Housing plus transportation affordability indices: uses, opportunities, and challenges

OECD round-table on income inequality, social inclusion, and mobility (Paris, 2016 April)

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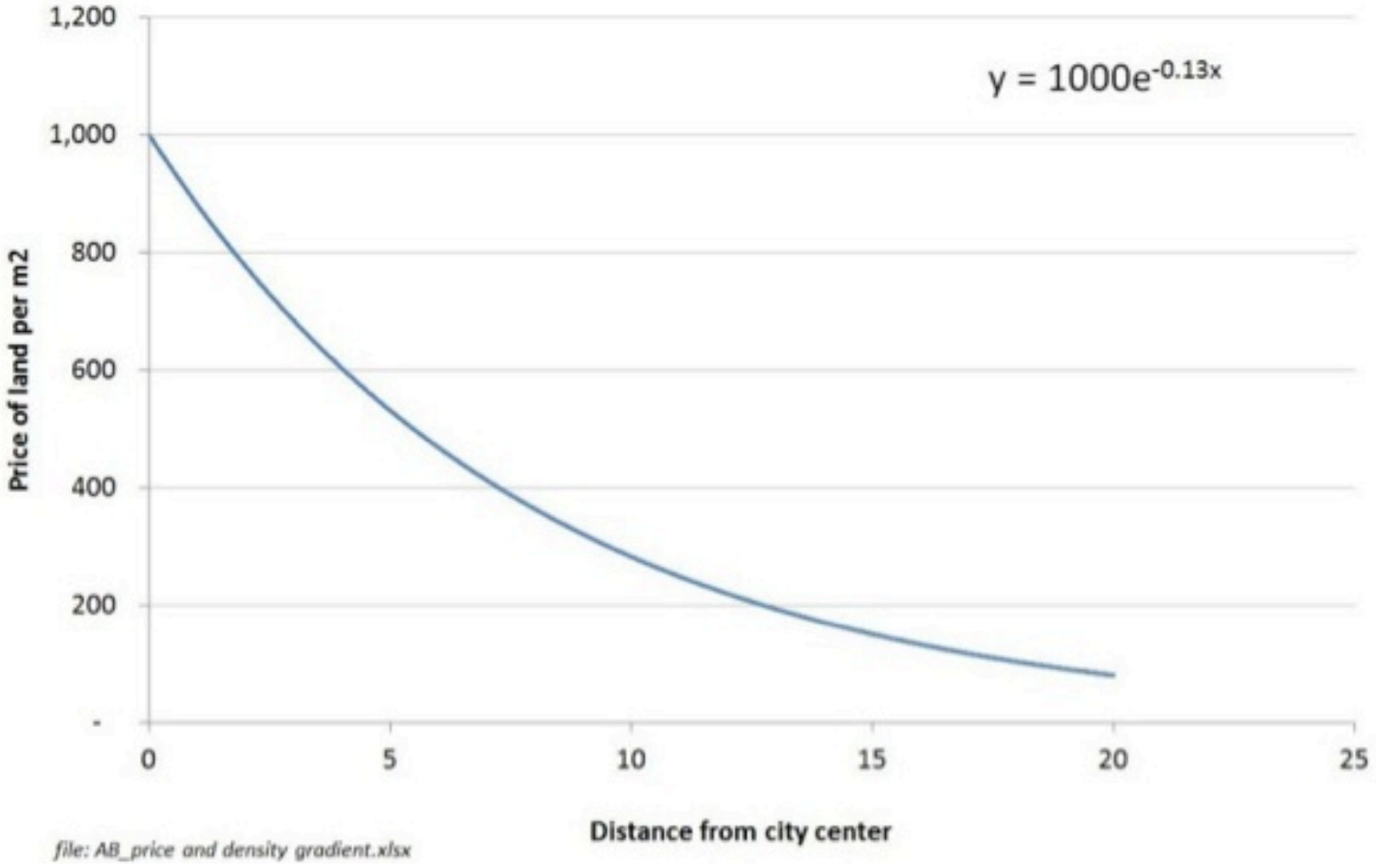
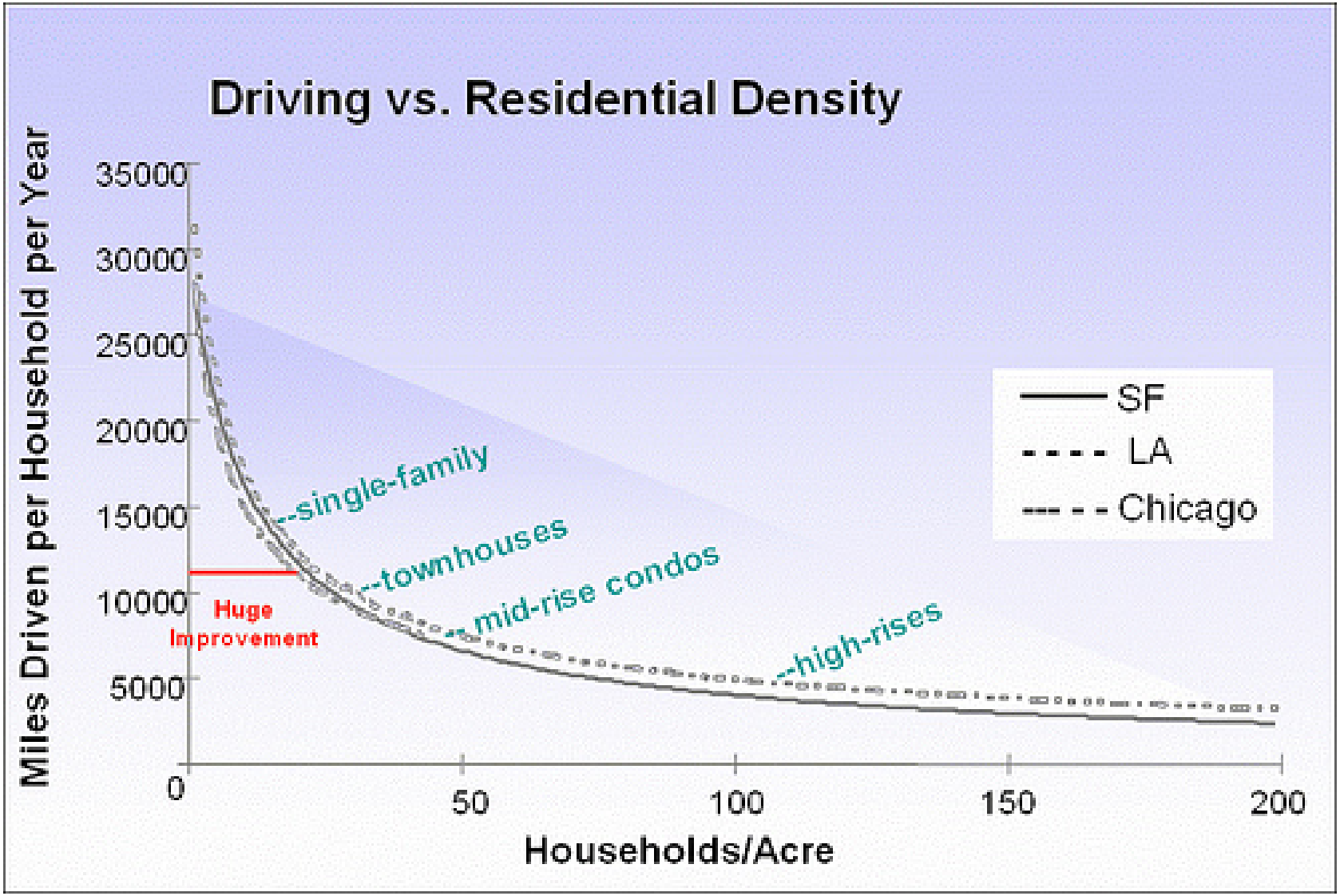
Presentation Outline

1. The relationship between transportation and housing costs
2. The H+T Adorability Index: estimation and policy uses
3. H+T challenges and critiques
4. Application to Mexico City
5. Transferability to other OECD countries

