

Health and Equity

GGR424 - Transportation Geography & Planning

March 7, 2022

Announcements

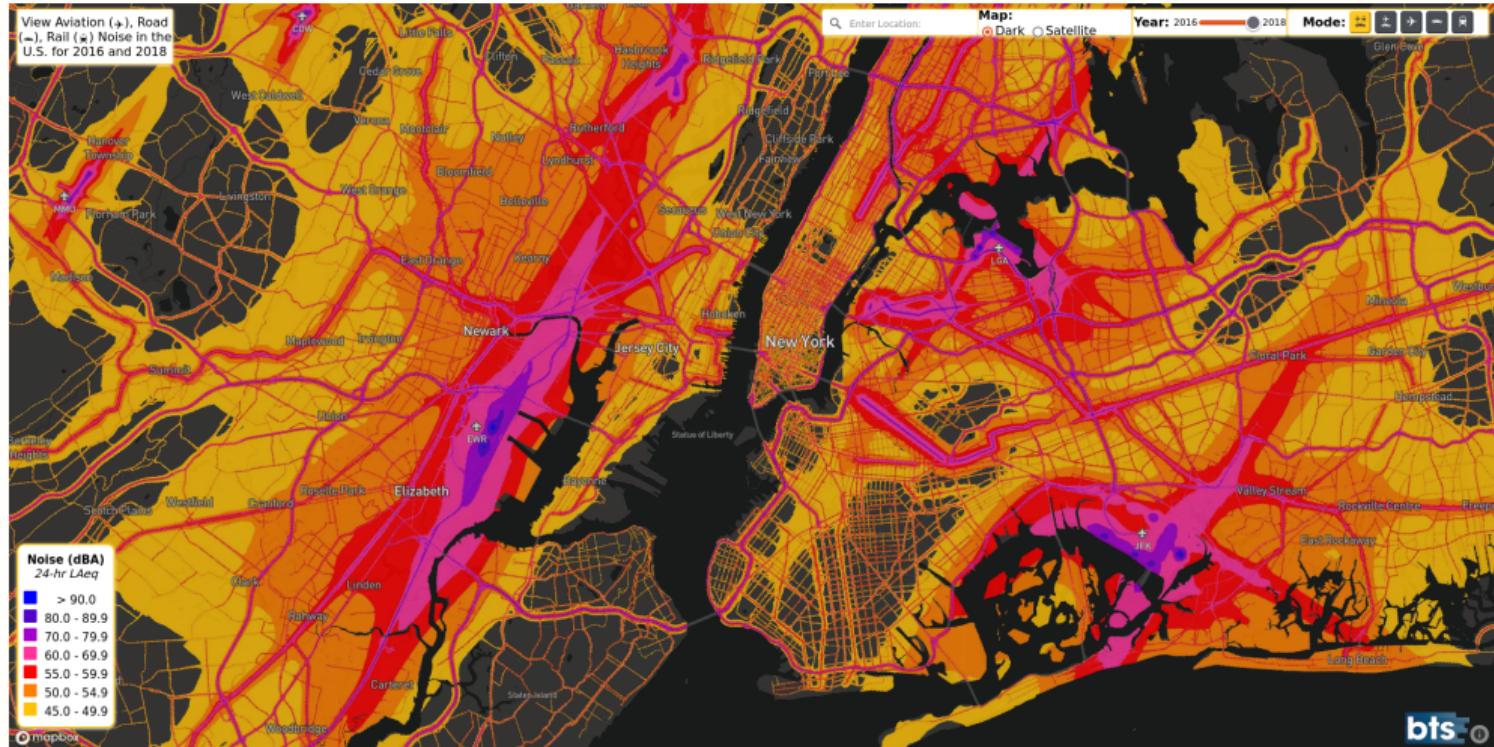
- ▶ Project Proposal due March 10

Today

- ▶ Health impacts of transportation (e.g. pollution, noise, physical activity)
- ▶ How the costs and benefits of transportation are (in)equitably distributed

How can urban transportation affect health and well-being?

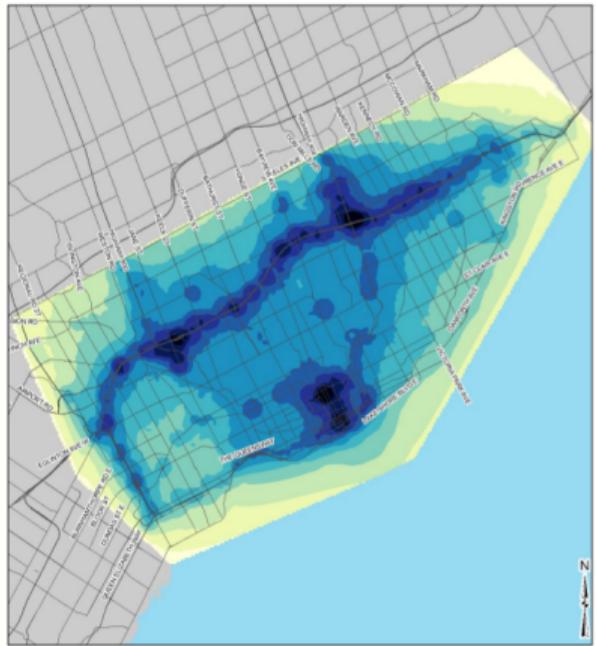
Noise



Source: <https://maps.dot.gov/BTS/NationalTransportationNoiseMap/>

City report on health impacts of noise <https://www.toronto.ca/wp-content/uploads/2017/11/8f98-tph-How-Loud-is-Too-Loud-Health-Impacts-Environmental-Noise.pdf>

Air Pollution



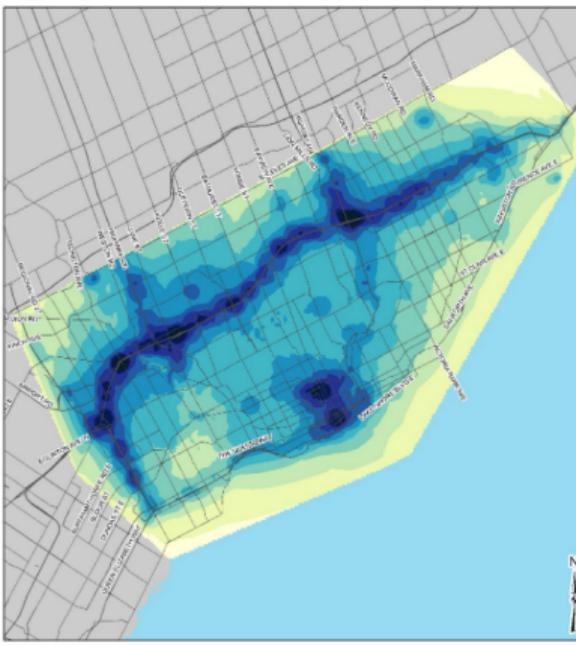
LEGEND

benzene-a	Annual AAQC ($\mu\text{g}/\text{m}^3$) = 0.45	0.9163 - 1.0042
	0.5641 - 0.6522	1.0043 - 1.0923
	0.6523 - 0.7402	1.0924 - 1.1803
	0.7403 - 0.8282	1.1804 - 1.2683
	0.8283 - 0.9162	1.2684 - 1.3563
REFERENCE		1.3564 - 1.4443

10.00 1 2
SOURCES

ANALYSIS MAP -
ANNUAL AVERAGE CONCENTRATION
TITLE
BENZENE ANNUAL AVERAGE
CONCENTRATIONS FROM ALL EMISSION SOURCES

Environment & Energy Division FIGURE: C-03



LEGEND

pm10-a-a	Particulate Matter 10 - Annual AAQC ($\mu\text{g}/\text{m}^3$) = N/A	19.01 - 21.69
	11.26 - 13.36	21.7 - 23.77
	13.37 - 15.44	23.78 - 25.85
	15.45 - 17.52	25.86 - 27.93
	17.53 - 19.6	27.94 - 30.01
REFERENCE		30.02 - 32.09

