Housing Assessment Resource Tools (HART)

HART HOUSING NEED ASSESSMENT TOOL

Methodology Guide

Why is a new approach to Housing Need Assessment necessary?

The National Housing Strategy (2018) represents a re-entry into the housing policy arena by the federal government, and with the National Housing Strategy Act (2019), the federal government has committed to progressively realize the right to adequate housing for everyone in Canada. This law creates an obligation for all Canadian governments to work together to progressively realize the right to adequate housing with an emphasis on the needs of the most marginalized populations.

In order to work together effectively, all levels of government should have simple and comparable ways to

1. Define adequate housing
2. Calculate housing deficits
3. Plan to meet the housing needs of a growing and changing population

The National Housing Strategy Act also mandates all levels of government to focus on equity - improving housing outcomes for persons in greatest need - and the federal government mandates GBA+ (gender and intersectional analysis) of all programs.

Without simple, robust, equity-focused, comparable, and replicable housing need assessments at all levels of government, it is impossible to set meaningful housing targets, or measure progress towards this right. The Housing Assessment Resource Tools (HART) project HART, funded by the CMHC's Housing Supply Challenge, helps meet that challenge. We detail below some of the challenges faced by the three levels of government when looking to solve this problem, and how our project aims to solve them.

There are currently multiple definitions of "affordable housing" used in government programs.

These include definitions based on average market rent, which, in many cases, do not reflect a household's ability to pay.

There is no standard method to measure housing need.

In many places, social housing waitlists are used, which is problematic because management of these lists is highly politicized. For instance, in Ontario:

- If a prospective tenant uses a portable housing benefit such as Canada Housing Benefit, they may be removed from the waitlist with no guarantee of a permanently affordable home.
- If a prospective tenant refuses a unit, they may be removed from the waitlist.
- Since social housing wait lists are often 7 to 10 years long, prospective tenants take themselves off the list or are dropped when they move with no clear forwarding address.
- Tenants may be on the waitlists of multiple governments.

In other places, such as BC, each municipality comes up with their own methodology for assessing housing need, making it difficult to compare analyses across time and space.

Given these shortcomings, we base our analysis on core housing need (CHN), which is measured by the census every five years. A household in CHN is one whose dwelling is considered unsuitable (because of overcrowding), inadequate (because of poor state of repair) and/or unaffordable (because the household is paying more than 30% of pre-tax income) and whose income levels are such that they could not afford alternative suitable and adequate housing in their community. The federal government has pledged to lift 530,000 households, out of a total of almost 1.7 million households, out of core housing need by 2028.[1]

[1] However, as we use core housing need, we recognize its limitations and are working with the CMHC, the Federal Housing Advocate, and Statistics Canada to improve these methods. Exclusions from core housing need include: individuals and households without shelter or in emergency shelters (homeless); individuals and households in congregate housing such as rooming houses and long-term care facilities; students living away from home; households forced to move away from high-cost areas (suppressed demand). The census does not have enough data to estimate core housing need for 2SLGBTQ+ households; core housing need currently excludes several elements of adequate housing, such as: accessibility; security of tenure; location; cultural adequacy. With all these flaws, census core housing need is still the only national measure that can be compared across jurisdictions (including smaller communities) and replicated every five years.

The various current strategies to measure housing need do not group households according to their needs

Current systems often use deciles (where the population is split into ten even groups) or quintiles (where the population is split into five even groups). These methods less helpful for measuring housing need or developing meaningful housing policy because they dilute those in greatest need by either a) breaking them up into too many categories to be helpful to housing policy, or b) including households with far less need in the category. HART's model adopts a model based on best practice methods used in the US; Vancouver, Canada; and Melbourne, Australia. We define five household income categories for meaningful housing need assessment:

- Very low income: 20% or less of Area Median Income (AMHI), generally equivalent to shelter allowance for welfare recipients. *In many Canadian communities, this equates to a housing cost of $375 per month or less. Approximately 6% of all Canadian households in this category are most at risk for homelessness due to inadequate economic support.*
- Low income: 21-50% AMHI, generally equivalent to one full-time minimum wage job. *Recent research on 'rental wage' shows that the private market is incapable of producing rental homes at $750 per month or less. This category includes about 16% of Canadian households.*
- Moderate income: 51-80% AMHI, equivalent to starting salary for a professional job such as nurse or teacher. *In many Canadian communities, the average home price requires a substantially higher gross income to move into market homeownership, approximately 20% of Canadian households.*