Housing values and distance to CBD



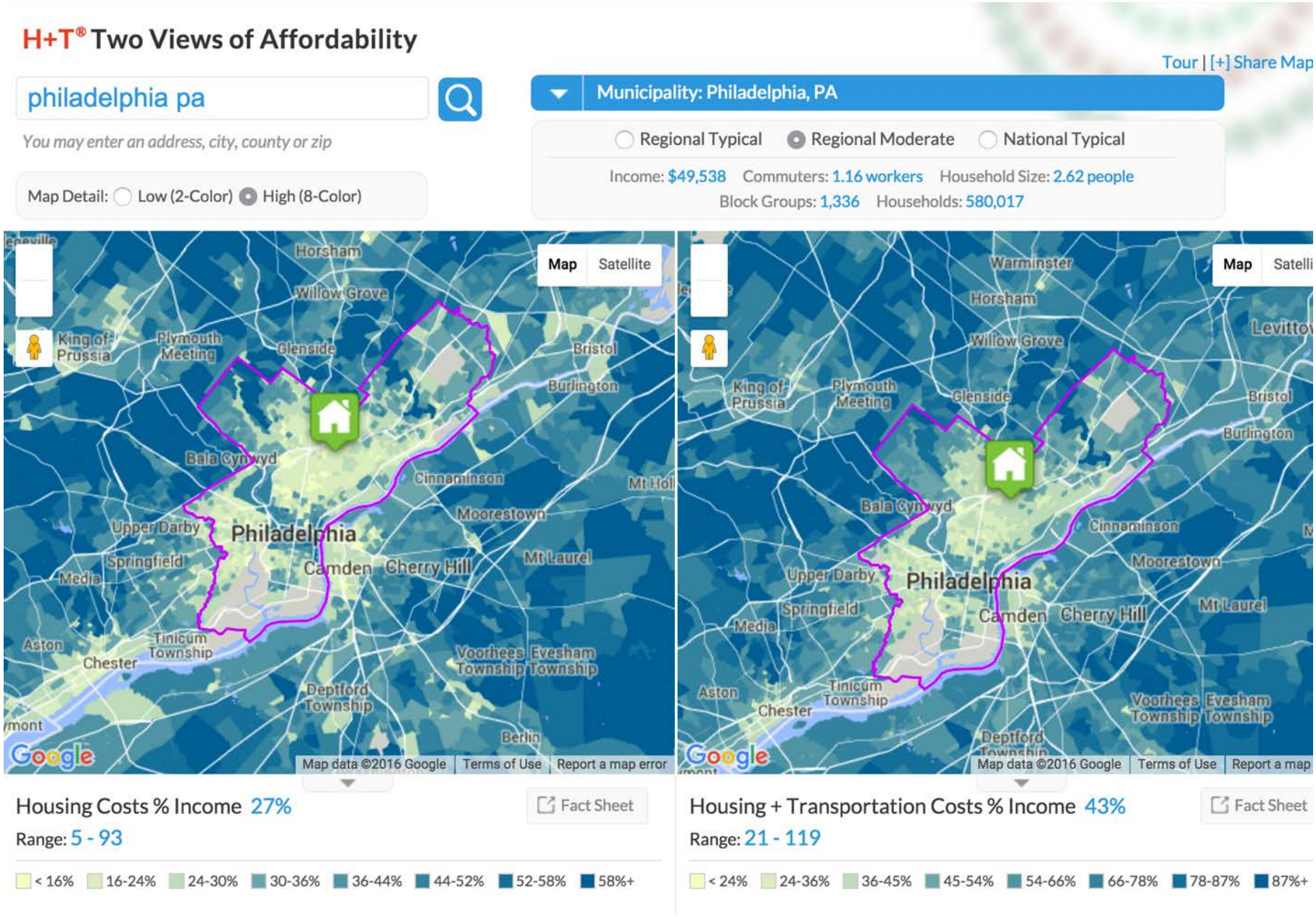
VMT and distance to CBD



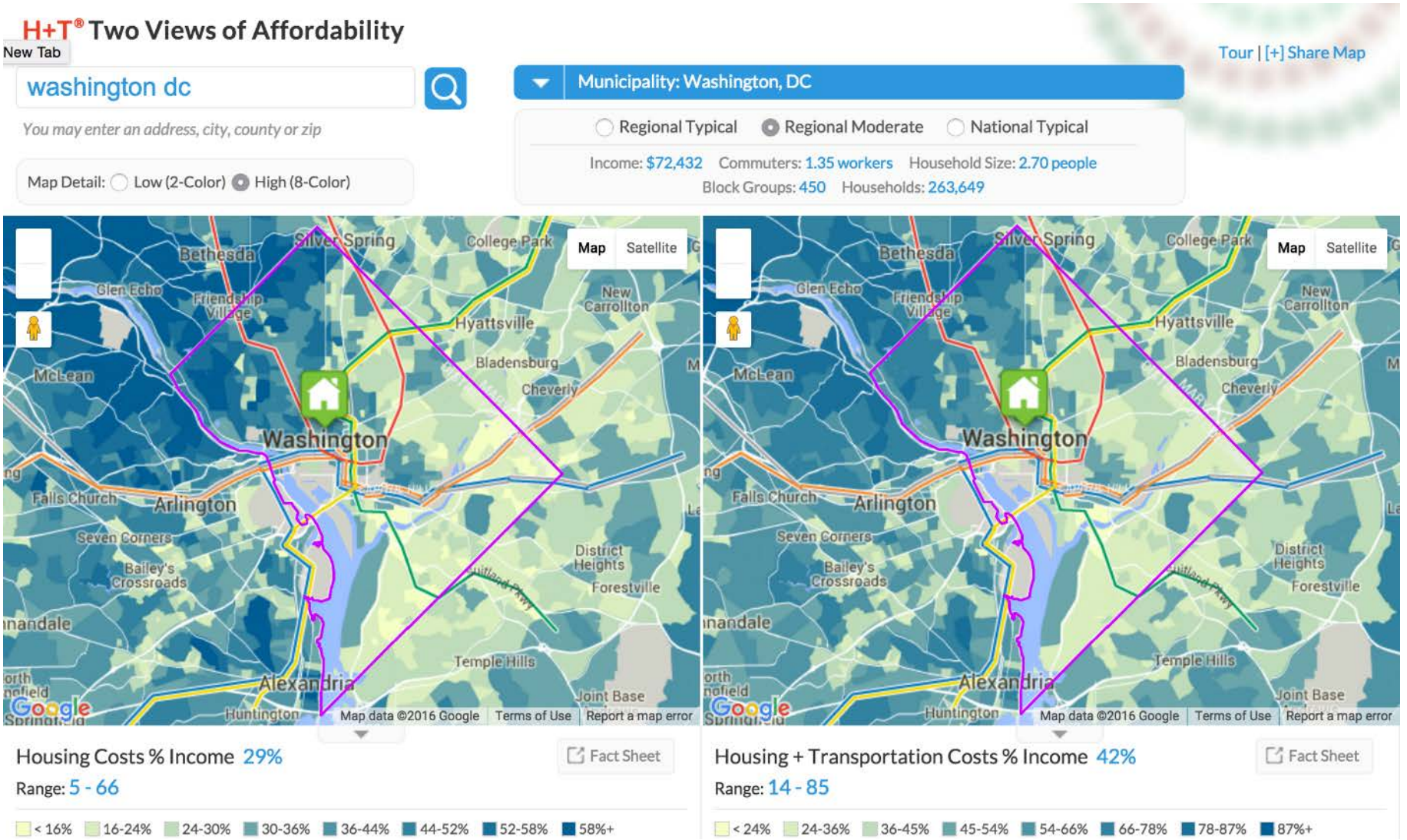
The H+T Affordability Index

- Housing affordability: < 30% of income spent on housing
- H+T affordability: <45% of income spent on housing and transportation

