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

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Transport Knowledge Conference 2019

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)

Stolen structure from Adli, Chowdhury, Shiftan

"Justice in Public Transport Systems: A comparative study of Auckland, Brisbane, Perth and Vancouver", Saeid Nazari Adli, Subeh Chowdhury, Yoram Shiftan, Elsevier Cities 90 (2019) 88-99

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Refs: Adli, Chowdhury, Shiftan

Auckland Macro Strategic travel demand model (MSM)

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

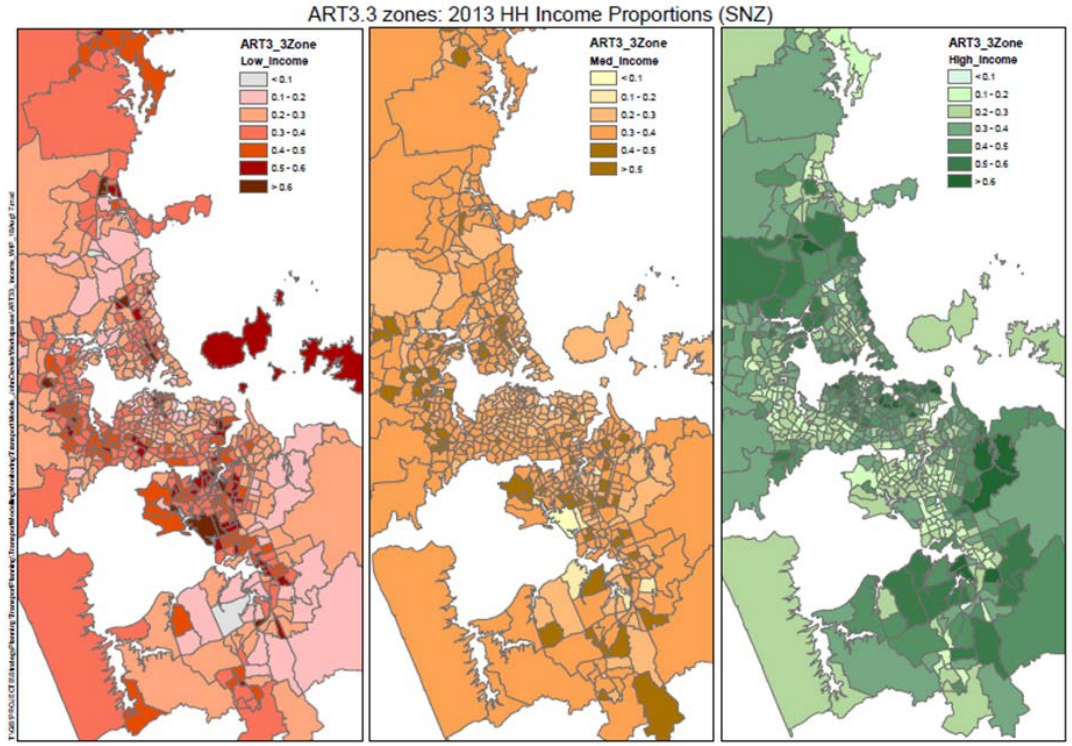
- Prioritise low income neighbourhoods (zones)

