The NCRP Rental Housing Disadvantage Index (RHDI)

An Introduction and Initial Analysis of Eight CMAs

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The RHDI was created for the NCRP by Richard Maaranen, NCRP Data Analyst, March 2014.

The Rental Housing Disadvantage Index (RHDI) was developed to help define specific locations of inadequate rental housing and housing-related distress among tenants in Canada's larger metropolitan areas. The RHDI is one tool in helping the Neighbourhood Change Research Partnership make decisions about *where* to focus further research on its rental housing research agenda.

Conceptually the RHDI is based on Canada Mortgage and Housing Corporation's measurement of Core Housing Need. Core Housing Need includes three housing indicators: adequacy, affordability, and suitability. The RHDI uses these three measures but it also includes average renter household income. The RHDI uses 2006 census custom housing tenure data at the census tract level. The 2006 census is the last available "long-form census" – a random 20% mandatory questionnaire.

1. CMHC's Definition of Core Housing Need

A household is said to be in core housing need if its housing falls below at least one of the adequacy, affordability or suitability standards. In addition, it would have to spend 30% or more of its total before-tax income on the median rent of alternative local housing that is acceptable (i.e., meets all three housing standards). (See CMHC's definitions, http://www.cmhc.ca/en/corp/about/cahoob/data/data_013.cfm)

A household is not in Core Housing Need if its

- housing is adequate -- reported by its residents as not requiring any major repairs.
- Housing is affordable -- housing cost is less than 30% of total before-tax household income.
- Housing is suitable – based on number of bedrooms for the size and make-up of the household, according to National Occupancy Standard definitions.

A household is not in core housing need if its housing meets all of the adequacy, suitability and affordability standards OR, if its housing does not meet one or more of these standards, but it has sufficient income to obtain alternative local housing that meets all three standards. In addition, regardless of their circumstances, non-family households led by maintainers 15 to 29 years of age attending school full-time are considered to be in a transitional stage of life and are not included in core housing need.

CMHC also measures and reports on "severe housing need" defined as those households in Core Housing Need that spend 50% or more on shelter. [CMHC (2010) *2006 Census Housing Series: Issue 8—Households in Core Housing Need and Spending at Least 50% of Their Income on Shelter*, Research Highlight: Socio-Economic Series. https://www03.cmhc-schl.gc.ca/catalog/productDetail.cfm?cat=164&itm=33&lang=en&fr=1426344364007]

2. The NCRP's Rental Housing Disadvantage Index

The RHDI is comprised of four indicators with each given equal weight.

1. ***Adequate Housing***: Percentage rental requiring major repairs. Census respondents are asked to judge their own housing condition by choosing one of three possible responses: regular maintenance only required, minor repairs are required or major repairs are required. The Census questionnaire gives examples of repairs by their severity. Major repairs refers to the repair of defective plumbing, electrical wiring, structural repairs to walls, floors or ceilings and other serious problems. Problems not considered to be major repairs include such issues as painting, furnace cleaning (considered regular maintenance); missing or loose floor tiles, bricks, shingles, defective steps, railings or siding. Moreover, respondents are told to disregard desired remodelling or additions in their response.

2. ***Affordable Housing***: Percentage of renter households paying 50% or more of income on rent. This is based on rent paid in the census year and the income from the previous calendar year. The percentage is calculated by dividing the occupants total shelter-related expenses (rent and utilities) by the households total monthly income and multiplying the result by 100. The census questionnaire does not ask for this percentage from respondents directly rather the figures are derived by Statistics Canada from the occupant's self-reported income and shelter costs.

3. ***Suitable Housing***: Average number of persons per bedroom in rented dwellings. This variable was calculated by dividing the average number of persons in a household by the average number of bedrooms. Note that these two input variables have both been rounded off by Statistics Canada to one decimal place in the custom dataset.

4. ***Income***: Average renter household income in dollars. This is income for the calendar year prior to the census year, from all sources, before-tax.