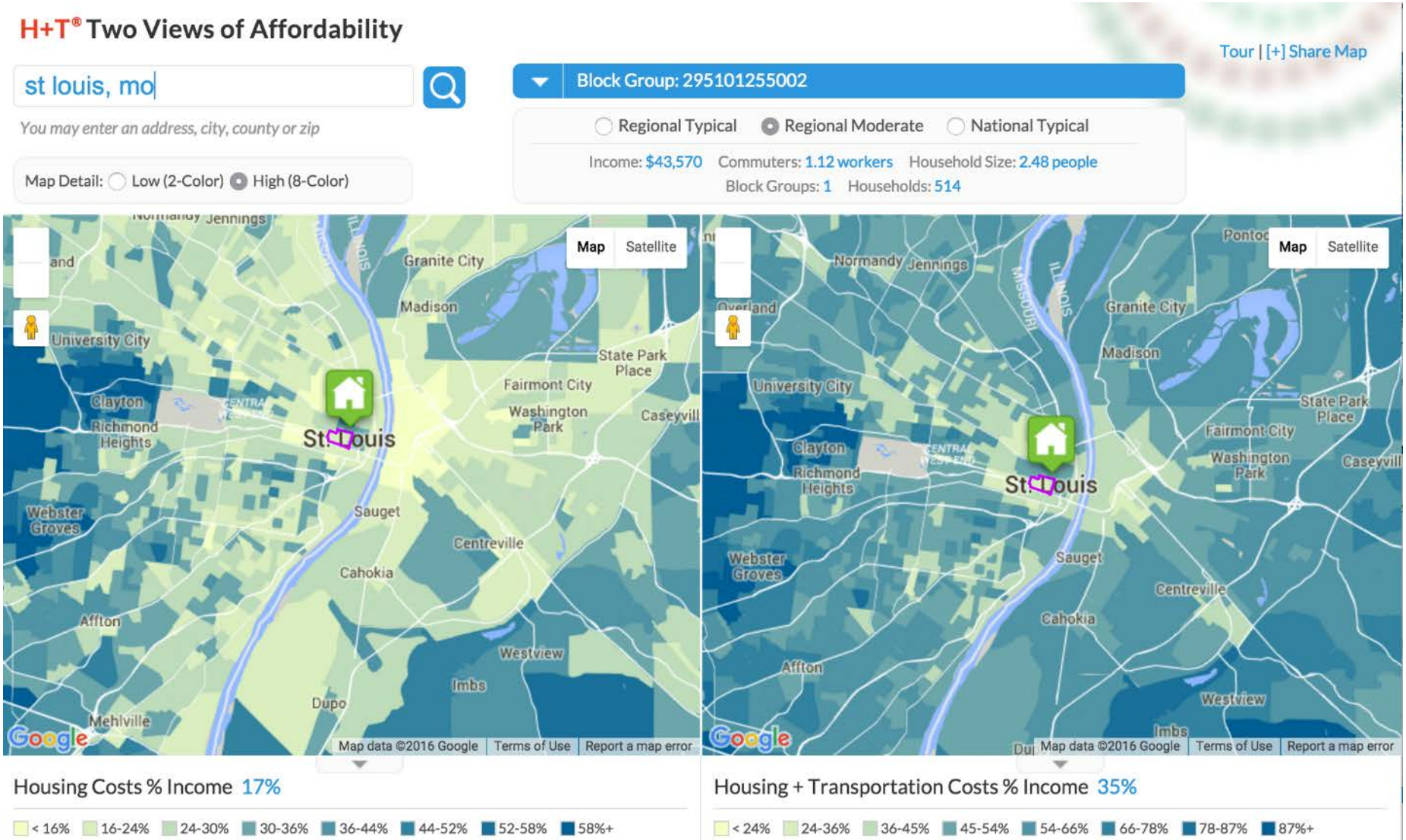
The H+T Affordability Index



The H+T Affordability Index



The H+T Affordability Index



H+T Calculation

The H+T Affordability Index: calculation

$$Index = \frac{Housing\ Costs + Transportation\ Costs}{Income}$$

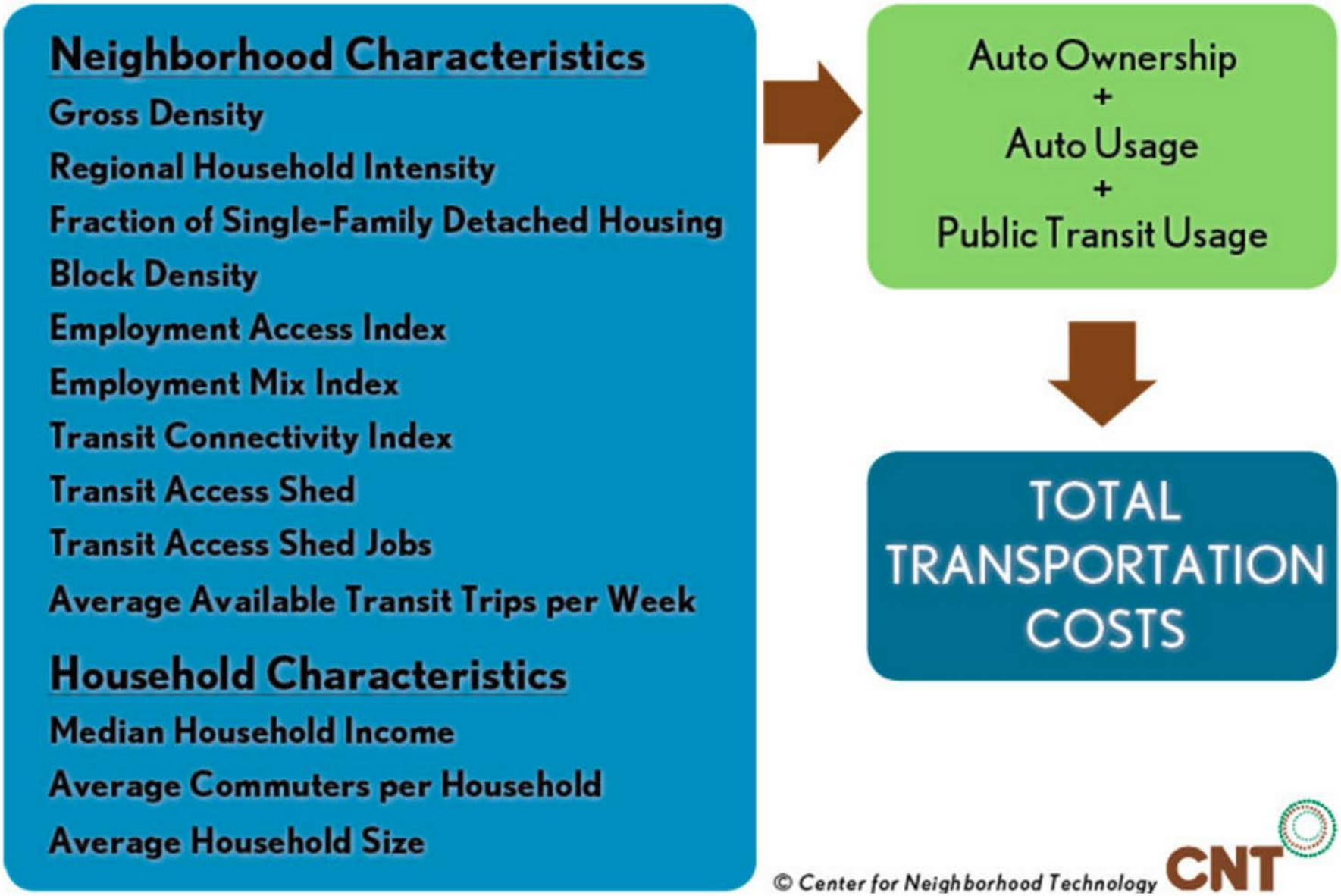
The H+T Affordability Index: calculation

$$Index = \frac{Housing\ Costs + Transportation\ Costs}{Income}$$

$$Household\ Tranportation\ Costs$$
$$[C_{AO} * F_{AO}(X)] + [C_{AU} * F_{AU}(X)] + [C_{TU} * F_{TU}(X)]$$

Where:
C is the cost factor (i.e. dollars per mile)
F is a function of the independent variables (F_{AO} is auto ownership, F_{AU} is auto use, F_{TU} is transit use)

The H+T Affordability Index: overview



The H+T Affordability Index: car ownership costs

1. Estimate car ownership in neighborhood (multivariate OLS)

Prediction	Source	Predictors
Auto Ownership	2013 ACS	Fraction of single family detached housing
		Commuters per household
		Transit connectivity index
		Median household income
		Gross household density
		Employment Mix
		Household Size
		Regional Household Intensity
		Block Density
		Employment Gravity

2. Estimate cost of car ownership for five income groups. Average cost of car ownership by income group from 2005-2010 Consumer Expenditure Surveys.
3. Multiply 1 and 2 for a typical regional household

The H+T Affordability Index: vehicle travel costs

1. Estimate vehicle travel (multivariate OLS using IL odometer data)

Prediction	Source	Predictors
Auto Use (VMT)	Odometer readings in IL from 2010-2012	Fraction of Single family detached housing
		Average Available Transit Trips per Week
		Commuters/Household
		Gross Household Density
		Regional Household Intensity
		Transit connectivity index
		Median household income
		Average Household Size
		Employment Access Index
		Transit Access Shed

2. Estimate cost of vehicle use for five income groups. Average cost by income group from 2005-2010 Consumer Expenditure Surveys.
3. Multiply 1 and 2 for a typical regional household

The H+T Affordability Index: transit costs

1. Estimate percent commuting to work by transit (multivariate regression)

Prediction	Source	Predictors
Transit Use	2013 ACS	Regional Household Intensity
	(% public transportation commuters)	Transit Connectivity
		Employment Access Index
		Employment Mix Index
		Fraction of single family detached housing
		Transit Access Shed
		Transit Access Shed Jobs
		Median Household Income
		Average Available Transit Trips per Week
		Average Household Size

2. Match fare revenue data from National Transit Database to block groups based on GTFS station/stop data.
3. Divide total fare revenues from a block group by households in block group

H+T and Public Policy

Planners

- Chicago - Metropolitan Panning Council (MPC) used H+T index data in a “corridor selection analysis” to determine potential BRT locations
- Chicago Metropolitan Agency for Planning (CMAP) used suggested H+T index standard as their livability measure in their GO TO 2040 comprehensive regional plan.
- Ohio –Living Cities sponsored the CNT and the Ohio Governor’s office to use the tool for suggestions for state urban revitalization strategies to reduce cost of living in Cincinnati, Cleveland, and Columbus.
- Washington, DC – Office of Planning worked with CNT on a custom H+T index that integrated market-rate housing costs and local land-use and transit network data.

Source: CNT website

Housing professionals

- Minneapolis-St.Paul; Washington, DC; Boston; San Francisco Bay Area – Partnered with the Urban Land Institute (ULI), CNT developed customized calculators that could both compare neighborhood costs and direct transportation choices.
- Santa Fe, NM – Local housing nonprofit uses a tailored Index platform to inform prospective homeowners about location efficiency and how to manage transportation costs in order to save for homeownership.
- San Francisco, CA – The Metropolitan Transportation Commission (MTC) gave credit to the Index for the establishment of the Bay Area Transit Oriented Affordable Housing Fund.
- Center for Housing Policy – Research with CNT concerning struggles of moderate-income households to tackle hidden factors that threaten affordability of housing and transportation.

Source: CNT website

Policy Makers

- State of Illinois – The 45% affordability measure adopted into law with bipartisan support to be used by five government agencies for both financing and siting decisions.
- El Paso, TX – City Council adopted 50% H+T affordability standard for City funding and policy decisions.
- Low Income Housing Tax Credit Allocations

Policy Makers

- Department of Housing and Urban Development (HUD) - Sustainable Communities Initiative grants to support sustainable development projects.