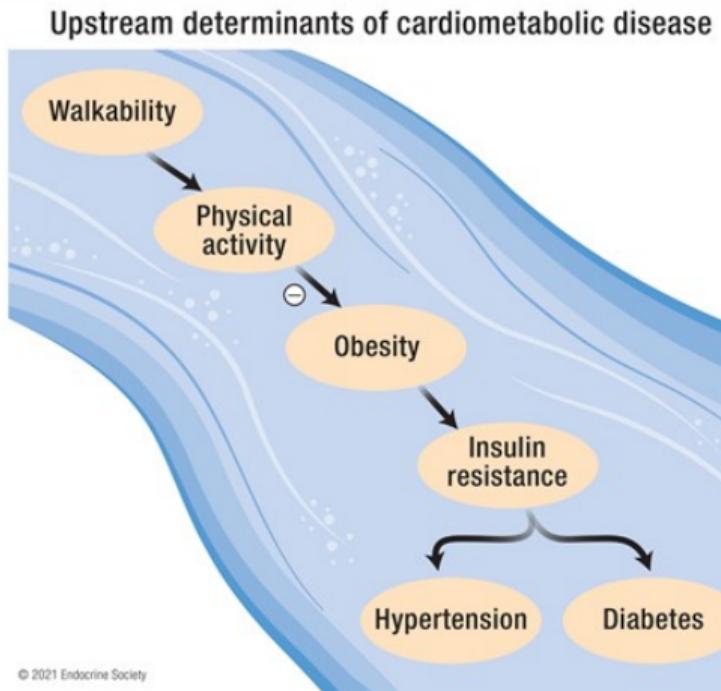
10.00 1 2
SOURCES

ANALYSIS MAP -
ANNUAL AVERAGE CONCENTRATION
TITLE
PARTICULATE MATTER $<10\mu\text{m}$ ANNUAL AVERAGE
CONCENTRATIONS FROM ALL EMISSION SOURCES

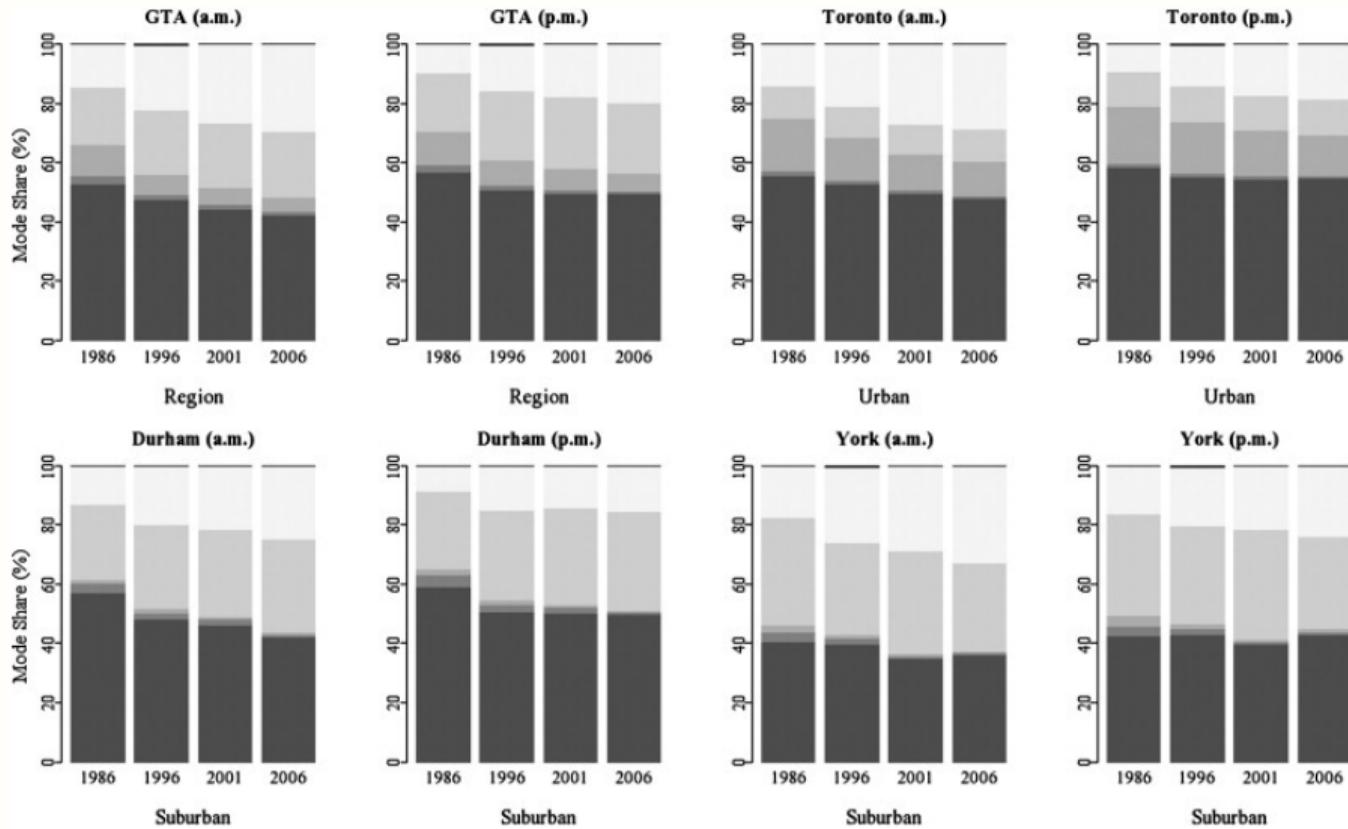
Environment & Energy Division FIGURE: C-22

City of Toronto. Avoiding the TRAP: Traffic-Related Air Pollution in Toronto and Options for Reducing Exposure. Technical Report.
October 2017.: <https://www.toronto.ca/legdocs/mmis/2017/h1/bgrd/backgroundfile-108070.pdf>

Active Travel and Physical Health



The weight of place: Built environment correlates of obesity and diabetes <https://doi.org/10.1210/endrev/bnac005>



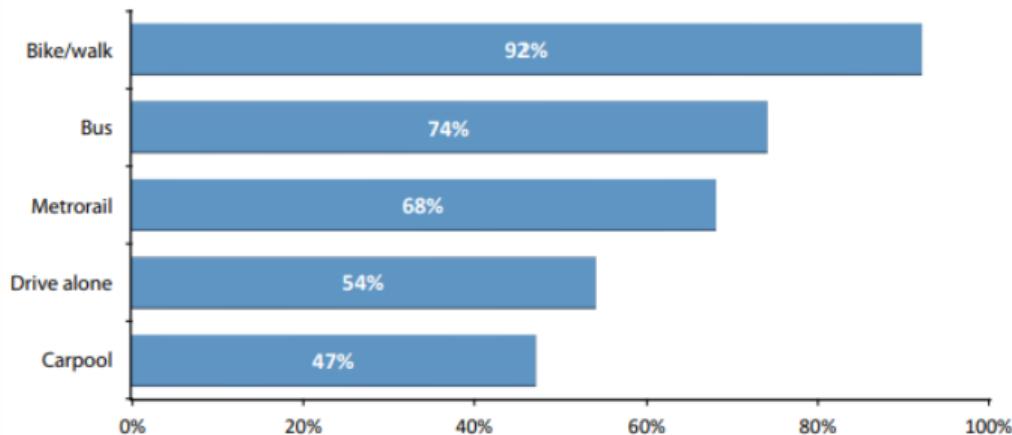
School travel mode share (% of trips) by jurisdiction and year (children and youth, 11–13 years of age) in the Greater Toronto Area, Canada (1986–2006).