These four basic indicators are general enough to make the index applicable to all Canadian cities at the census tract level. This facilitates comparisons regardless of regional differences in the characteristics of the rental stock and its residents. The index can easily be expanded to include other indicators, depending on data availability to suit various local contexts.

To calculate the RHDI, each indicator is standardized, that is transformed to standard scores (commonly known as z-scores) because they involve incompatible metrics such as percentages and dollar amounts. Standard scores are calculated by subtracting a population mean from an individual raw score and then dividing the difference by the population standard deviation. Thus, a standard score indicates how many standard deviations a census tract is above or below the mean, which is represented by a value of zero. For example, an RHDI of +1.1 is 1.1 standard deviations above the mean of zero.

Calculation of the income variable involves an extra step. Its standard scores are multiplied by negative one so that the inversed lower incomes contribute to higher disadvantage (i.e. lower incomes have

higher positive standard score and higher incomes have lower negative standard score). The last step to derive the RHDI for each census tract is to calculate the average of the four standardized scores.

An RHDI of zero for any census tract means an average degree of disadvantage. This can be the result of each of the four indicators having standard scores of zero or more likely some combination of positive and negative standard scores that average out at zero. An RHDI below zero indicates below average disadvantage (not to be misinterpreted as "no disadvantage" which the index cannot determine). An RHDI above zero indicates above average disadvantage.

3. Comparison of the RHDI with Core Housing Need

There are a number of differences between the RHDI and Core Housing Need.

1. The RHDI is a rating of the degree of disadvantage in rental housing. Unlike Core Housing Need, it is not a classification of how many and what share of rented dwellings / households are specifically disadvantaged. Such a binary determination would require more detailed custom cross-tabulated census data with indicators that have a common metric.
2. The RHDI uses a higher cut-off for affordability: 50% of income spent on rent versus 30% for Core Housing Need. However, CMHC also uses the 50% of income cut-off in its definition of “severe housing need.” Together with CMHC, the NCRP agrees that for research purposes seeking to focus on “severe need” or “serious disadvantage” the 30% income cut-off is too low.
3. The RHDI explicitly includes the income level of renters as one of the indicators while CHN only considers it indirectly to calculate affordability. Income was included directly by the RHDI because it affects the quality of life for renters in various ways independent of affordability stress.
4. For suitability, Core Housing Need uses a better indicator. Due to data limitations, the RHDI uses average number of persons per bedroom. This fails to take into account family status and living arrangements. Generally, the RHDI is biased towards single people living alone (lower disadvantage) rather than families (higher disadvantage). Despite this weakness, the RHDI is still a useful measure of the extent of disadvantage in rental housing and the occupants of that housing.
5. The RHDI does not exclude households led by maintainers age 15 to 29 years attending school full time. It is possible that in the RHDI areas with many university students renting may be rated as highly disadvantaged. In Core Housing Need, these households are considered to be in a transitional stage of life and not in core housing need.

4. Limitations of the RHDI

A general limitation of the RHDI, like other census-based research, concerns the reliability of the Census (a 20% random sample of households) in which responses are self-reported. There is possible misreporting in the components of the indicators: income, household size, number of bedrooms, monthly rent and need for major repairs. In particular, it should be noted that the tables and maps of the RHDI for this project are based on 2006 census data rather than the 2011 National Household Survey (NHS). We have serious concerns about the reliability of the voluntary NHS.

5. Rental Housing Overview, Eight Census Metropolitan Areas

This NCRP has a focus on eight census metropolitan areas in Canada. Toronto, Montréal, Vancouver, Ottawa – Gatineau, and Calgary are chosen because they are the five largest CMAs in Canada by

population (2006). Winnipeg, Hamilton and Halifax have considerably smaller populations but are included for the purpose of having regional representation. As noted in Table 1 these eight CMAs account for 47% of Canada's total population. Due to time and budget constraints not all CMAs in Canada are being analyzed in this study.