The H+T Affordability Index: shaping affordability narratives

Moderate-Income Housing and Transportation Burden

MUNICIPALITY	% Housing Rank	% Housing + Transportation Rank	Change in Rank After Adding Transportation
Washington	8	1	-7
Baltimore	1	2	1
Philadelphia	6	3	-3
Boston	12	4	-8
Minneapolis	7	5	-2
NYC	17	6	-11
St. Louis	3	7	4
Cincinnati	2	8	6
Pittsburgh	5	9	4
Detroit	4	10	6
Denver	10	11	1
San Francisco	20	12	-8
Chicago	15	13	-2
Dallas	11	14	3
Seattle	16	15	-1
Houston	9	16	7
Sacramento	13	17	4
Portland	18	18	0
Atlanta	19	19	0
Phoenix	14	20	6
Miami	21	21	0
Los Angeles	24	22	-2
San Diego	25	23	-2
Riverside	22	24	2
Tampa	23	25	2

CMSA	% Housing Rank	% Housing + Transportation Rank	Change in Rank After Adding Transportation
Washington	4	1	-3
Minneapolis	1	2	1
Baltimore	9	3	-6
Boston	16	4	-12
Denver	6	5	-1
Seattle	13	6	-7
Philadelphia	15	7	-8
San Francisco	18	8	-10
Cincinnati	2	9	7
Pittsburgh	3	10	7
St. Louis	5	11	6
Dallas	7	12	5
Detroit	12	13	1
NYC	22	14	-8
Houston	8	15	7
Chicago	17	16	-1
Portland	14	17	3
Atlanta	10	18	8
Phoenix	11	19	8
Sacramento	19	20	1
San Diego	23	21	-2
Los Angeles	24	22	-2
Tampa	20	23	3
Riverside	21	24	3
Miami	25	25	0

Critiques and Challenges

What does affordability mean?

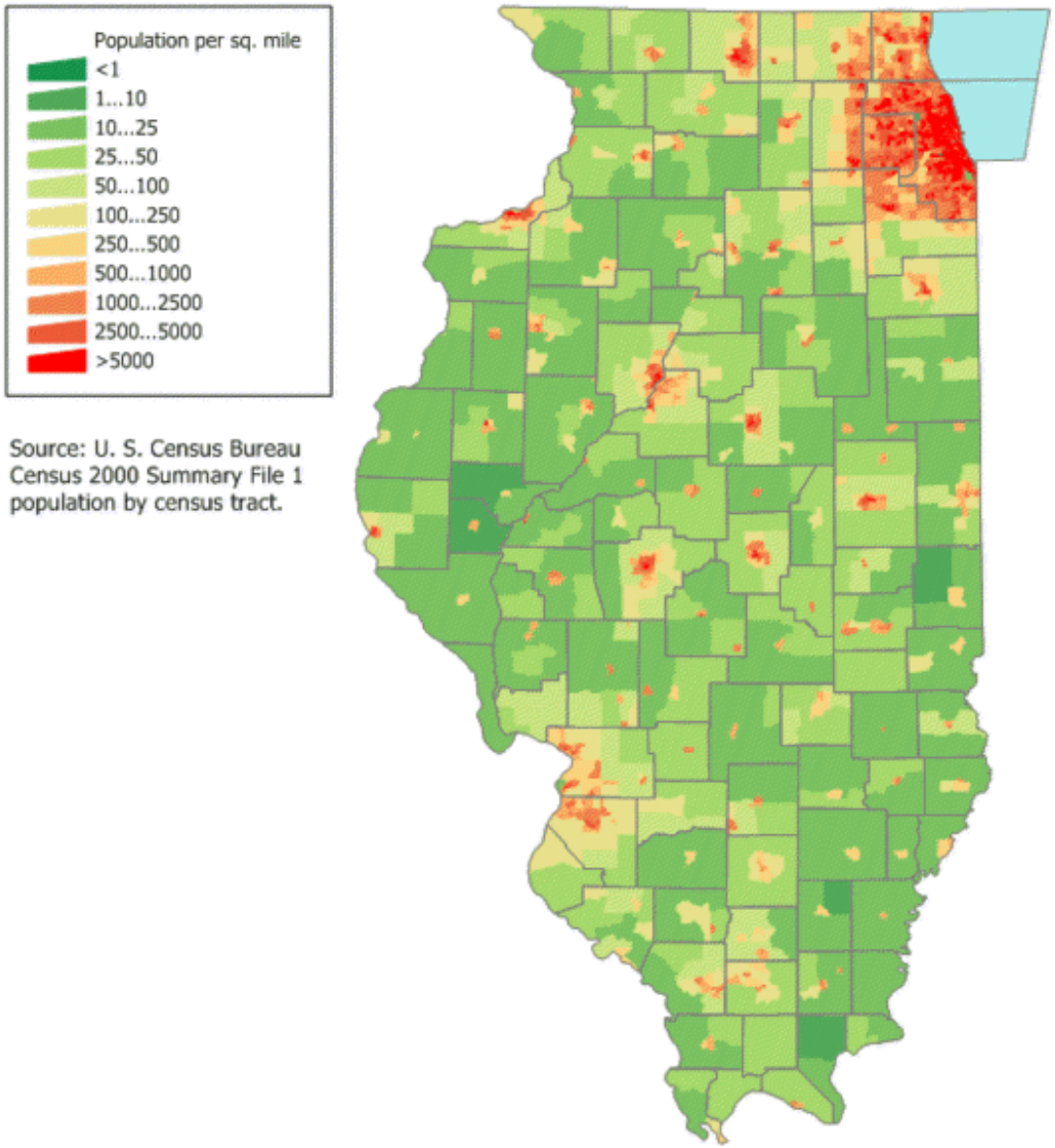
- Threshold somewhat arbitrary (a week's wage for a month's rent)
- Index does not consider other expenses that vary with location like schools and groceries.
- Index ignore household size, age, composition, and life-stage considerations (earnings vs. wealth vs. earnings potential).
- Index ignores variation in household preferences

Aggregation bias

The focus on typical households and typical prices accounts for substantial variation in neighborhoods and households.

An ideal city and neighborhood should have distributions of income and housing prices that match, not averages or medians.

Challenges and critiques: VMT estimation



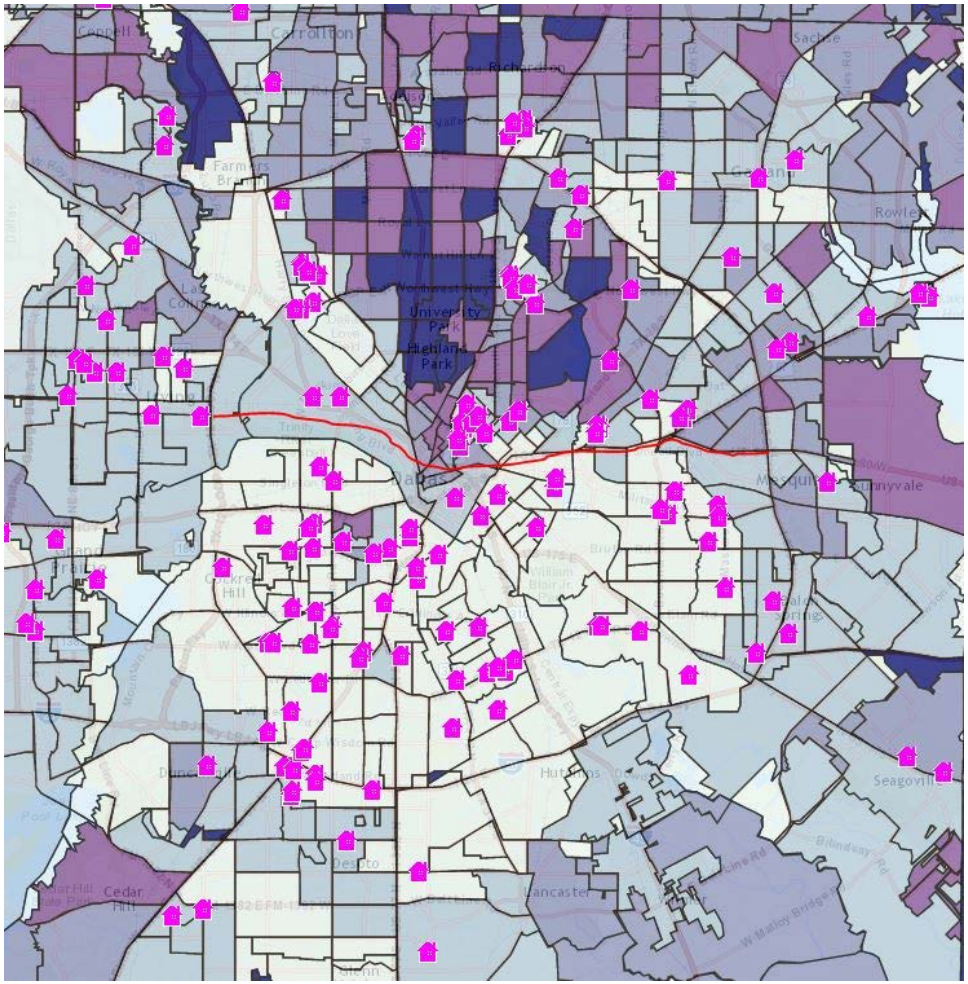
The high cost of new construction

New construction is expensive. Absent deep subsidies, focusing new construction around transit is unlikely to reduce housing and transportation expenditures for vulnerable households.