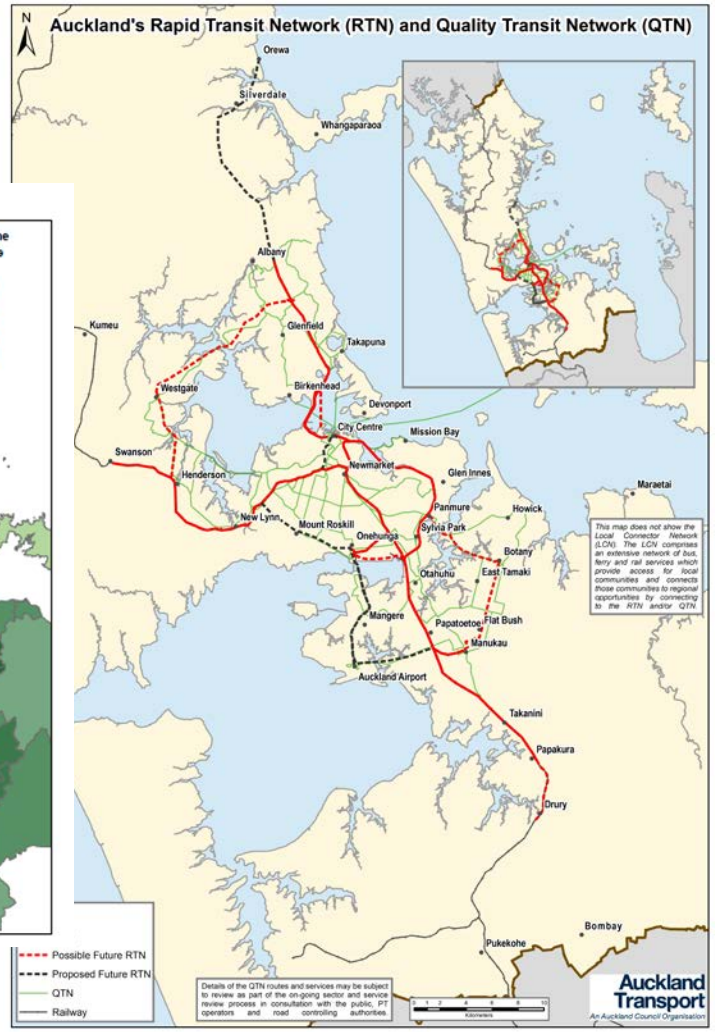
Rule 4: spatiality of a just distribution

- Identify priority areas for PT
- (Unjust) Areas of low income AND poor PT access

And not Rule (5) - a Mobility Index

Auckland





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Rule 1: the right to access transport

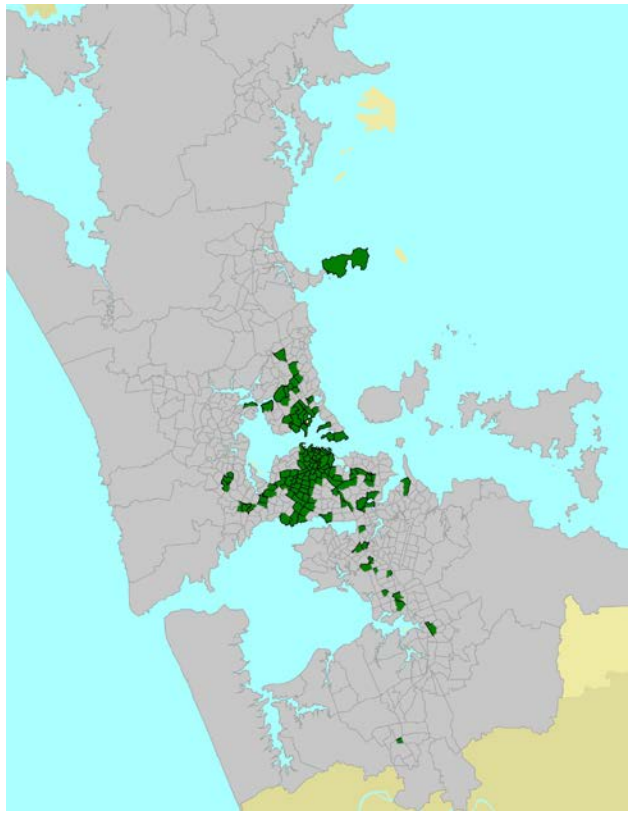
All zones <= 15 minutes walk time to rapid/frequent PT services (or 1km), morning peak

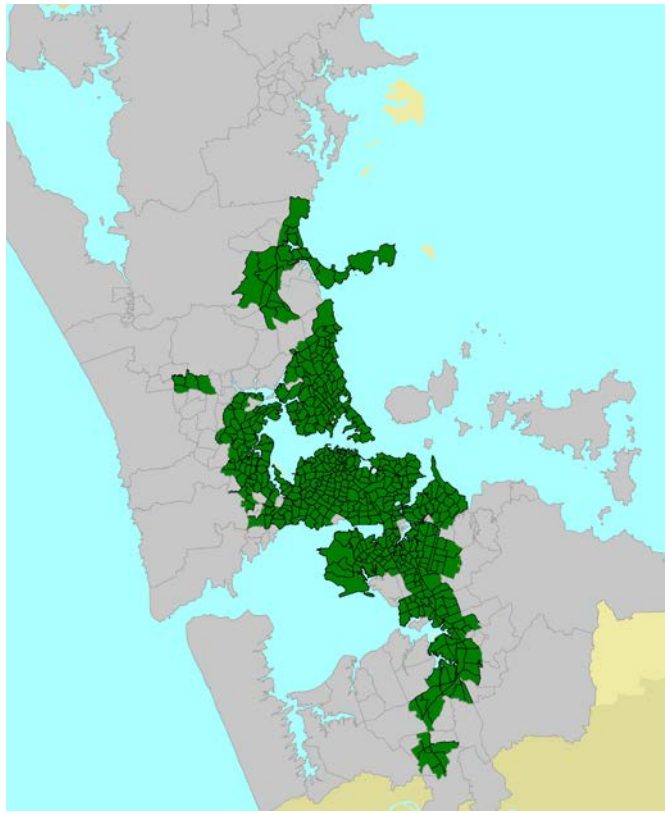
Access from zone centroid to ANY rapid/frequent service