Table 1
Population Rankings, Eight CMAs 2006

CMA	Population	Percent of Canada
Toronto	5,113,149	16.2%
Montréal	3,635,571	11.5%
Vancouver	2,116,581	6.7%
Ottawa - Gatineau	1,130,761	3.6%
Calgary	1,079,310	3.4%
Winnipeg	694,668	2.2%
Hamilton	692,911	2.2%
Halifax	372,858	1.2%
Total 8 CMAs	14,835,809	46.9%
Canada	31,612,897	100%

Source: Statistics Canada, Census Profile Series, 2006

Table 2
Rental Housing Rankings by Percentage, Eight CMAs 2006

CMA	Percent Rental	Total Rental	Share of Canada's Rental
Montréal	46.6%	711,435	18.3%
Halifax	36.0%	55,850	1.4%
Vancouver	34.9%	285,045	7.3%
Ottawa - Gatineau	33.1%	148,690	3.8%
Winnipeg	32.8%	92,450	2.4%
Toronto	32.4%	584,130	15.1%
Hamilton	28.4%	75,630	1.9%
Calgary	25.9%	107,680	2.8%
Total 8 CMAs	36.1%	2,060,910	53.1%
Canada	31.2%	3,878,500	100%

Source: Statistics Canada, Census Profile Series, 2006

As indicated in Table 2 rental housing is most common in Montréal at 47% of the total stock and least common in Calgary at 26% of the stock. Halifax is the smallest metropolitan area of the eight yet it ranks second in rental housing at 36%. Although Toronto is Canada's largest metropolitan area overall, it ranks sixth with 32% rental housing. These eight CMAs have a disproportionate share of rental housing: 53% of Canada's rental stock, but 47% of Canada's population.

Table 3.
Population Within Major Regions of the Toronto CMA, 2006

Region	Population	Share of Toronto CMA
City of Toronto	2,503,281	49.0%
Suburbs Outside the City	2,609,868	51.0%
Peel Region	1,159,405	22.7%
York Region	892,712	17.5%
Suburbs (minus Peel and York)	557,751	10.9%
Toronto CMA Total	5,113,149	100%

Source: Statistics Canada, Census Profile Series, 2006

Table 4
Rental Housing Within Major Regions of the Toronto CMA, 2006

Region	Rental Percent	Rental Total	Share of Toronto CMA
City of Toronto	45.6%	446,850	76.5%
Suburbs Outside the City	16.7%	137,280	23.5%
Peel Region	21.9%	78,595	13.5%
York Region	11.7%	32,360	5.5%
Suburbs (minus Peel and York)	14.1%	26,325	4.5%
Toronto CMA Total	32.4%	584,130	100%

Source: Statistics Canada, Census Profile Series, 2006

We also examine major regions within the Toronto CMA because with 5.1 million people it is by far the largest of Canada’s CMAs (Table 1). Most of the rental housing in the Toronto CMA is concentrated in the City of Toronto which has 77% of the CMA's rental stock yet 49% of the population (Tables 3 and 4). Outside of the City of Toronto, the suburban "905 region" has a small amount of rental housing. Peel Region is the largest suburban region with 23% of the CMA population but only 14% of the CMA rental stock. York Region is the second largest, 18% of the CMA population but only 6% of the CMA rental stock. The rental housing stock in the remaining suburbs (partially covering Durham, Halton, Dufferin and Simcoe census divisions) is small in quantity with just 5% of the CMA total. It is also scattered across a number of smaller municipalities.

6. The RHDI Sample in Eight Census Metropolitan Areas

The RHDI was first calculated for 3,107 (99%) out of a total of 3,145 census tracts with at least some rental housing in the eight CMAs. Calculations are based on a custom Census 2006 cross-tabulation involving the characteristics of renters (table reference EO1790). Since many of these CTs have a very small share of rental housing compared to owner occupied housing, the decision was made to map and analyze a sample of 1,720 census tracts where rental comprises a substantial share of the total housing stock (defined as 25% or more rental). The RHDI includes 1,765,425 rented dwellings (86%) of the total rental stock in the 8 CMAs and 46% of Canada's total rental stock. Note, as indicated in Table2, that the 25% rental threshold is below the 36% rental share for all eight CMAs combined. On average in the sample of 1,720 census tracts, rental housing includes 54% of the total housing stock and home ownership 46%.