View of BART Plaza

Fair housing vs. affordable housing

Texas Department of Housing and Community Affairs v. The Inclusive Communities Project, Inc.



H+T in Mexico City

National data and Mexico City overview

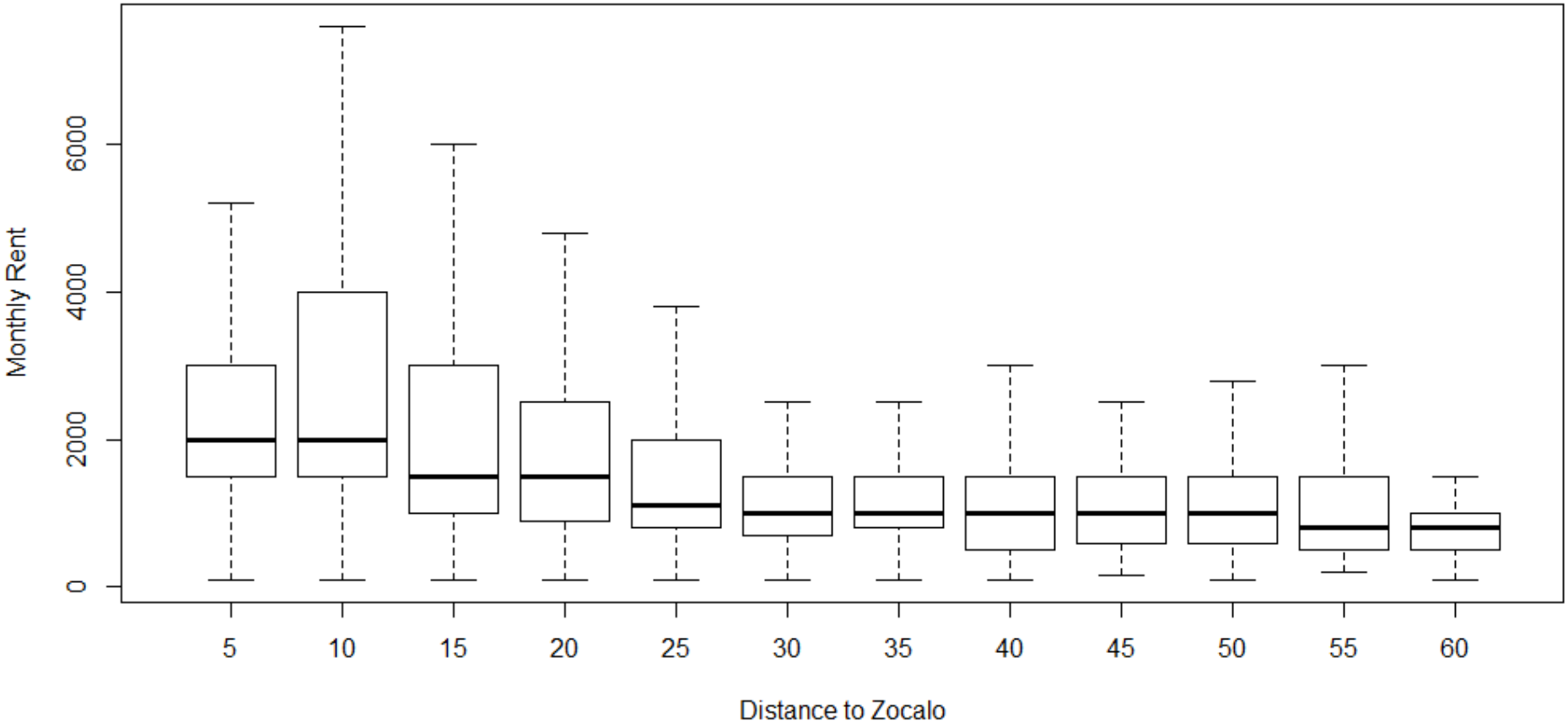
How readily could a housing and transportation affordability index be applied to Mexico and Mexico City?

- Data available on household expenditures
- Insufficient data on car ownership, transit use, and VMT
- Rely on 2007 Mexico City household travel survey
- Focus on households that did not drive on survey day (roughly two-thirds)


Legend
Mexico City Metropolitan Area
Mexico State Boundaries
Other Country State Boundaries
0
250
500
1,000 Kilometers

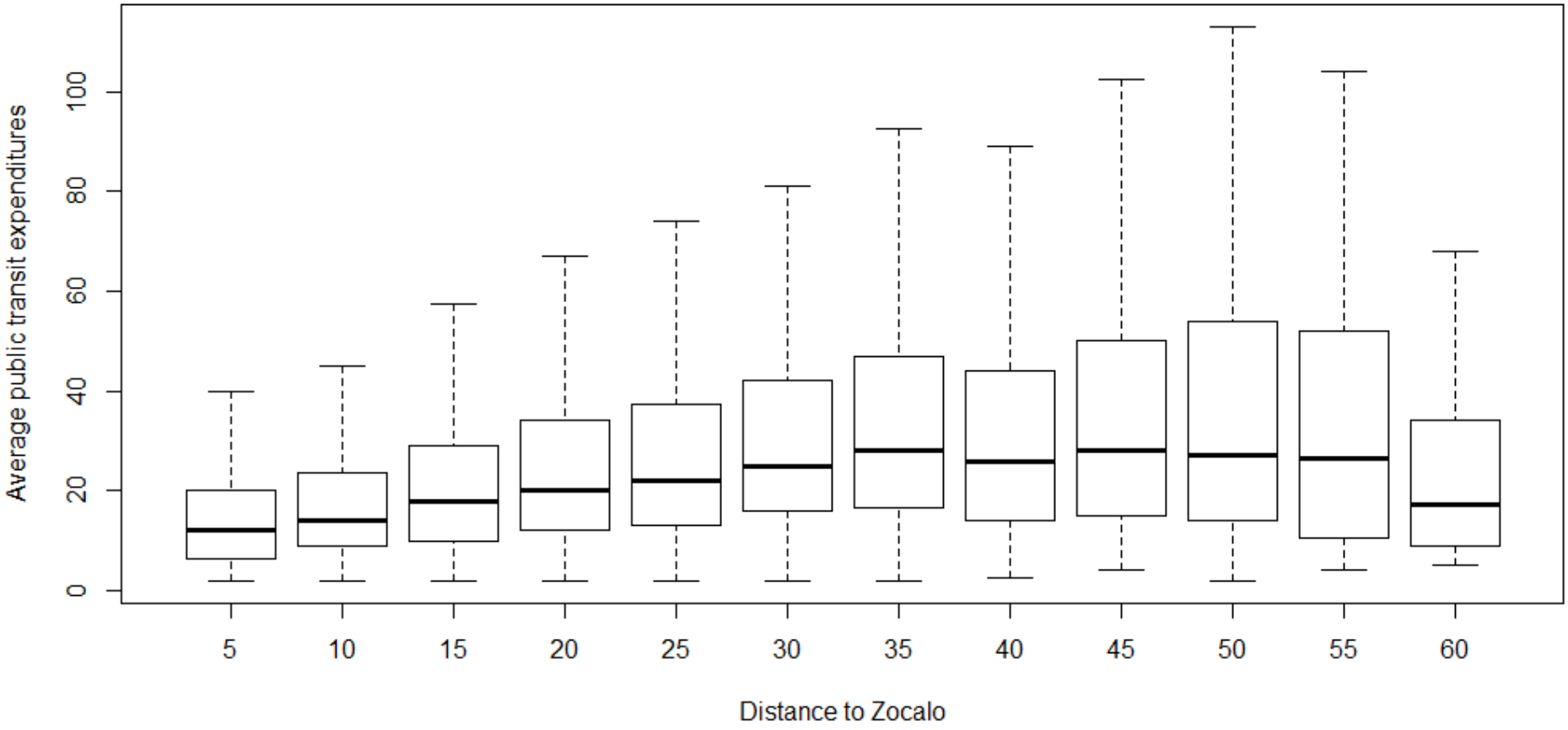
Rent by location

Average non-driving household spends an estimated 33% of income on rent in Mexico City