  The vast majority of Canadian households in core housing need are found in the 40% of households with very low to moderate incomes.
- Average Income: 81-120% AMHI, representing the 'middle class' and about 20% of total Canadian households. *Although few of these households are in core housing need, average income households are currently locked out of the first-time homebuyer market in most Canadian cities.*
- High Income: More than 120% AMHI, approximately 40% of Canadian households, the group with most housing wealth.[2]

By using a percentage of AMHI for each jurisdiction, we overcome hurdles to comparability, related to inflation and the wide range of housing costs across communities.

[2] HART data; Statistics Canada Table 98-10-0058-01; Canadian Real Estate Association August 2022 home sales figures; Nesto mortgage calculator https://www.nesto.ca/calculators/mortgage-payment/

The needs of marginalized and underserved communities are not clearly represented in most HNAs

Since 1995, the Canadian government has been committed to a gender and intersectional analysis (GBA+) of all policies and programs. Despite this commitment, housing need assessments have widely varying methods and willingness to analyse housing need for priority populations, which include single mothers, seniors, newcomers to Canada (including refugee claimants), people with disabilities, Indigenous and racialized households.

We break down deficit by all priority populations identified in the census. However, certain priority populations cannot currently be identified through the census, including 2SLGBTQ+ people and survivors of domestic violence.

In summary, despite limitations of available data, the HART housing need assessment is:

- Using the most robust and reliable source of disaggregated nationwide data available in Canada
- Replicable over time – allowing objective monitoring of targets
- Comparable within and between scales of government – it moves all jurisdictions and actors towards a common language on affordable housing
- Simple – it is easy to derive for any jurisdiction, lessening dependence on consultants
- Equity-focused
    - by including maximum housing costs for each income category, it allows governments to set housing targets that will be genuinely affordable
    - by Including household sizes, it provides guidance to governments to prevent overcrowding
    - by includes priority populations, it provides a framework for governments to apply a GBA+ analysis towards sub-targets (e.g. 33% of funding for women-led households [CMHC], 20% of new affordable rental homes For Indigenous By Indigenous [City of Toronto])

The HART HNA tool is based on a method that is simple, comparable, equitable and replicable. With wide adoption across Canada, communities would be better able to identify their housing need now and in the future, pinpoint the strengths and weaknesses in how their current housing stock meets the needs of the community, compare progress to neighbouring and similar communities in Canada, and address need where it is most dire.

What data does the Housing Needs Assessment Tool use?

How populations are grouped

Geography

In line with Statistics Canada, we produce outputs related to Census Divisions (CDs) and Census Subdivisions (CSDs), which often roughly aligns with municipal political boundaries and regional/provincial/territorial boundaries. While it is possible to obtain data for more granular geographical areas, the more granular the data, the more likely for census suppression methods to kick in, i.e. nullifying the data to protect individuals from being identified.

Income

We classify households (HHs) into five variable categories in relation to Area Median Household Income (AMHI).[3] We chose to use AMHI for a number of reasons:

- AMHI is specific to a community. As area median incomes differ between communities, using nominal dollar values to classify HH in CHN may not reflect local conditions appropriately.
- Using a measure like AMHI also means that these categories do not need to be adjusted to reflect inflation.
- AMHI can easily be compared across years. The buying power of someone making 50% of AMHI will be relatively consistent, even as the dollar value of that AMHI fluctuates across census years.

One *disadvantage* to the use of AMHI is that HHs in CHN across multiple communities cannot be summed together in order to represent conditions in specific larger geographic areas; an average income HH in one community may be categorized as a low income HH in another community. Our outputs include some larger regional areas, but cannot provide custom geographical outputs.

Our five income categories are:

- Very low income: 20% or less of Area Median Income (AMHI), generally equivalent to shelter allowance for welfare recipients. *In many Canadian communities, this equates to a housing cost of $375 per month or less. Approximately 6% of all Canadian households in this category are most at risk for homelessness due to inadequate economic support.*
- Low income: 21-50% AMHI, generally equivalent to one full-time minimum wage job. *Recent research on 'rental wage' shows that the private market is incapable of producing rental homes at $750 per month or less. This category includes about 16% of Canadian households.*

[3] Based on methods used in the USA, Vancouver, and Melbourne.