After limiting the sample to census tracts with only 25% or more rental housing the next step was to categorize the RHDI distribution according to the degree of disadvantage present. The lower the RHDI score, the lower the level of disadvantage. The higher the RHDI, the more severe the disadvantage. The eight CMA mean RHDI is zero when all rental housing is considered which rises to 0.24 once those census tracts with less than 25% rental housing are filtered out (Table 5). After examining the overall distribution of RHDI values in the sample, each census tract was determined to exhibit low disadvantage (RHDI below 0.26), moderate disadvantage (RHDI 0.26 to 0.50) or high disadvantage (RHDI above 0.50). This resulted in 52% of the sample tracts being categorized as low disadvantage, 22% as moderate disadvantage, and 26% as high disadvantage.

Initially, five groups were chosen with +1.0 and -1.0 indicating the thresholds for highest and lowest levels of disadvantage (i.e. one standard deviation above or below the mean which are significant values with standard scores). These five groups were reduced to just three as too few CTs were found to have very high disadvantage (RHDI above +1.0). This also makes the data analysis and mapping easier to follow with a focus more towards CTs with above average disadvantage (RHDI values 0.26 or higher).

Table 5
Rental Housing Disadvantage Index Distribution, Eight CMAs 2006

Figures limited to census tracts with 25% or more rental housing.
Low disadvantage is RHDI below 0.26; Moderate 0.26 to 0.50; High above 0.50.

CMA	Low Total	Low Share	Moderate Total	Moderate Share	High Total	High Share	Total CTs	Mean RHDI
Halifax	27	56%	7	15%	14	29%	48	0.22
Montréal	348	57%	119	19%	145	24%	613	0.19
Ottawa - Gatineau	47	40%	42	36%	27	23%	117	0.30
Toronto	209	44%	104	22%	166	35%	479	0.29
Hamilton	35	44%	22	28%	23	29%	79	0.35
Winnipeg	48	60%	14	18%	18	23%	80	0.20
Calgary	49	59%	19	23%	14	17%	83	0.22
Vancouver	138	62%	43	19%	42	19%	223	0.20
Sample Total CTs	901	52%	370	22%	449	26%	1720	0.24

Source: Statistics Canada, Census 2006 Custom Tabulation EO1790

The distribution of rental disadvantage is not even across the eight CMAs and bears little association with the rankings by rental housing percentage (Table 5). The top three CMAs by highest mean RHDI in the sample are Hamilton (0.35), Ottawa (0.30) and Toronto (0.29). Rental housing neighbourhoods in those three CMAs are rated the most disadvantaged of the eight. In contrast, Montréal (0.19), Winnipeg (0.20) and Vancouver (0.20) show the least disadvantage among rental neighbourhoods on average.

The average degree of disadvantage is a summary statistic that masks differences in the distribution of rental disadvantage within each CMA. As noted in Table 5, Low disadvantage is most commonly found among rental neighbourhoods in Vancouver (62%), Winnipeg (60%) and Calgary (59%). Moderate disadvantage is most common in Ottawa (36%), Hamilton (28%) and Calgary (23%). High disadvantage is most common in Toronto (35%), Halifax (29%) and Hamilton (29%). Halifax appears to have the most bi-polar distribution of renter disadvantage in the sample with 56% of CTs rated as low, 29% as high and only 15% as moderate. This suggests there are two distinct rental neighbourhood groups in Halifax with little in-between.

Table 6
Rental Housing Disadvantage Index Distribution Regionally within the Toronto CMA, 2006

Figures limited to census tracts with 25% or more rental housing.
Low disadvantage is RHDI below 0.26; Moderate 0.26 to 0.50; High above 0.50.