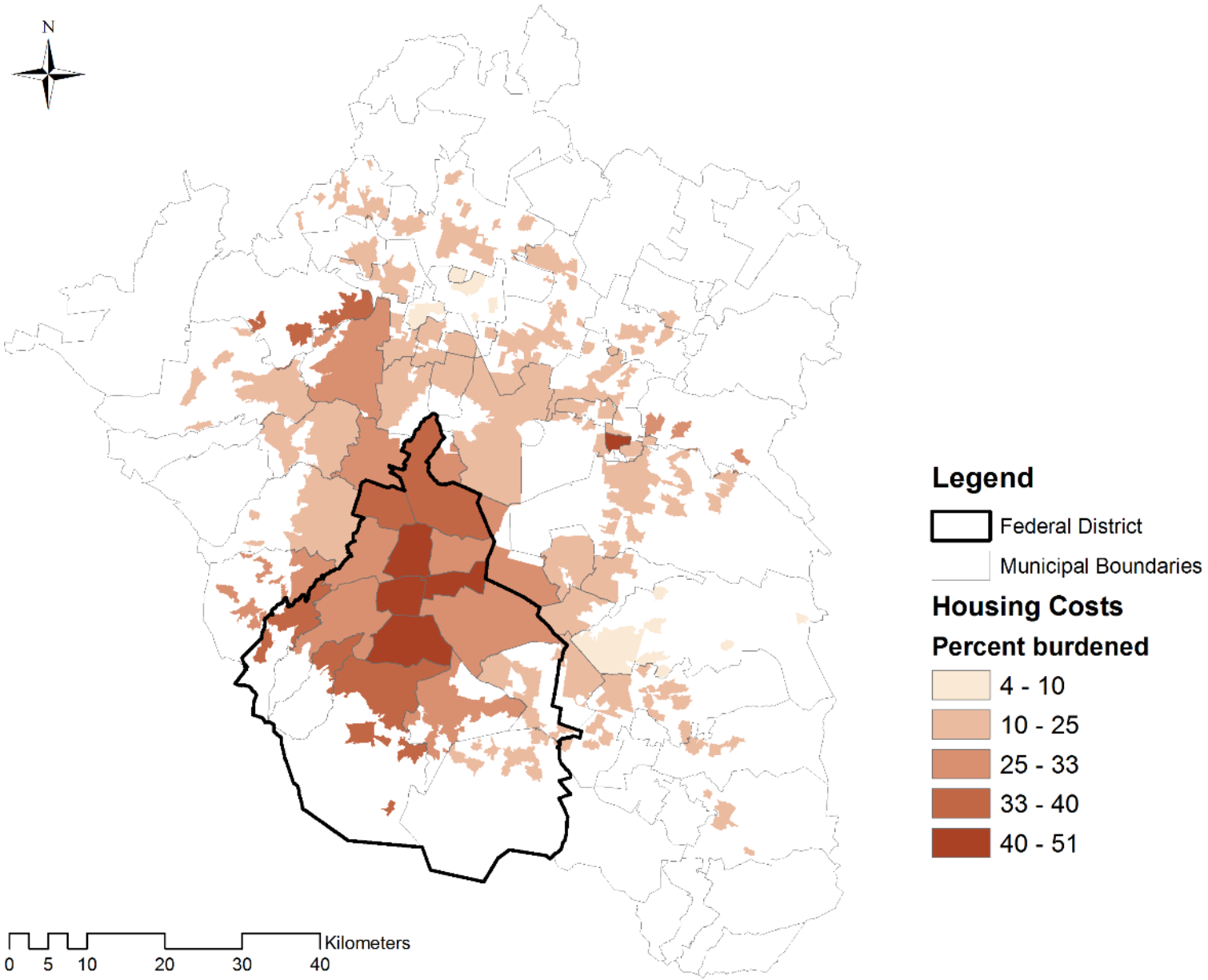


Transit expenditures by location

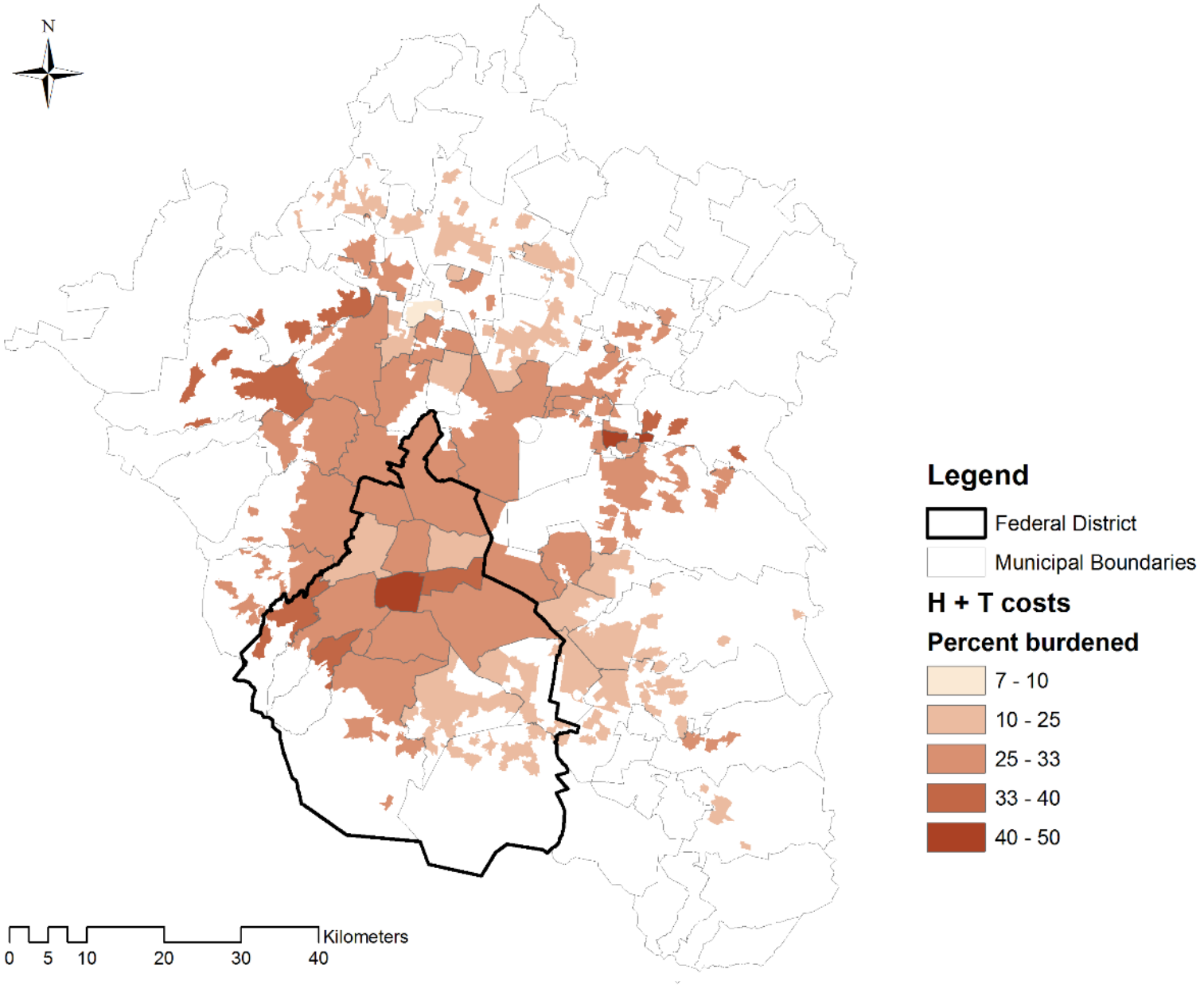
Average non-driving household spends an 15% of income on transit expenditures in Mexico City



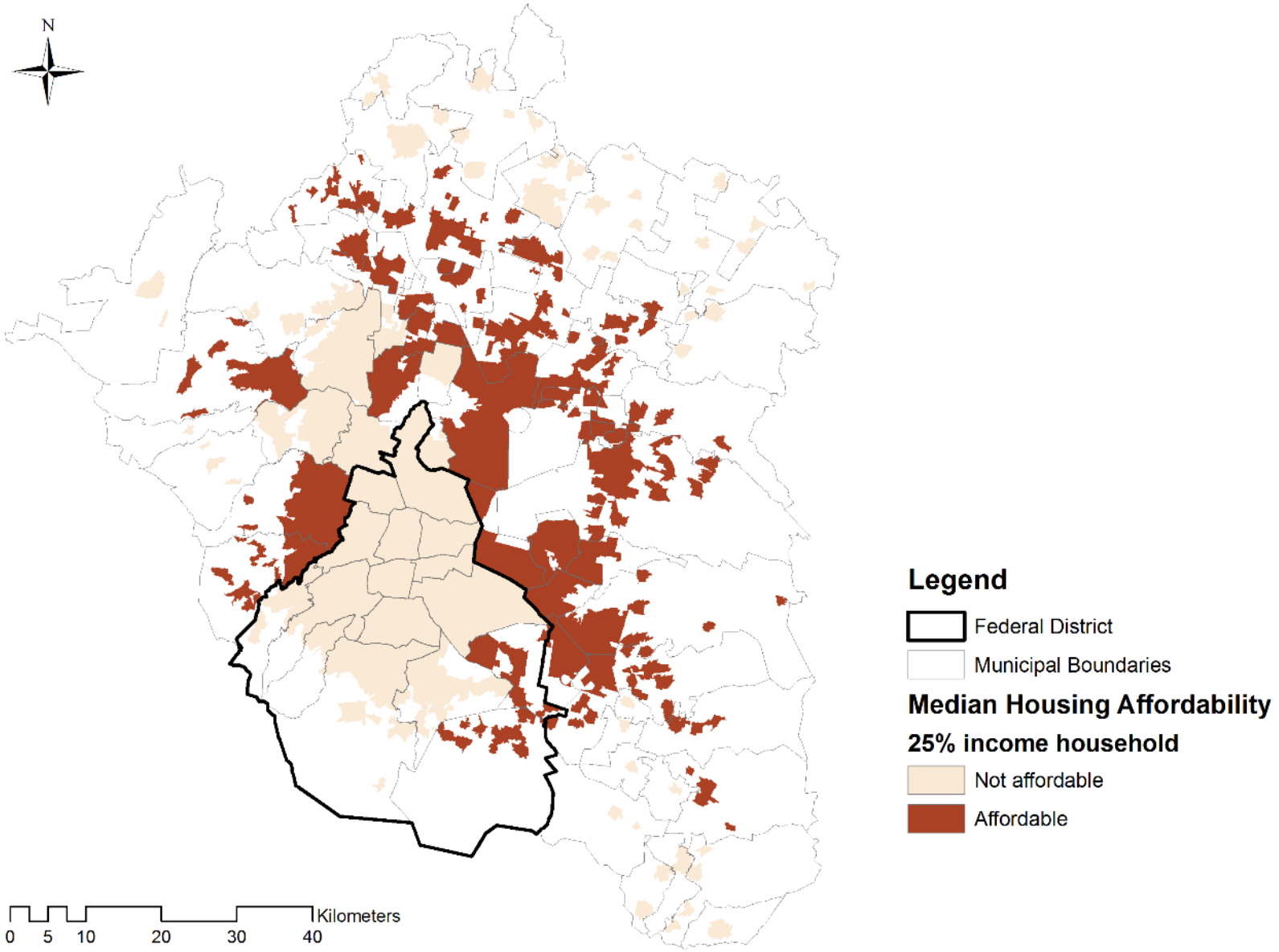
Percent of rent burdened households by municipality