2016: 24% of population
→ 2048: 78%

(better equity)

Measure: Distance from zone centroid to nearest rapid/frequent PT services
* walk speed at 4kph





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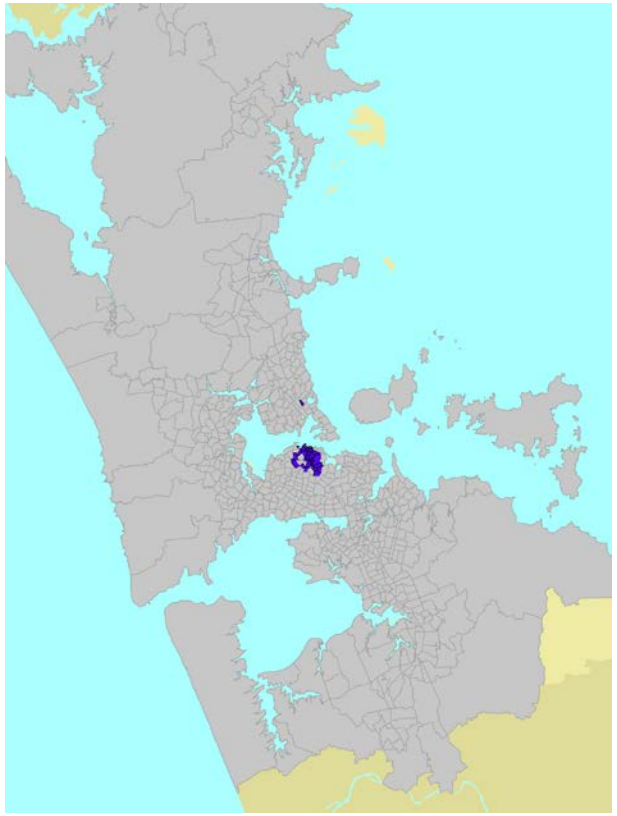
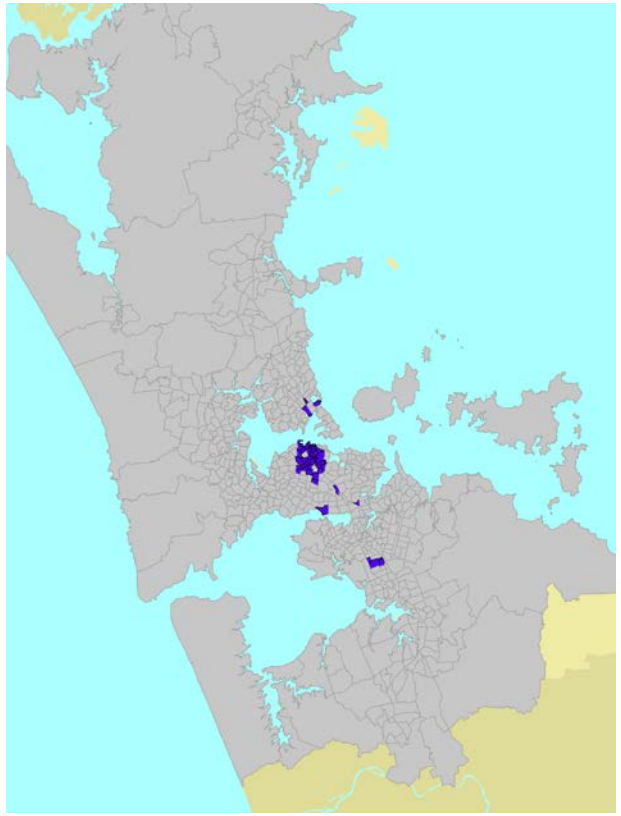
Rule 2: minimum transit / PT accessibility