<https://doi.org/10.1016/j.ypmed.2009.03.001>

Satisfaction of travel

Satisfaction with Commute by Primary Commute Mode – Lived in Arlington
Percent Rating Commute a 4 or 5

(Bike/walk n = 73, Bus n = 63, Metrorail n = 253 Drive alone n = 331, Carpool n = 21)



<https://mobilitylab.org/2020/09/29/the-pursuit-of-happiness-how-commute-mode-affects-commute-mood/>

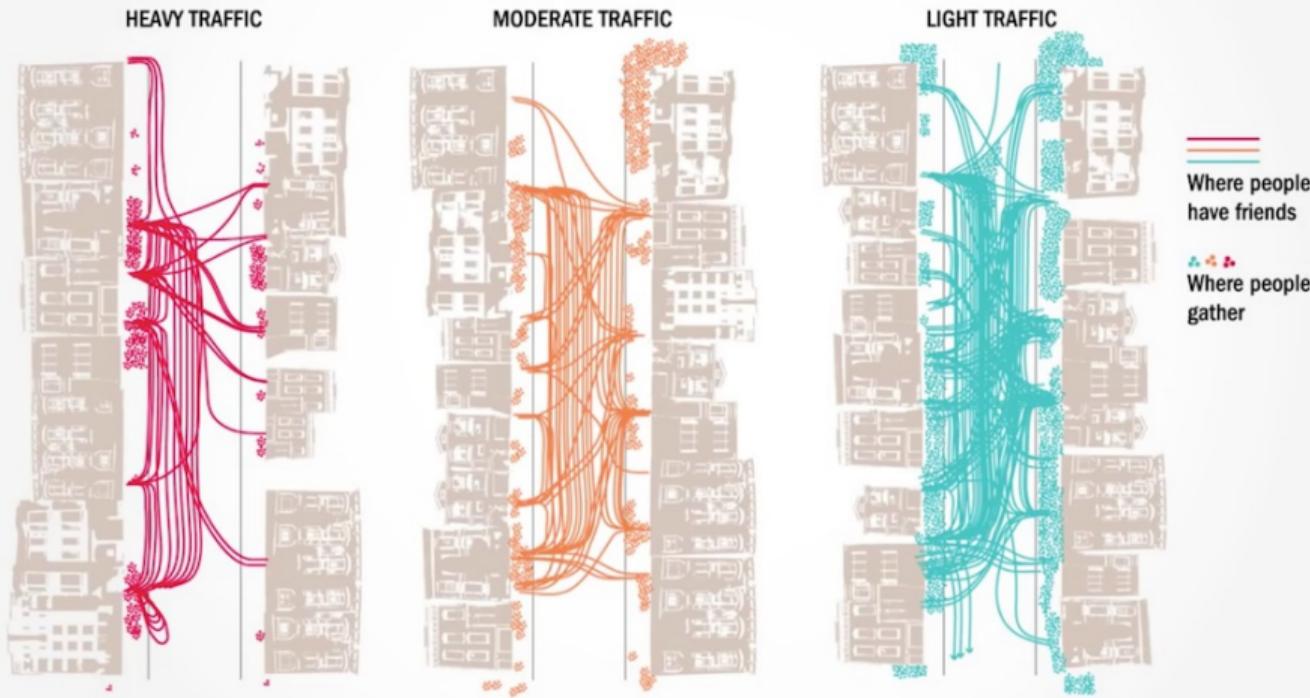
Long commutes

From the 2016 Canadian census:

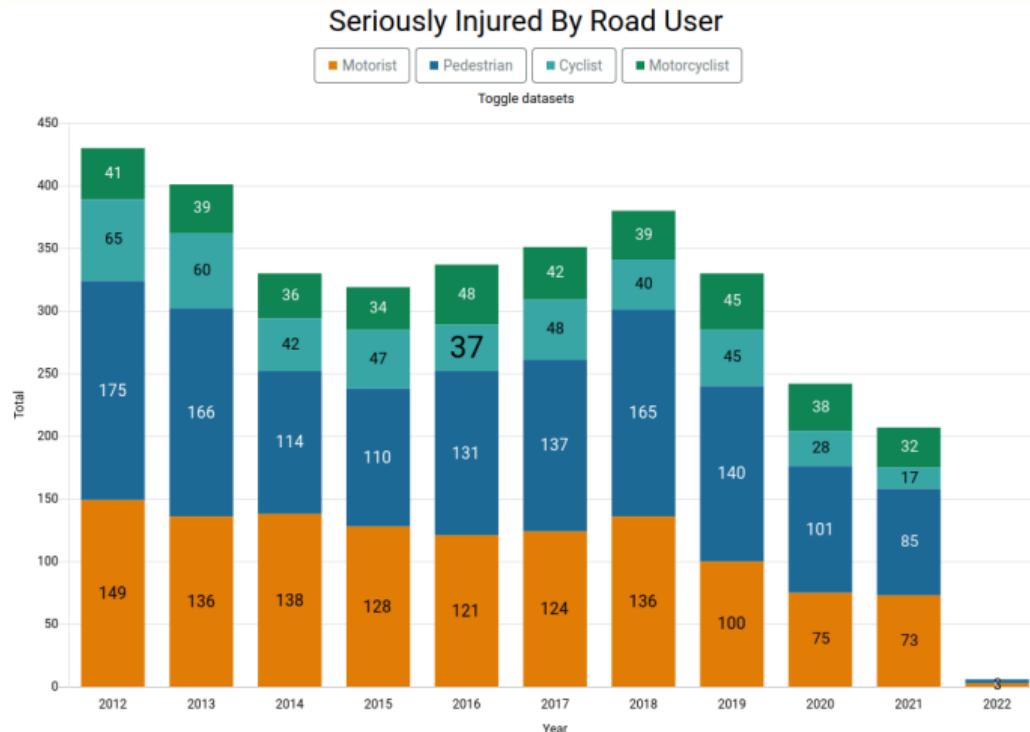
- ▶ 9.7% have a commute greater than 60 minutes
- ▶ 3.5% have a commute greater than 75 minutes
- ▶ 2.5% have a commute greater than 90 minutes

Donald Appleyard's "Livable Streets" was one of the first studies to look at the impact of traffic on social characteristics of streets

Social Interactions on Three Streets - Neighboring and Visiting



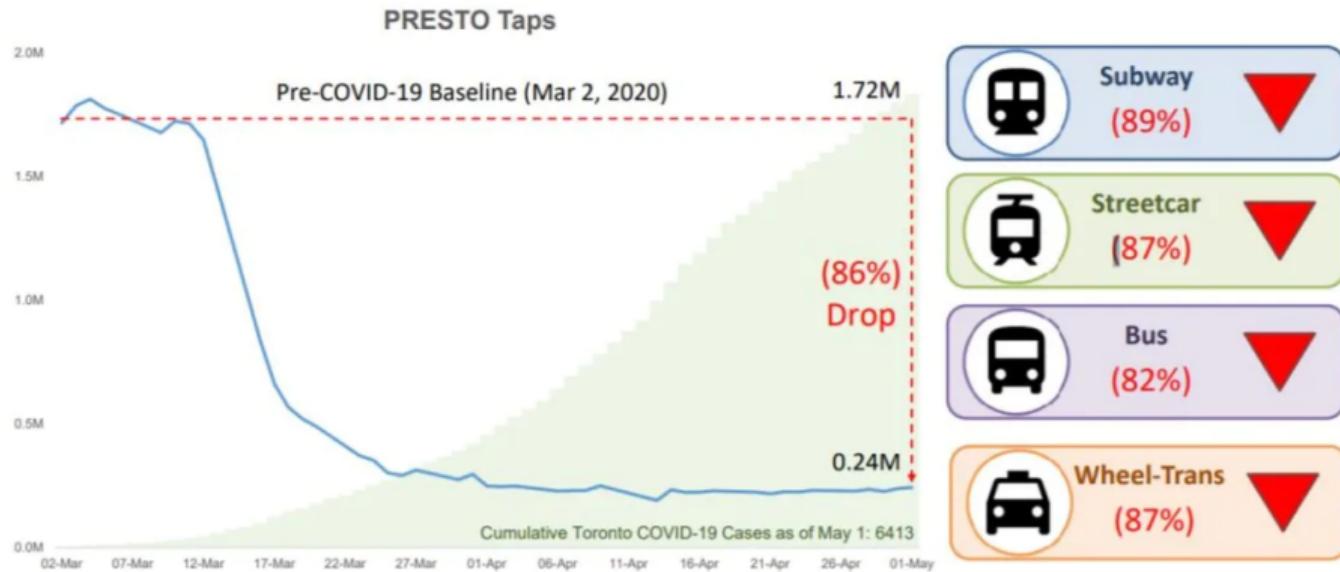
Safety, e.g. Collisions



<https://www.toronto.ca/services-payments/streets-parking-transportation/road-safety/vision-zero/vision-zero-dashboard/seriously-injured-vision-zero/>