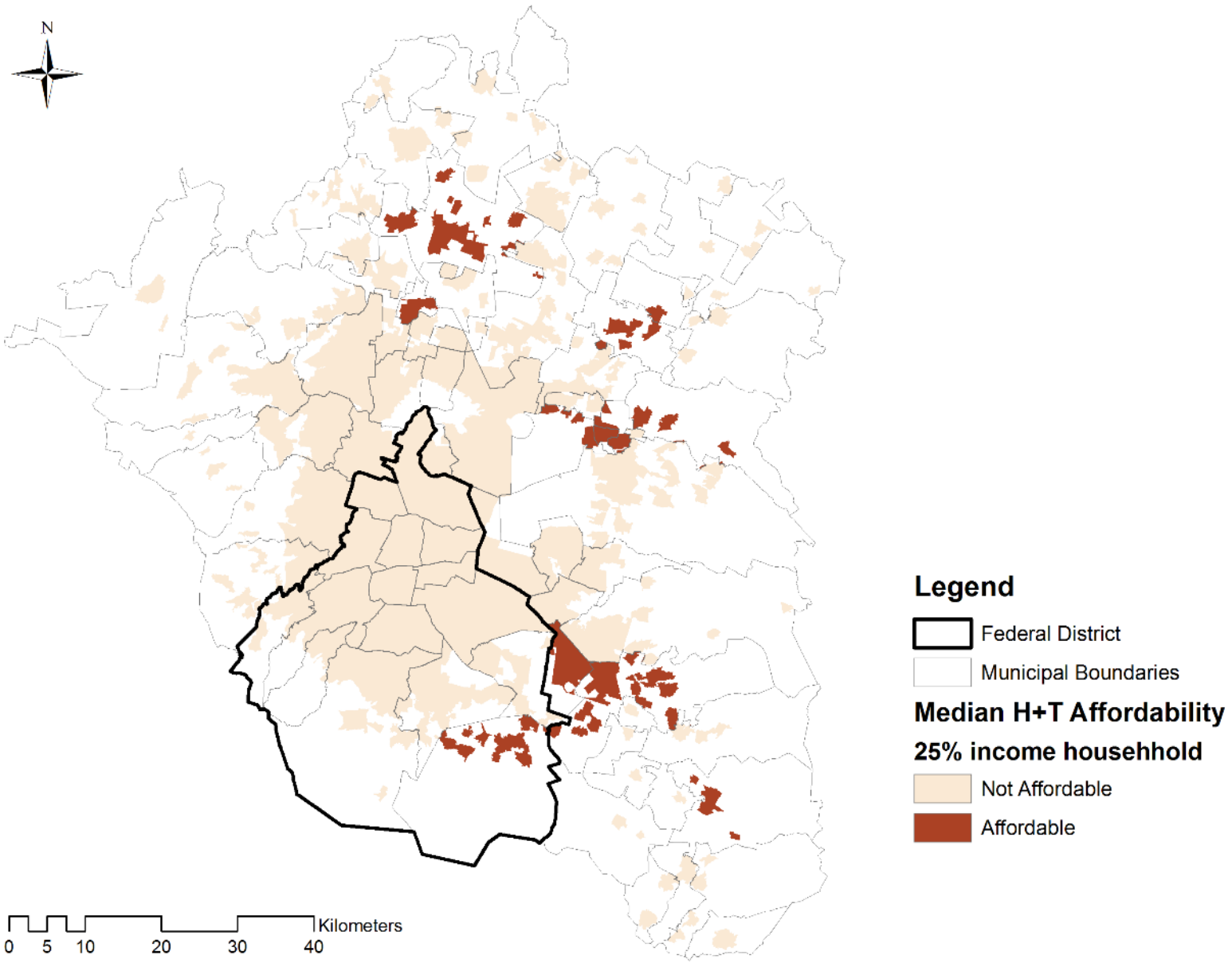
Percent of H+T burdened households by municipality



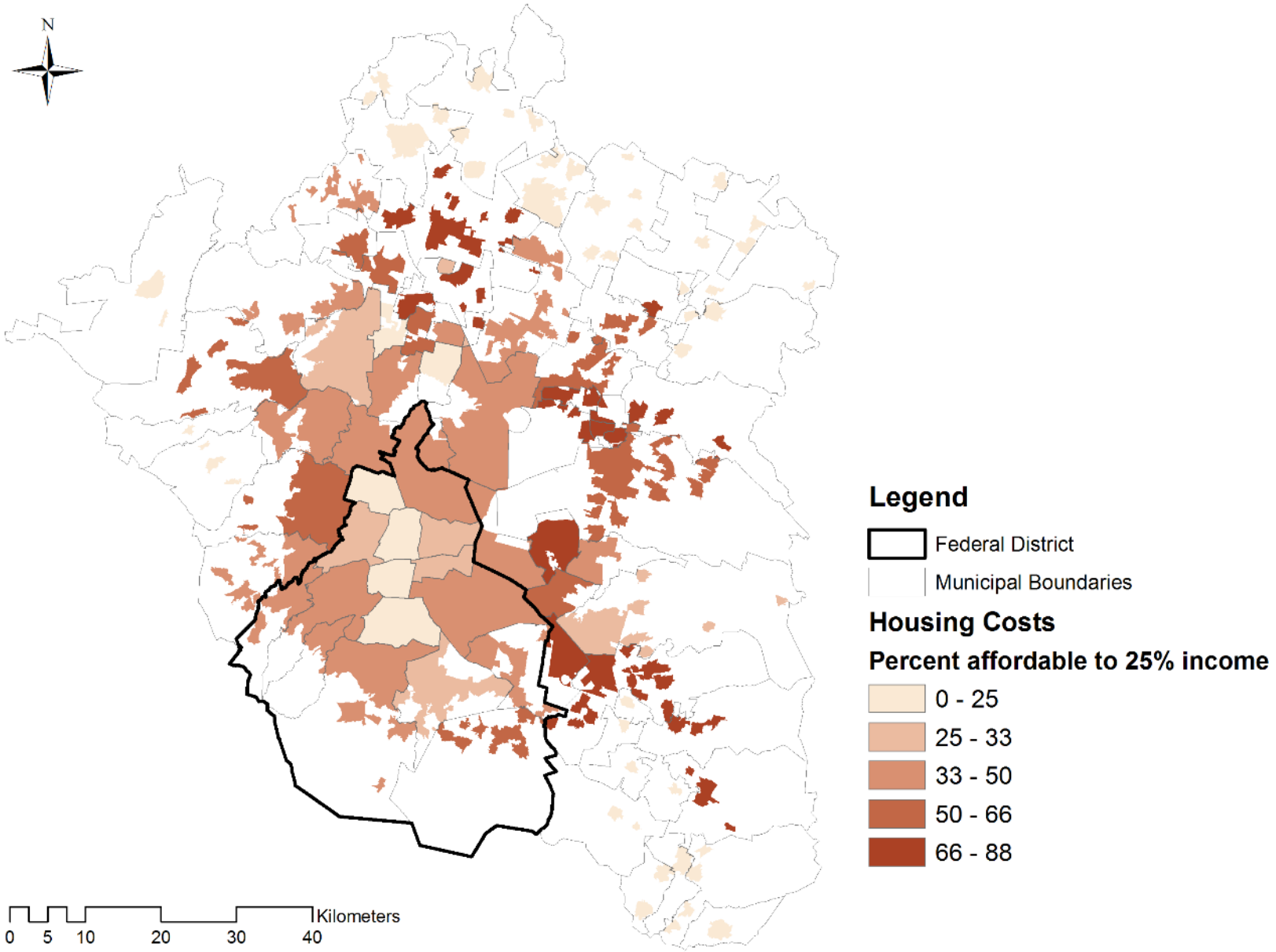
Housing affordable municipalities for 25th percentile income household