- Moderate income: 51-80% AMHI, equivalent to starting salary for a professional job such as nurse or teacher. *In many Canadian communities, the average home price requires a substantially higher gross income to move into market homeownership, approximately 20% of Canadian households.*
  The vast majority of Canadian households in core housing need are found in the 40% of households with very low to moderate incomes.
- Average Income: 81-120% AMHI, representing the 'middle class' and about 20% of total Canadian households. *Although few of these households are in core housing need, average income households are currently locked out of the first-time homebuyer market in most Canadian cities.*
- High Income: More than 120% AMHI, approximately 40% of Canadian households, the group with most housing wealth.[4]

Based on international, research-based practice, HART classification categories are designed for data to be best distributed to be translated into policy or housing initiatives that serve the maximum number of HHs with similar needs.[5]

Priority populations

Please find a detailed table of descriptors and definitions for each priority population in Appendix B.

The methodology facilitates a GBA+ (gender and intersectional approach) which is mandated for all federal initiatives, by assessing the proportion of CMHC priority populations (e.g. single mother led, Indigenous, new migrant HHs).

Variance and accuracy

When showing count data, Statistics Canada employs random rounding in order to reduce the possibility of identifying individuals within the tabulations. Random rounding transforms all raw counts to random rounded counts. Reducing the possibility of identifying individuals within the tabulations becomes pertinent for very small (sub)populations. All counts are rounded to a base of 5, meaning they will end in either 0 or 5. The random rounding algorithm controls the results and rounds the unit value of the count according to a predetermined frequency. Counts ending in 0 or 5 are not changed.

In cases where count values are very low, to avoid disclosure of individuals, statistic suppression methods are employed. This results in aggregate count data varying slightly from the sum of disaggregated count data. For example, the total number of HHs in CHN may differ slightly from the sum of each income category disaggregated by HH size.

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4 HART data; Statistics Canada Table 98-10-0058-01; Canadian Real Estate Association August 2022 home sales figures; Nesto mortgage calculator https://www.nesto.ca/calculators/mortgage-payment/.

5 Based on methods used in the USA, Vancouver, and Melbourne.

How the Housing Needs Assessment Tool works

We calculate housing need using the following methods:

1. Identify deficit, based on existing residents and stock, using the latest available census data, by
    a. Income category/maximum affordable housing cost
    b. Household size
    c. Priority population
2. Estimate future housing need based on population projections

Determining existing housing need

We have five standard outputs for our Housing Needs Assessment: Income Categories and Affordable Shelter Costs, CHN by Income Category, CHN By Household Size, Affordable Housing Deficit, and CHN by Priority Population. Sample interpretations for these outputs can be found in "Appendix C: Sample interpretations" on page 22. The method for calculating and visualizing these outputs follows.

1. Calculating Income Categories and Affordable Shelter Costs

There are four percentage points that separate the five income categories: 20%, 50%, 80%, 120%. Income is often considered a continuous variable, but household income data as captured in the census is rounded to the nearest dollar, and is therefore a discrete variable.

The Very Low Income category "up to 20% of AMHI" contains all HH incomes from zero to 20% of AMHI (note that incomes generally may be negative, but CHN only examines households with income greater than zero). The Low Income category "21% to 50% of AMHI" should start immediately after the first category without any overlap to ensure that every household is assigned to one, and only one, income category. So, while the income category is named "21% to 50% of AMHI," in practice the income range is calculated as starting at "20% of AMHI + $1" ($1 being the smallest increment in the household income variable) and ending at "50% of AMHI". This rule is applied to the three other income categories too, noting that the High Income category "121% + of AMHI" has no upper bound.

Affordable shelter cost for each income category is a function of the household incomes associated with each income category. These incomes need to be transformed in two respects. First, transform annual income into monthly shelter costs requires income to be divided by 12 months, which gives us the households monthly income. Second, we apply an affordability benchmark to the monthly income. We use 30% of income as our benchmark, meaning that shelter costs above this benchmark are unaffordable, and those below are affordable.

$$Affordable\ Shelter\ Cost = \frac{Annual\ Household\ Income}{12\ \text{months}} * 30\%$$