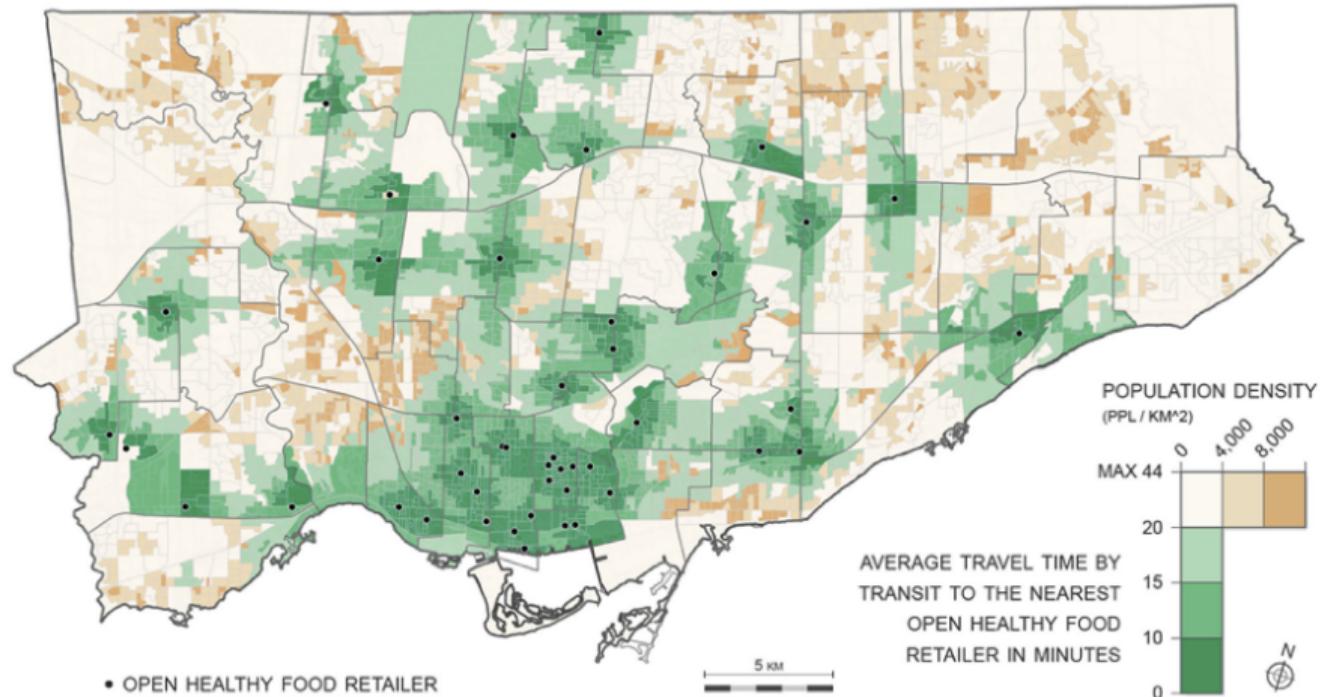
Safety, e.g. COVID-19

PRESTO Taps Impact: 86% drop from Pre-Covid-19



Accessibility, e.g. to healthy food

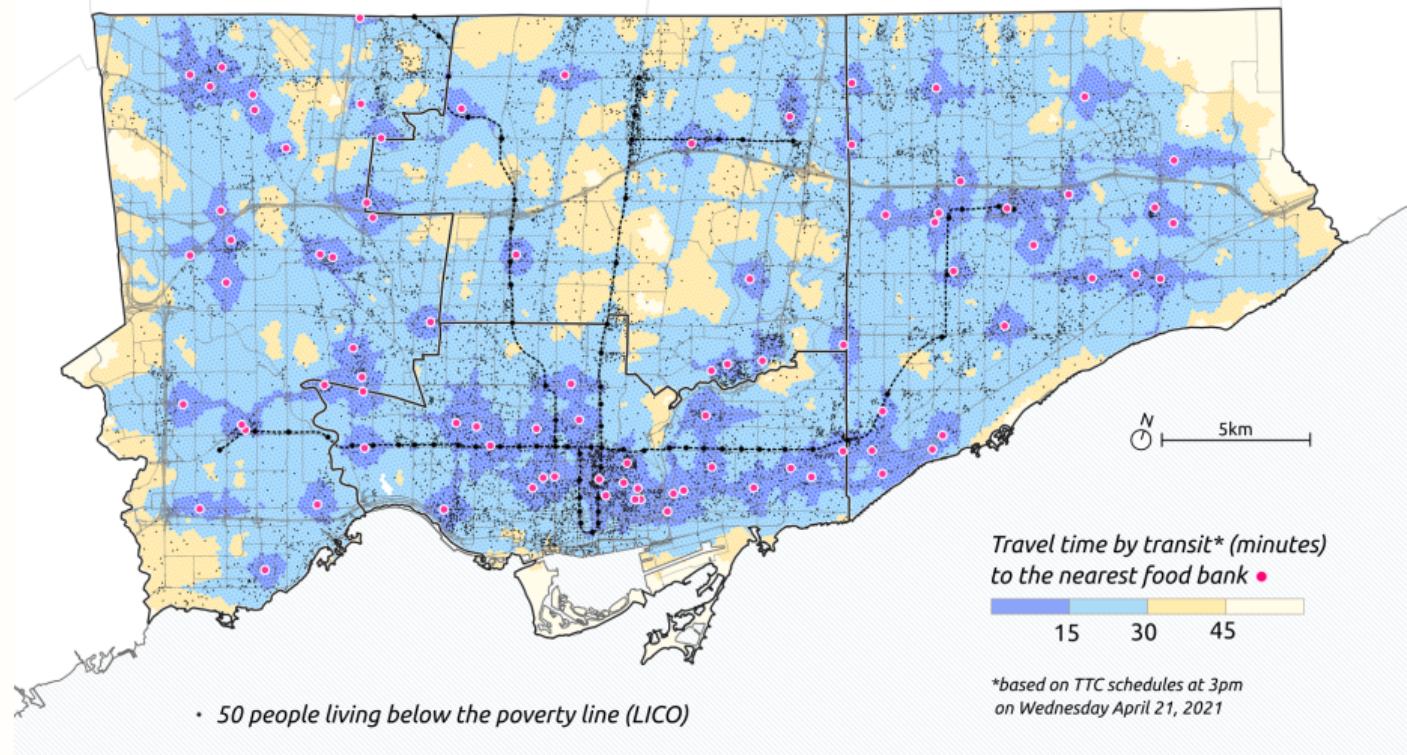
TRANSIT ACCESS TO HEALTHY FOOD / MONDAY / 12:00AM TO 1:00AM



Source: Widener et al (2017) How do changes in the daily food and transportation environments affect grocery store accessibility?
<https://doi.org/10.1016/j.apgeog.2017.03.018>

Accessibility, e.g. to food banks

Transit Accessibility to Food Banks in May, 2021



Transport Equity

Equity generally refers to the fairness with which impacts (i.e. benefits and costs) are distributed

Transportation planning decisions can have large and diverse equity impacts.

- ▶ **Horizontal Equity** - about the distribution of a resource (e.g. public transit) equally among the overall population
- ▶ **Vertical Equity** - about the distribution of a resource with focus towards specific groups, often those who are more vulnerable to social or economic exclusion

Transport Equity

Dimensions of measuring transport equity

- ▶ **Exposure** - about inequalities in exposure to pollutants, unsafe travel, etc.
- ▶ **Opportunities** - about how transportation infrastructure and accessibility are (in)equitably distributed
- ▶ **Outcomes** - about whether there are inequalities in travel behaviour outcomes, e.g. activity participation, commute times, etc.

People of Color Breathe More Hazardous Air. The Sources Are Everywhere.