Region	Low Total	Low Share	Moderate Total	Moderate Share	High Total	High Share	Total CTs	Mean RHDI
City of Toronto	139	36%	93	24%	152	40%	384	0.34
Suburbs Outside the City	71	74%	11	11%	14	15%	96	0.05
Peel Region	37	64%	8	14%	13	22%	58	0.18
York Region	16	80%	3	15%	1	5%	20	-0.05
Suburbs minus Peel and York	17	100%	0	0%	0	0%	17	-0.26
Toronto CMA Sample Total	210	44%	104	22%	166	35%	480	0.29

Source: Statistics Canada, Census 2006 Custom Tabulation EO1790

In the City of Toronto, renters are much more disadvantaged than in the suburbs of the CMA. The City of Toronto's mean RHDI of 0.34 is 5.8 times higher than the suburban "905 region" which has a mean RHDI of 0.05 (Table 6). Renters in Peel Region are noticeably more disadvantaged than elsewhere in the suburban "905 region" with a mean RHDI of 0.18 but they are still better-off compared to renters in the City of Toronto. In York Region, the mean RHDI is negative 0.05 indicating below-average disadvantage. In the remaining outer suburbs, the mean RHDI is very low at negative 0.26.

In terms of the distribution of rental disadvantage, 40% of rental neighbourhoods in the City of Toronto have high disadvantage. This is more than double the percentage in the "905 suburbs" outside the City (40% vs. 15%). Renters within the City of Toronto appear to be polarized between low disadvantage (36%) and high disadvantage (40%) with only 24% in the moderate range. In contrast, rental neighbourhoods in the "905 suburbs" have mostly low disadvantage scores (74%) with few neighbourhoods in the moderate or high range which occur solely in Peel or York Regions. Rental neighbourhoods in the remaining suburbs of the Toronto CMA (parts of Durham, Halton, Dufferin and Simcoe regions) are all in the low disadvantage range. Renters living in these outer suburban renters are much better off compared to City of Toronto, Peel and York.

APPENDIX

Table 7
Rental Housing Disadvantage Index by Mean Indicator Standard Score
High Disadvantage Census Tracts, Eight CMAs 2006

Figures limited to census tracts with 25% or more rental housing.

High disadvantage is RHDI > 0.50.

CMA	Mean RHDI	Household Income	Adequate Housing	Suitable Housing	Affordable Housing
Halifax	0.80	0.77	0.63	0.84	0.94
Montréal	0.89	0.56	0.78	1.32	0.91
Ottawa	0.78	0.67	0.14	1.47	0.82
Toronto	0.74	0.66	0.77	1.09	0.43
Hamilton	0.75	0.60	0.59	0.99	0.81
Winnipeg	0.83	0.80	0.46	1.19	0.88
Calgary	0.70	0.30	0.31	1.80	0.39
Vancouver	0.76	0.53	0.35	1.59	0.56

Table 8
Rental Housing Disadvantage Index by Mean Indicator Standard Score
Moderate Disadvantage Census Tracts, Eight CMAs 2006

Figures limited to census tracts with 25% or more rental housing.

Moderate disadvantage is RHDI 0.26 to 0.50.