Sample calculation for the "21% to 50% of AMHI" income category:

$$Assume\ AMHI = \$100{,}000 \text{ per year}$$

$$Income_{Lower\ bound} = AMHI * 20\% + \$1 = \$100{,}000 * 20\% + \$1 = \$20{,}001$$
$$Income_{Upper\ bound} = AMHI * 50\% = \$100{,}000 * 50\% = \$50{,}000$$

$$Affordable\ shelter\ cost_{Lower\ bound} = \frac{Income_{Lower\ bound}}{12 \text{ months}} * 30\%$$
$$= \frac{\$20{,}001}{12} * 30\% = \$500 \text{ per month}$$
$$Affordable\ shelter\ cost_{Upper\ bound} = \frac{Income_{Upper\ bound}}{12 \text{ months}} * 30\%$$
$$= \frac{\$50{,}000}{12} * 30\% = \$1250 \text{ per month}$$

2. Calculating Core Housing Need by Income Category

The percent of HH in CHN is calculated by dividing the total number of HHs that were assessed for CHN by the number of HHs in each income category. As discussed, not all HHs are examined for CHN (e.g. HHs with incomes equal to, or less than, zero are not examined) Give this data gap , we need the denominator to be households examined for core housing need and not total private households.

$$\text{For each income category } x\text{:}$$
$$\%\ \text{HHs in CHN}_x = \frac{\text{HHs in CHN}_x}{\text{HHs examined for CHN}_x}$$

3. Calculating Core Housing Need by Household Size and Income Category

The relative share of HHs in CHN by HH size and income category is determined by dividing the number of HHs in CHN for each HH size category by the total number of HHs in CHN. This calculation is completed for each income category. The sum of these fractions will equal one (i.e. 100%) as long as there are a non-zero number of HHs in CHN within a given income category. If there are zero HHs in CHN then the denominator will be zero and the solution will be undefined.

$$\text{For each income category } x\text{,}$$
$$\text{and household size category } y\text{:}$$
$$\%\ \text{of } x\ \text{HHs in CHN}_y = \frac{\text{HHs in CHN}_{x,y}}{\text{HHs examined for CHN}_x}$$

4. Calculating Affordable Housing Deficit

The Affordable Housing Deficit is a consolidation of the data from CHN by Income Category and Household Size into a single table. No additional data has been brought in. This table displays in absolute numbers how many people are in each household size-income category.

5. Calculating Core Housing Need in Priority Populations

The percent of HHs in CHN for each priority population is calculated by dividing the number of HHs in CHN for a given priority population by the total number of HHs assessed for CHN in that priority population.

$$\text{For each income category } x,$$
$$\text{and each priority population } p:$$
$$\%\ \text{HHs in CHN}_{x,p} = \frac{\text{HHs in CHN}_{x,p}}{\text{HHs examined for CHN}_{x,p}}$$

Projecting household growth

There are numerous ways to project household growth in communities, all with unique advantages and drawbacks, none of them perfect. We chose a simple formula of calculating and projecting historical growth rates for ease of application cross-Canada. We also compute regional growth rates for broader context and trend forecasting.

In addition to projecting household growth, we provide guidance on how to turn projected household growth in projected housing need in terms of required units, and suggestions for how individual municipalities may use community knowledge to fine-tune growth projections.

Estimating growth

Our method for projecting household growth, which is applied to each cross section of income category and household size, allows us to estimate the number of households, their size, and income as a result of 'Business as Usual' growth and policy based on data from 2006 to 2021. We estimate community household growth both using historic growth rates at the Census Subdivision (municipal) level, as well as the Census Division (regional) level, which provides context to compare a communities' estimated growth against its surrounding area.

The estimation of growth uses a line of best fit for each income category and household size for every community. Specifically, we use the "TREND" function in Excel to calculate the line of best fit across three census periods: 2006 being period "0," 2016 as period "2," and 2021 as period "3," where each period represents 5 years. The actual value used is the number of private households – not households examined for core housing need nor households in core housing need. The "TREND" function then allows the line of best fit to be extrapolated into the future, which we set as period "5," representing the year 2031.

We apply this extrapolation to different values depending on whether we are estimating household growth by household size or by household income, or both. We use HART's custom census data for each of three census years to find the number of private households in each household size

subcategory (i.e. 1 person, 2 person, etc.) or income category (i.e. Very Low Income, Low Income, etc.) or both (i.e. 1 person Very Low Income, 1 person Low Income, etc.). Once we have that value for all three years we apply the extrapolation for each category, and then calculate the total as the sum of the categories. This process tends to lead to a different total than if we applied the extrapolation to the category totals for each year, but we think it's important for the totals to equal the sum of the relevant categories when communicating the results.