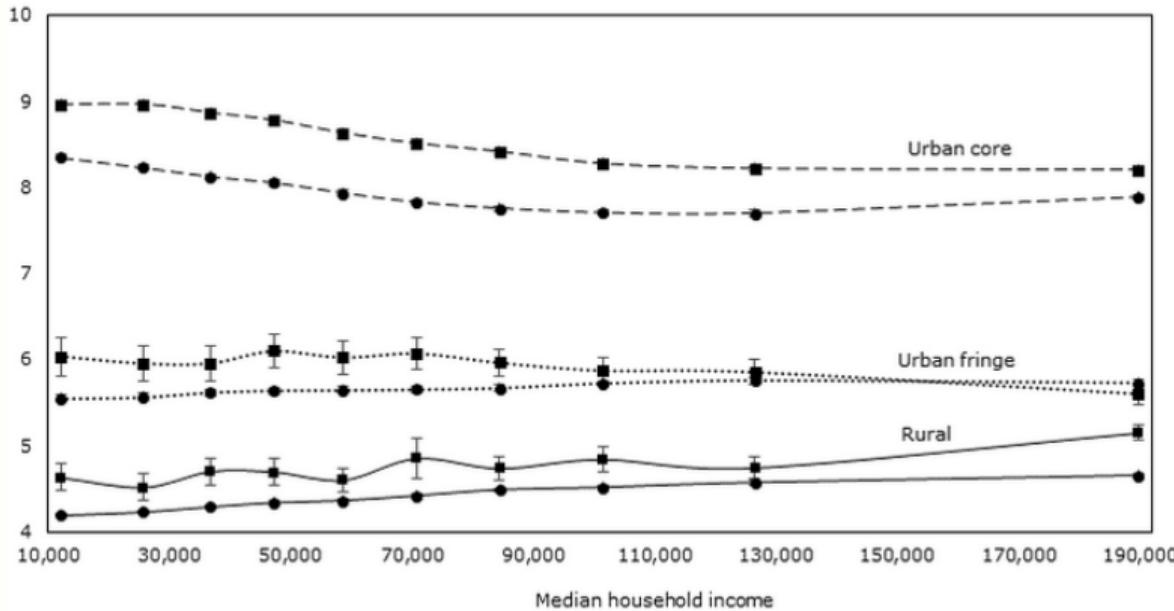
Researchers uncovered stark disparities between white people and minorities across thousands of categories of pollution, including trucks, industry, agriculture and even restaurants.



<https://www.nytimes.com/2021/04/28/climate/air-pollution-minorities.html>

Mean residential fine particulate matter (PM_{2.5}) exposure, by visible minority status, urban/rural residence and household income, household population, Canada, 2006

PM_{2.5} exposure ($\mu\text{g}/\text{m}^3$)



I = 95% confidence interval

■ = visible minority

● = white

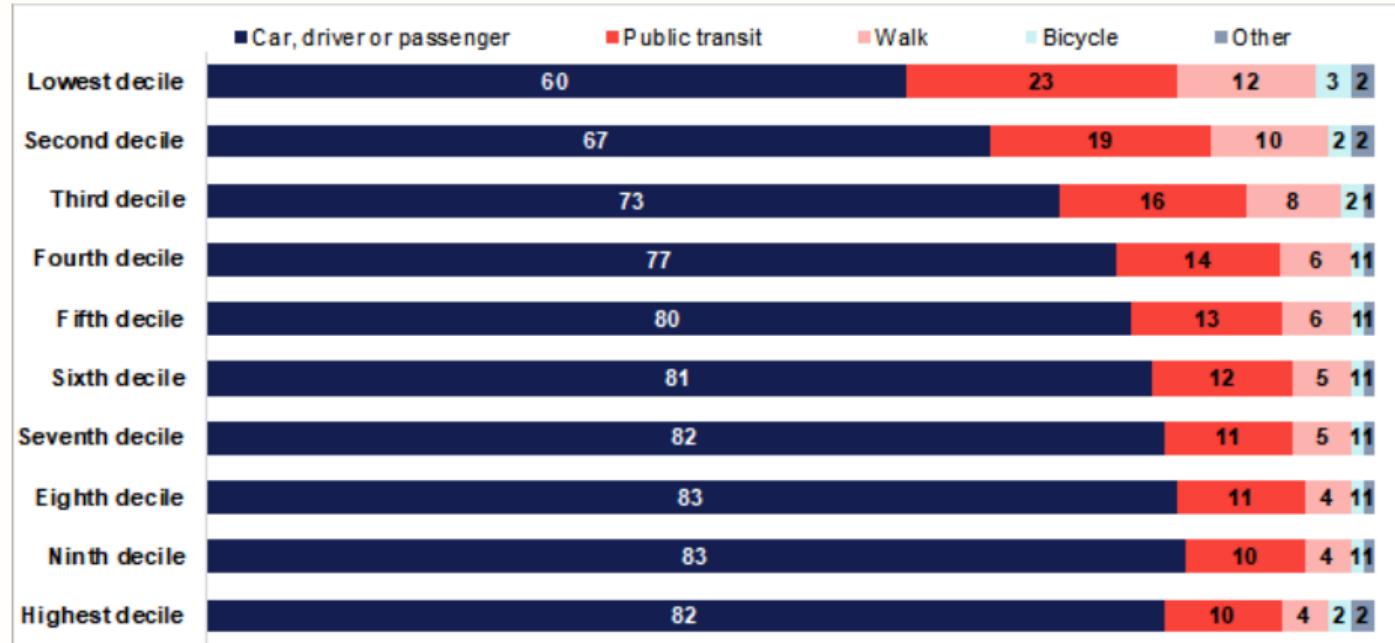
Note: Dashed line is mean residential exposure among non-immigrants in urban cores.

Sources: 2006 Census of Canada; van Donkelaar A, Martin RV, Spurr RJD, et al. High-resolution satellite-derived PM_{2.5} from optical estimation and geographically weighted regression over North America. Environmental Science and Technology 2015; 49(17): 10482-91.

Transit in Toronto: Let's explore the connections between socioeconomic status and transit availability within the City of Toronto

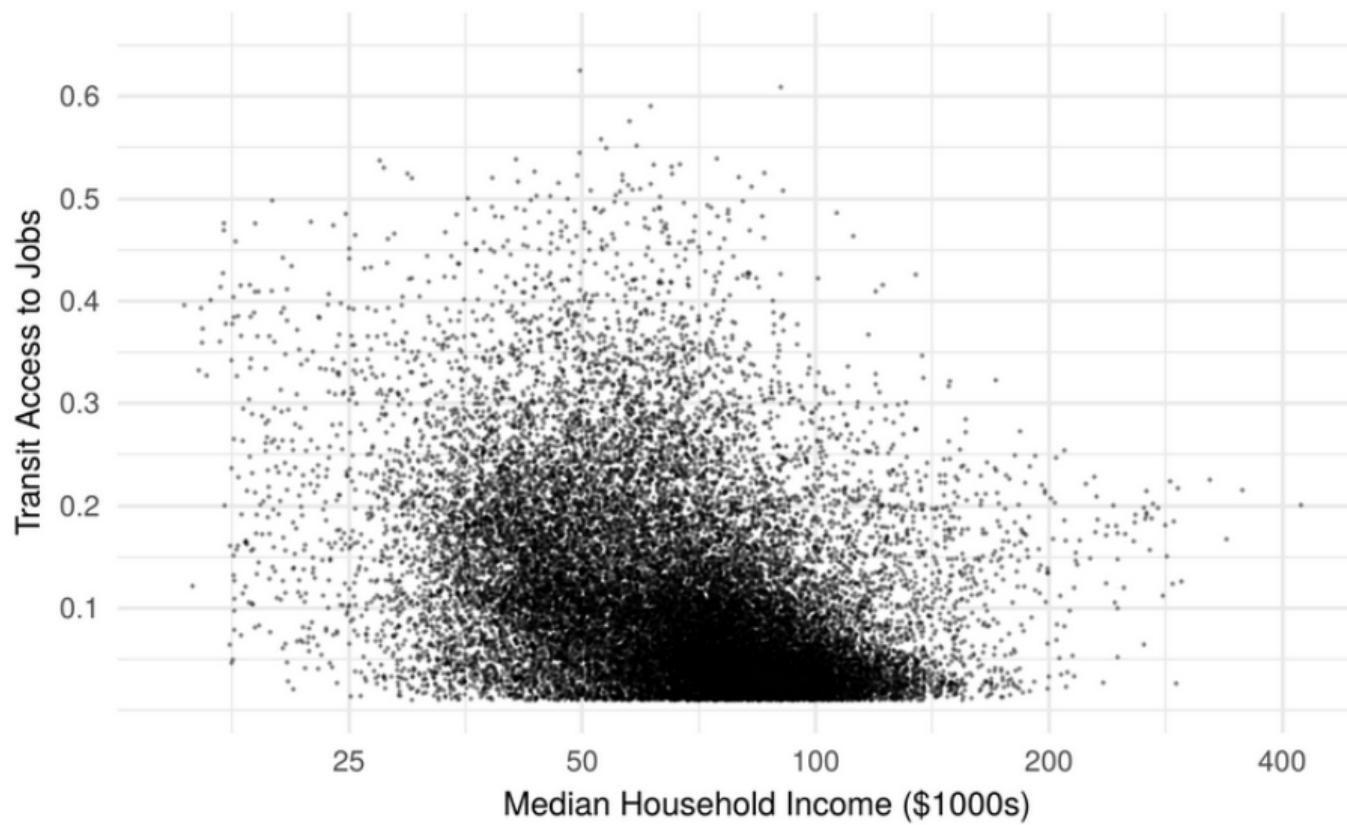
<https://edu.maps.arcgis.com/apps/Cascade/index.html?appid=58618c037f344aaaada20b0c894e011c>