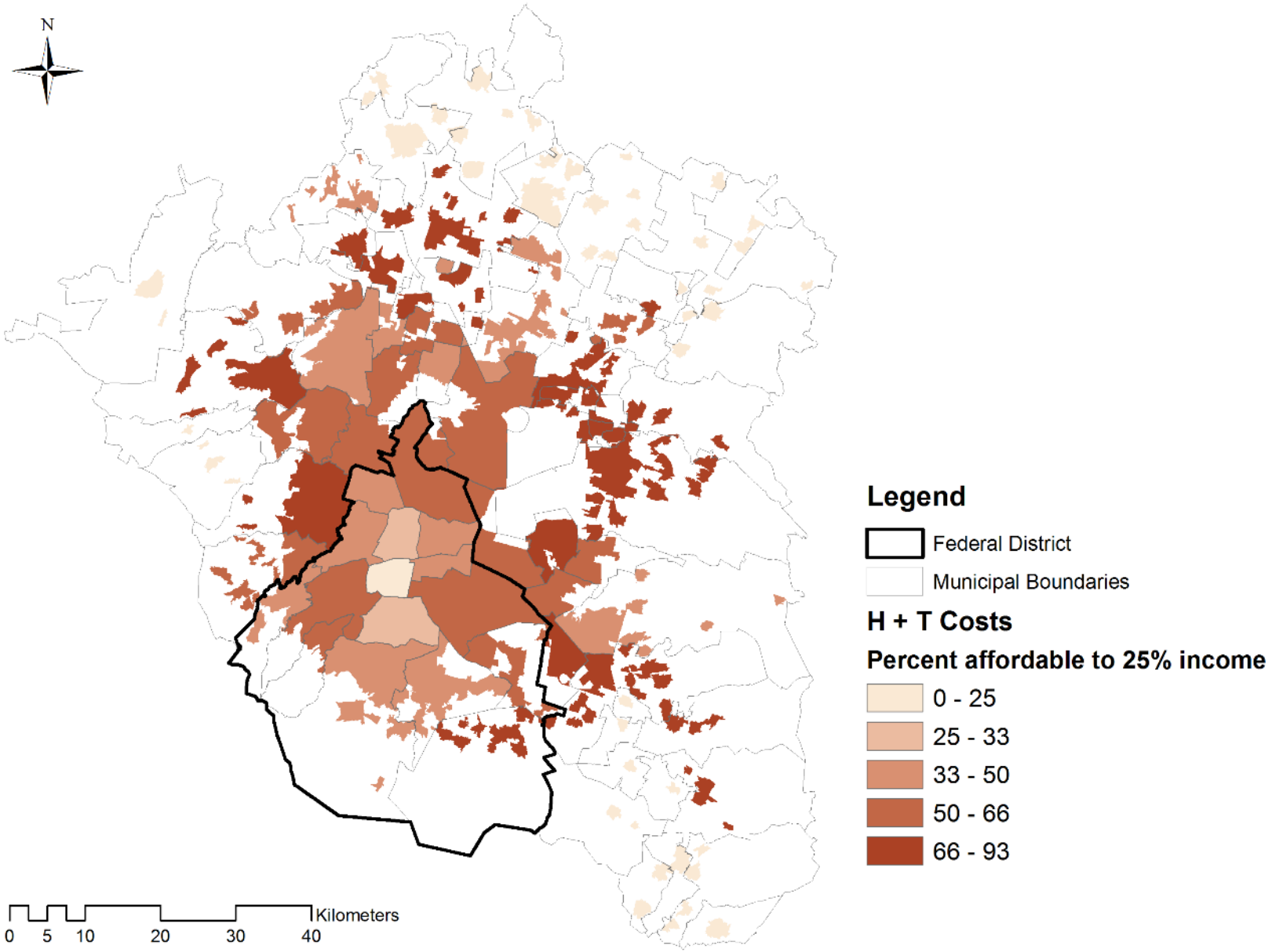
H+T affordable municipalities for 25th percentile income household



Percent affordable for 25th percentile income household



Percent H+T affordable for 25th percentile income household



Summary of findings

- Possible to apply an H+T index in a place like Mexico City with relative ease (at least when excluding car expenses).
- More transit-friendly central locations appear relatively more affordable when accounting for travel costs as well as housing costs.
- Since Mexico is the poorest of the OECD countries and the US is one of the wealthiest, these findings likely extend to the rest of the OECD.
- Shortage of the necessary data makes it difficult to extend this analysis beyond the Mexico City to the rest of the country.

Housing policy takeaway

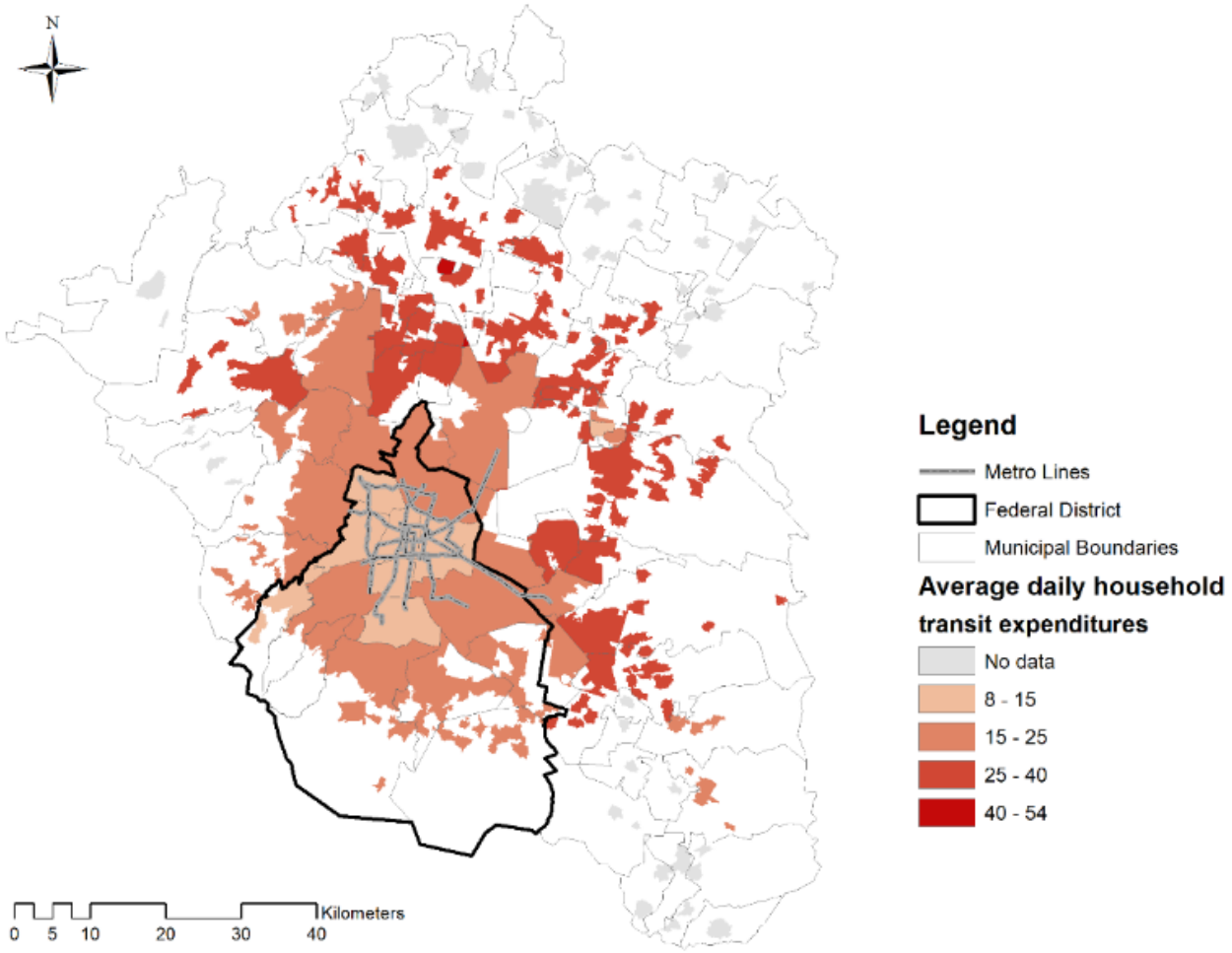
- Between 1995 and 2005, public agencies funded 75% of all housing loans by value—and even more by volume—in Mexico
- Most in peripheral locations
- Higher car ownership and driving than nearby informal settlements despite similar incomes

	Traditional Development	Subsidized Development
	Mean	Mean
Cars per household	0.41	0.62
Average daily VKT	6.2	15.8
Monthly income (in pesos)	$7,617	$8,725
People per hectare in Census Tract	109	204

Los Héroes de Ecatepec, 25km northeast of downtown (Erick Guerra, 2012)

Transit policy takeaway

Limited suburban transit service despite higher reliance of suburban households on transit



Concluding Remarks on Transferability

Potential for H+T index in other OECD nations

1. Strengthen the public and policy makers' understanding of which countries, cities, and regions are most affordable.

2. Encourage bank lending and the construction of affordable housing in neighborhoods with higher land costs but lower transportation costs.

3. Focus transit investments in a way that could help to reduce the amount that poorer households spend on transportation.

Transfer challenges: context

Relationship between transportation costs and housing location varies in different contexts.

1. Wealthy households in Mexico City generally opt to live in transit accessible areas but own and use cars.
2. May make central locations look less affordable to poor and moderate-income households than they actually are.
3. Similar differences when comparing American and European cities (Brueckner *et al.* 1999).
4. US's local control and financing of public school districts almost certainly also leads to substantial differences in housing markets when compared to other countries.

Transfer challenges: data

1. Data not always available or comes in a different form in different countries

2. No single methodology can or should be applied to all OECD countries and regions.

3. Estimating the costs of vehicle travel is likely most problematic.

Thank you