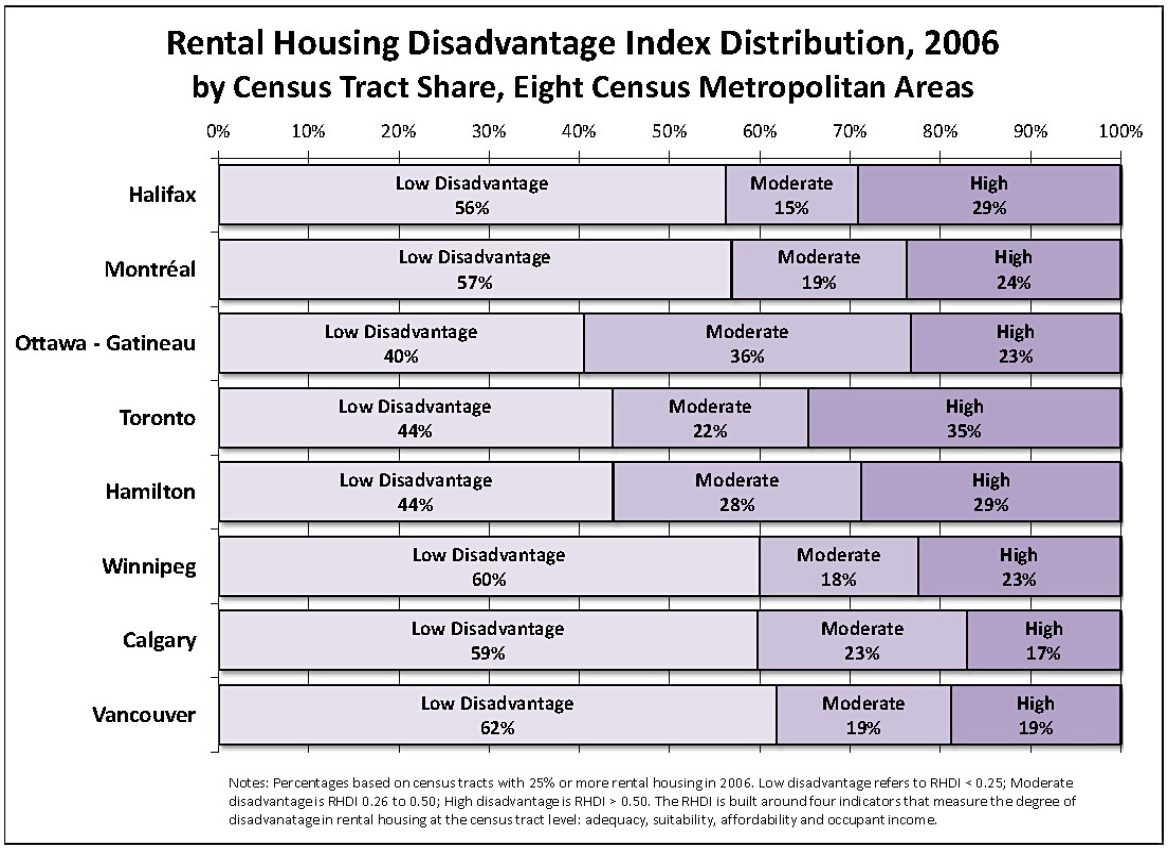
CMA	Mean RHDI	Household Income	Adequate Housing	Suitable Housing	Affordable Housing
Halifax	0.36	0.68	0.13	0.16	0.46
Montréal	0.37	0.33	0.39	0.32	0.46
Ottawa	0.39	0.49	0.21	0.46	0.39
Toronto	0.38	0.41	0.16	0.61	0.34
Hamilton	0.37	0.42	0.05	0.48	0.53
Winnipeg	0.35	0.32	-0.06	0.63	0.49
Calgary	0.37	0.35	0.25	0.43	0.47
Vancouver	0.37	0.30	0.17	0.65	0.39

Table 9
Rental Housing Disadvantage Index by Mean Indicator Standard Score
Low Disadvantage Census Tracts, Eight CMAs 2006

Figures limited to census tracts with 25% or more rental housing.
Low disadvantage is RHDI < 0.26.

CMA	Mean RHDI	Household Income	Adequate Housing	Suitable Housing	Affordable Housing
Halifax	-0.11	-0.29	-0.23	0.00	0.07
Montréal	-0.17	-0.05	-0.26	-0.26	-0.09
Ottawa	-0.06	0.02	-0.10	-0.15	0.00
Toronto	-0.12	-0.11	-0.20	-0.24	0.06
Hamilton	0.06	0.17	-0.07	0.03	0.13
Winnipeg	-0.08	0.00	-0.33	-0.05	0.06
Calgary	0.02	0.29	0.01	-0.19	-0.03
Vancouver	-0.02	0.11	-0.20	0.10	-0.10

Figure 1



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Source: Statistics Canada,
Census 2006 Custom
Tabulation EO1790