Income and mode share - for commuters across Canada

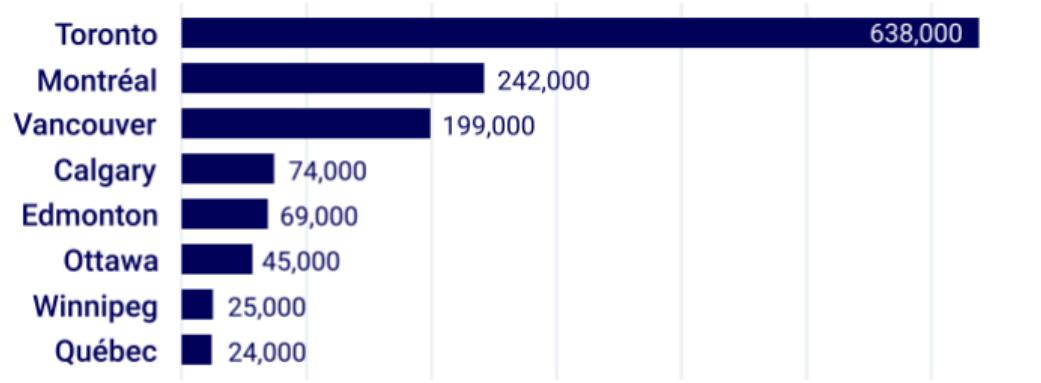


<https://mobilizingjustice.ca/how-the-canadian-population-gets-to-work/>

Accessibility and income - for neighbourhoods across Canada

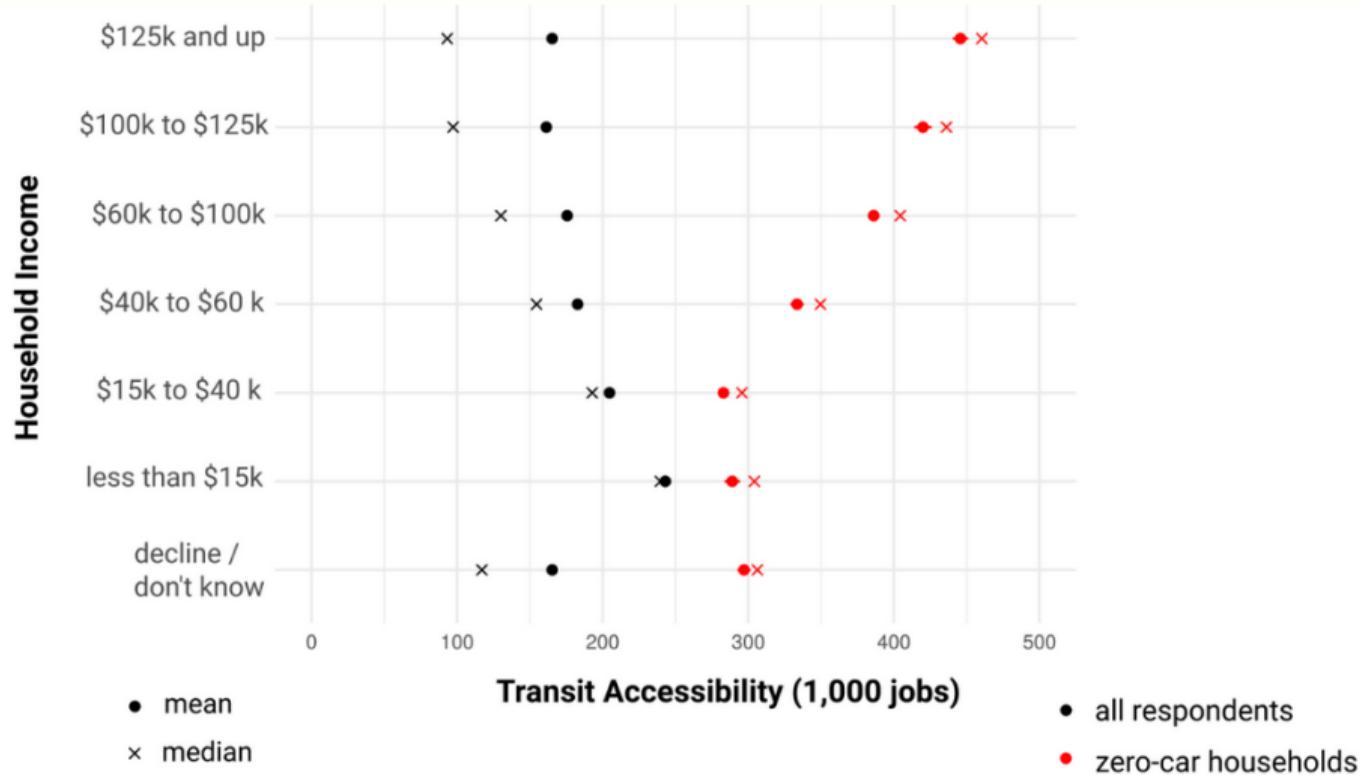


Accessibility and income - counting by city



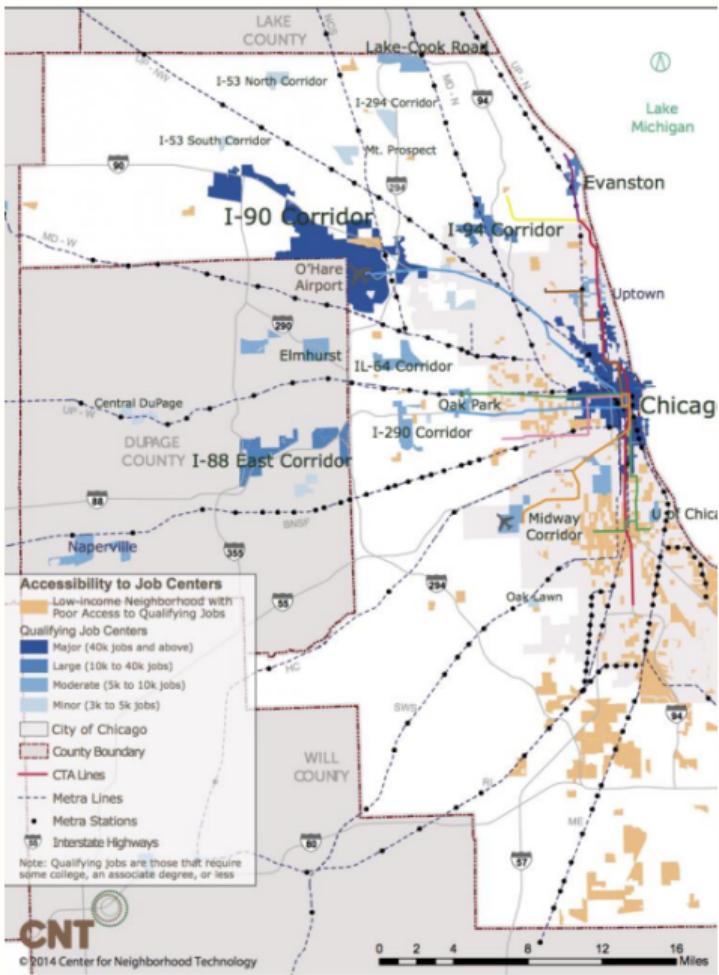
Estimated number of low-income residents living in neighbourhoods
with low transit accessibility in 2016