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

4.2% of population
→ 8.2%
(better equity)





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Rule 3: better access for low income

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

Note: Aver zonal HH income held constant 2013 to 2048

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

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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:

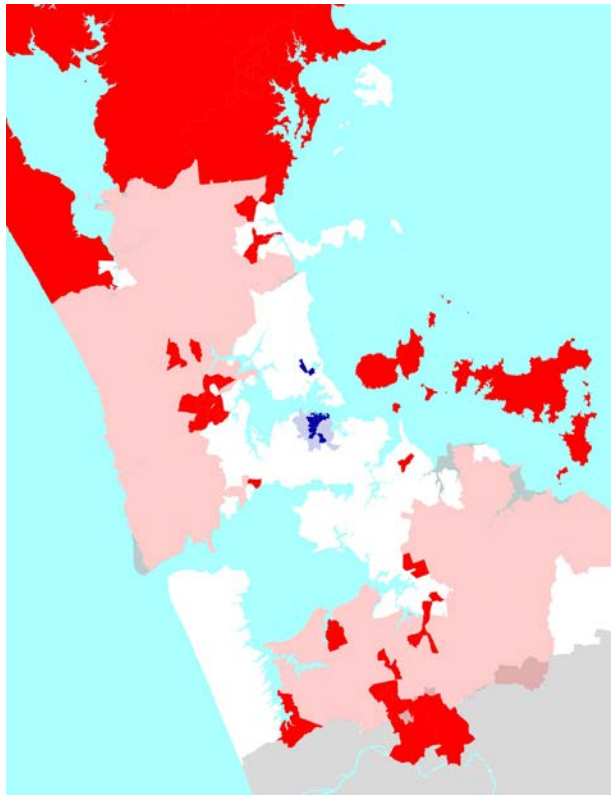
(Reduce) Low Income AND Low Accessibility

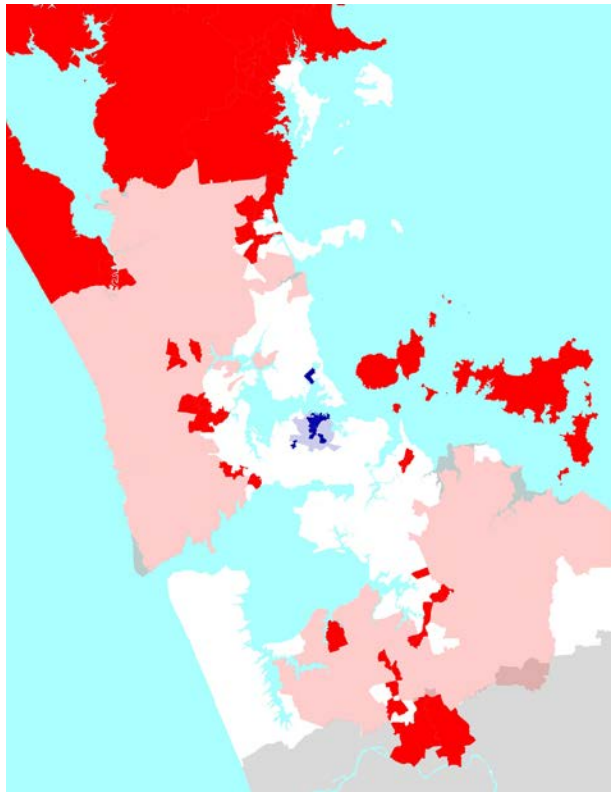
7.8% → 10.6% (worse)

(Increase) Low Income AND High Accessibility

3.0% → 3.9% (better)

Note: Aver zonal HH income held constant 2013 to 2048





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Mobility index

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

Mode	2016 Mobility	2016 Mob Index	2048 Mobility	2048 Mob Index	
Car 30 min	232,675	0.34	299,749	0.30	Worse
PT 45 min	66,299	0.10	171,658	0.17	Better
Combined	149,487	0.22	235,704	0.24	Better
Employment	*689,795*		*986,185*		

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Thank you

Questions?

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

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