland) transport models

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Social Equity Measures

Why? Transport equity snapshot, tell the story......lift the lower equity line
Simple, repeatable, measurable, use existing tools, transferable

Not a critique of transport and social equity!
Builds on measures already in place, adds spatial bits
→ Accessibility is a basic human right, right to the city
→ Measured using
  → PT accessibility (if you have a car, then no worries)
  → Access to work (= income = opportunity = equity)
  → Morning peak
  → Spatial distribution across city
  → Aggregate score (to compare)
Rule 1: the right to access transit
- Everyone enjoys equal high accessibility
- Zones that access rapid/high frequency PT services with 15 minutes walk

Rule 2: minimum transit/PT accessibility
- Minimum level of accessibility (to employment)
- % of region’s jobs accessed with reasonable travel time

Also generate aggregate scores

Rule 3: better access for low income
- Prioritise low income neighbourhoods (zones)

Rule 4: spatiality of a just distribution
- Identify priority areas for PT
- (Unjust) Areas of low income AND poor PT access

And not Rule (5) - a Mobility Index
Auckland
Rule 1: the right to access transport

All zones <= 15 minutes walk time to rapid/frequent PT services (or 1km), morning peak

Access from zone centroid to ANY rapid/frequent service

2016: 24% of population → 2048: 78% (better equity)

Measure: Distance from zone centroid to nearest rapid/frequent PT services
* Walk speed at 4kph
Rule 2: minimum transit / PT accessibility

All zones == access to 10% of employment within 45 minutes of PT time

4.2% of population → 8.2% (better equity)
Rule 3: better access for low income

All zones → relationship of Income to Accessibility (PT access in AM peak)

Regression of Zonal Income and PT Accessibility

95% Significant

2016 Income parameter = +0.036

($10,000 income increase → 360 more jobs accessible)

2048 Income parameter = not significant at 95%

but +0.060 at 84% significance

($10,000 income increase → 600 more jobs accessible) → Overall better than 2016

The fact that 2048 scenario is not significant shows there is no statistical relationship between accessibility and income

→ Future less significant, but trend of higher income / higher access continues

→ Decline in transport equity

Note: Aver zonal HH income held constant 2013 to 2048
Rule 4: spatiality of a just system

All zones → High and low access zones with significant relationship to Income (95% significance)

Population in zones with:
(Reduce) Low Income AND Low Accessibility
7.8% → 10.6% (worse)

(Increase) Low Income AND High Accessibility
3.0% → 3.9% (better)

Note: Aver zonal HH income held constant 2013 to 2048
Accessibility to jobs in the region weighted by population in each zone, aggregated over all zones

Car == 30 minutes travel time
PT == 45 minutes travel time

<table>
<thead>
<tr>
<th>Mode</th>
<th>2016 Mobility</th>
<th>2016 Mob Index</th>
<th>2048 Mobility</th>
<th>2048 Mob Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car 30 min</td>
<td>232,675</td>
<td>0.34</td>
<td>299,749</td>
<td>0.30</td>
</tr>
<tr>
<td>PT 45 min</td>
<td>66,299</td>
<td>0.10</td>
<td>171,658</td>
<td>0.17</td>
</tr>
<tr>
<td>Combined</td>
<td>149,487</td>
<td>0.22</td>
<td>235,704</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Employment | 689,795 | 986,185 |

Worse
Better
Better
Thanks to Saeid Adli and Todd Ballance for building scripts and extracting data.