Accessibility and income - for individuals in the GTHA

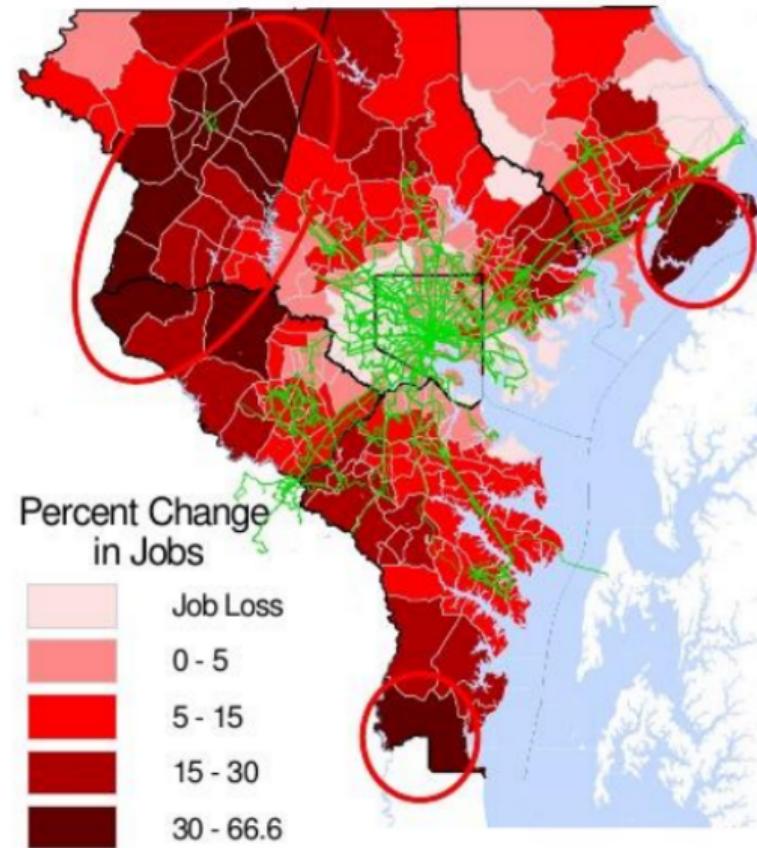


Spatial Mismatch

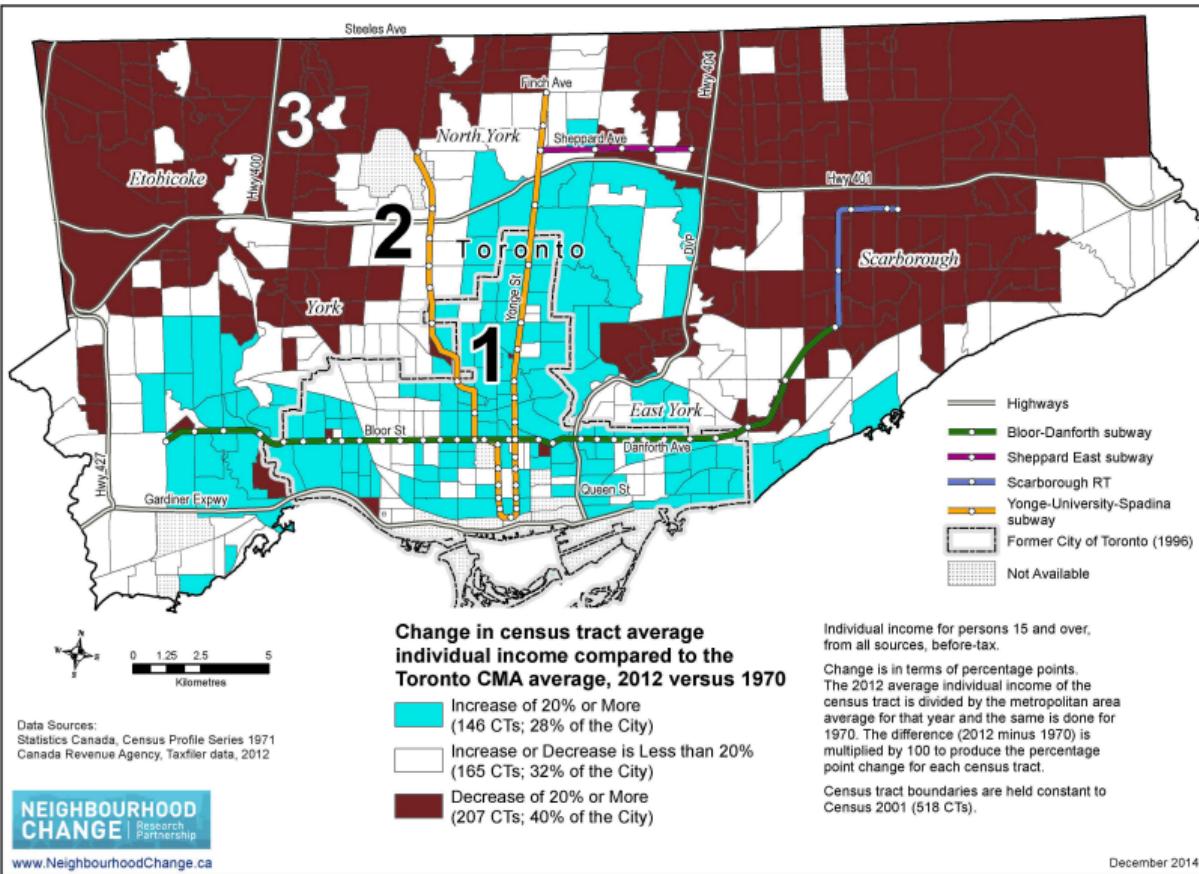
- ▶ The mismatch between where low income households live and where suitable job opportunities are available
- ▶ Originally pertained to low-income inner-city Americans were socioeconomically excluded from living in suburbs, coupled with the movement of both manufacturing and retail sectors to the suburbs
 - ▶ suburban employment is far away
 - ▶ lack of car + poor transit to the suburban employment



Recent Job Growth 98-02 and Public Transit in the Baltimore Region

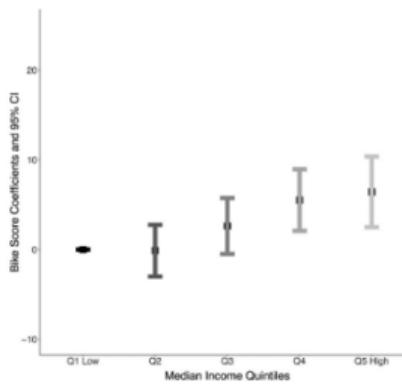


Neighbourhood Income Change: City of Toronto, 2012 vs. 1970

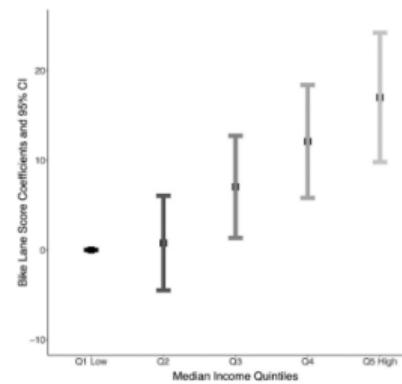


Cycling infrastructure and neighbourhood-level income in Canada

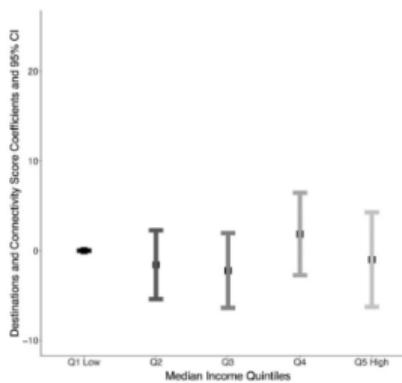
A. Bike Score



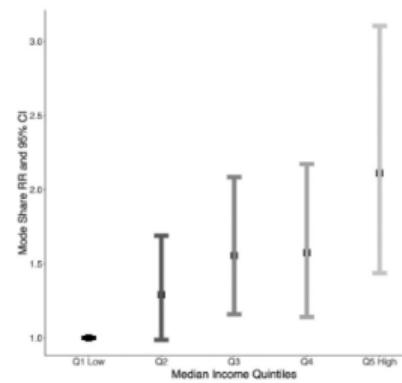
B. Bike Lane Score



C. Destinations and Connectivity Score



D. Cycle to Work Mode Share



What are the impacts of a new transit line on social equity?



Transport and Social Exclusion

“the process by which people are prevented from participating in the economic, political, and social life of the community because of reduced accessibility to opportunities, services and social networks, due in whole or in part to insufficient mobility in a society and environment built around the assumption of high mobility” Kenyon et al. (2003:210)

Transport Poverty & Social Exclusion

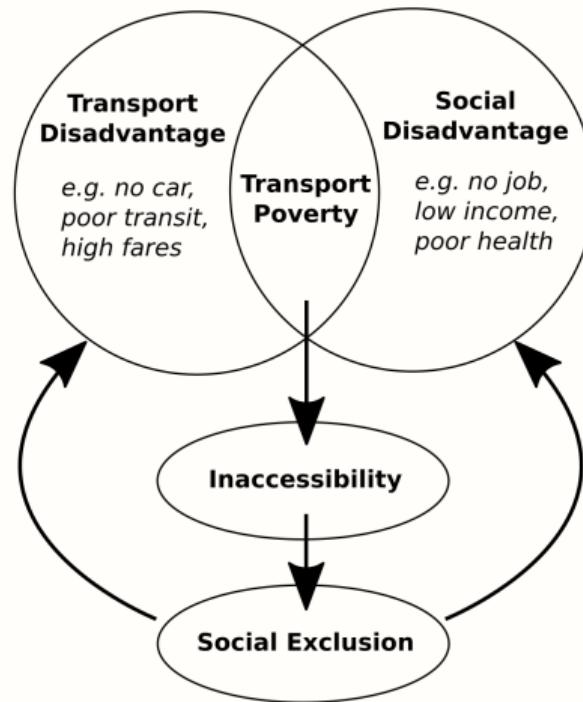
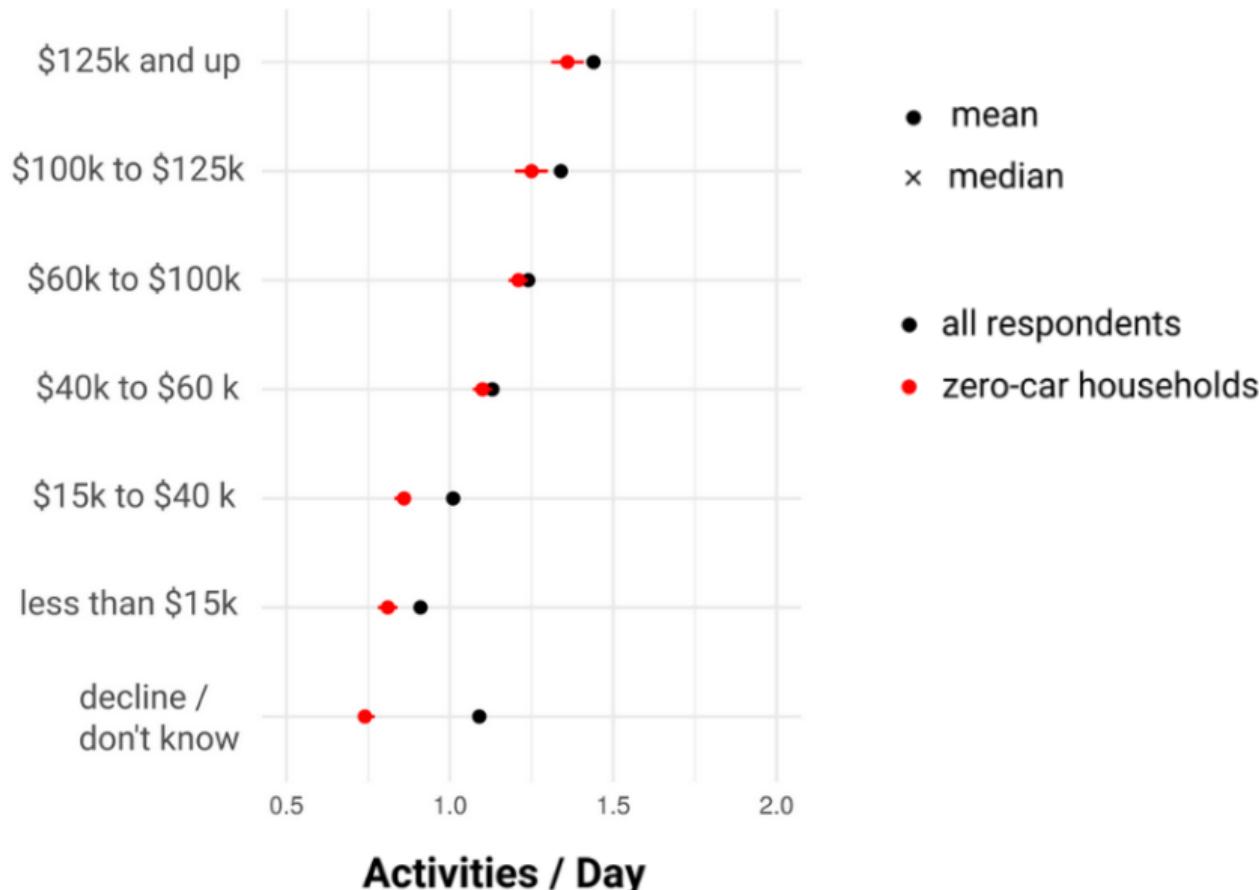
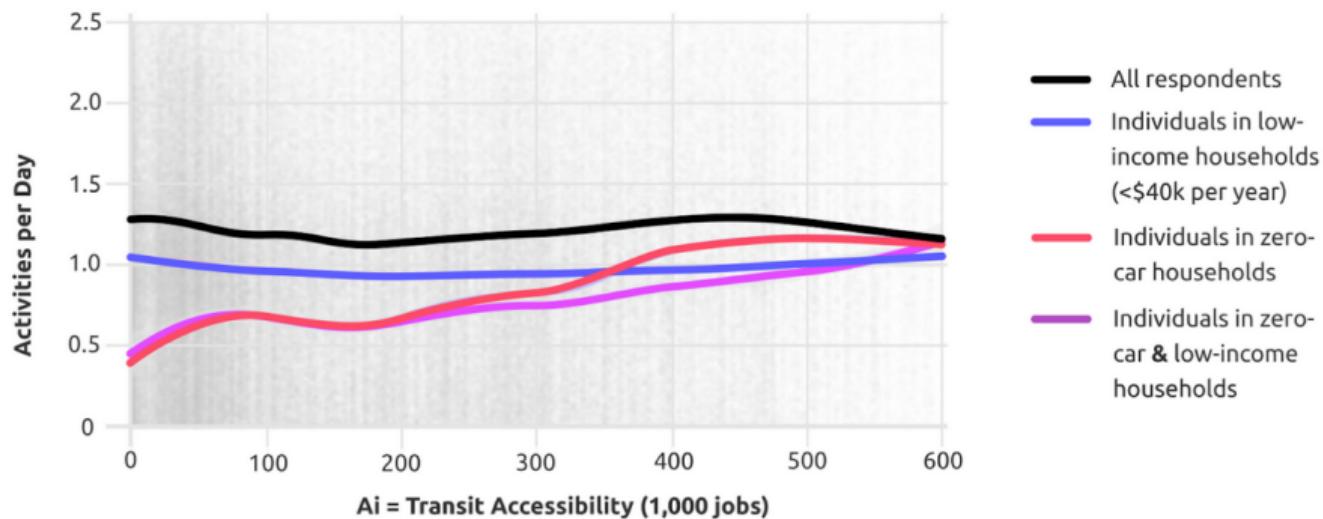


Figure adapted from Lucas (2012) Transport & Social Exclusion: Where are we now

Income and activity participation - for individuals in the GTHA



Accessibility and activity participation - for individuals in the GTHA



Benefits of cars for alleviating (transport) poverty

Transportation
<https://doi.org/10.1007/s11116-018-9959-3>



Disentangling the role of cars and transit in employment and labor earnings

Michael J. Smart¹ · Nicholas J. Klein²

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Abstract

We examine the relationship between transportation access on the one hand and individuals' employment and labor earnings on the other. We improve on existing studies by bringing a large national panel data set to bear on this question, attempting to disentangle the mechanisms by which individuals improve their economic standing and, finally, comparing the economic benefits to the direct costs of car ownership. To do this, we use nine waves from the Panel Study of Income Dynamics from 1999 to 2015. We find that access to a car is a strong predictor of future economic benefit for individuals, and that at very high levels of transit access, carless individuals can also fare equally well. Access to an automobile is strongly associated with employment, job retention, and earning more money over time. Though having a car is associated with economic benefits, owning and operating a car is expensive; yet, our findings suggest that the benefits may outweigh the costs for most people living outside neighborhoods with truly excellent transit service.

Keywords Economic mobility · Transit · Cars · PSID

<https://link.springer.com/article/10.1007/s11116-018-9959-3>

Discussion Question:

Should the government provide subsidies for low-income households to purchase/lease cars in the suburbs of the GTHA?