Given the extraordinary growth across Canada since the census collection in 2021 that these growth projections are likely underestimating the number of households and should be contextualized in every community based on immigration, demographic shifts, and the growth in housing supply. HART's projection represents the trend that existed between 2006 and 2021 and therefore reflects the context that existed in that time period. New housing policies are being adopted across the country that are not accounted for in the projections. We recommend using HART's projection as the foundation of, or as a comparison to, future housing targets. Further discussion can be found below in sections "What is not included in projections," and "How communities could build upon these projections."

Estimating unit mix

In addition to income and household size, we are also able to estimate the household growth by family type, which allows us to add further utility to our projections for community planning by estimating the types of units required.[6]

For the purpose of translating household sizes to bedroom requirements, we use only the specific seven categories bolded in the list below:

- Census family households
    - One census family households without additional persons
        - One couple census family without other persons in the household
            - Without children
            - With children
        - One lone-parent census family without other persons in the household
    - One census family households with additional persons
        - One couple census family with other persons in the household
            - Without children

[6] Census family type data, table 11-10-0017-01, is available for download from Statistics Canada here.

        - With children
            - One lone-parent census family with other persons in the household
    - Multiple-family households
- Non-census family households
    - Non-family households: One person only
    - Two-or-more person non-census family household

We elected to use these groups because they account for all categories that would affect the type of unit needed to house them. For example, the aggregate category “non-census family households” was chosen as both (i) one person households and (ii) two or more-person non-census family households would have the same type of bedroom requirement, i.e. one bedroom per individual in the non-census family household.

Below we present a step-by-step guide on how to estimate the required housing unit mix in 2026 based on projected household growth. We also illustrate each step below for the example of low-income households in Peel, Ontario.

1. Calculate 2016 family type ratios by number of persons and income category

First, we calculate the proportion of households in each family type (family type ratio) by dividing the number of households in each family type (see "Appendix D: Family type bedroom requirements" on page 27) by the total number of households in the respective income-household size category (HART data). This calculation is repeated for each income-household size category.

$$Family\ type\ ratio\ =\ \frac{HH\ in\ Family\ Type}{All\ HH}$$

We elected to measure the family structures as a proportion of total households because of census suppression and rounding policies, which means that total figures may not equal the sum of each category. This method remains accurate (within 5-10 households) of the nominal totals when implemented.

2. Apply family type ratios to 2026 households.

Next, we can estimate future family type mix for 2026. For each income category, we multiply each household size category by the matrix of family type ratios.

$$Family\ type\ mix_{\ income\ category}\ =\ HH\ in\ size_{\ income\ category}\ \times\ Family\ type\ ratio$$

3. Calculate bedroom requirements for projected households.

Using National Occupancy Standards, we can estimate the size of units required for the number of households based on family type. For the purposes of this estimation, as the ages and sex of children within families are not available, we assume that every child would require their own bedroom. Note that this assumption may lead to larger estimated unit size needs in places with many young children. On the other hand, this assumption is in line with long-term community planning, which can accommodate families as they grow and age.

The conversion to bedroom requirements table, found in Appendix D, is applied for each family type within each household size-income category. The results are then regrouped by required number of bedrooms.

$$Total\ required\ unit\ type\ =\ family\ type\ mix\ *\ total\ HH$$

4. Add in total required unit types for each income category

This calculation is then be repeated for each of the five income categories to arrive at a complete estimate of required units by size and income categories for any one geography.

Example calculations, for the region of Peel, Ontario.

The tables below run through the steps above for households in the Low-Income (21% to 50% of AMHI) category in Peel.

1. For each income category, calculate 2016 family type ratios

In this example we will focus only on the Low Income category for clarity.

Peel Low Income households (2016)					
	Number of Persons/ Household Size				
	1 person	2 persons	3 persons	4 persons	5 persons
Without children	0	11,530	0	0	0
With children	0	0	4,850	5,740	2,915
One lone-parent census family without other persons in the household	0	6,190	3,465	1,175	380
One couple census family households with additional persons	0	0	835	530	570
One lone-parent census family with additional persons in the household	0	0	570	260	0
Multiple-family households	0	0	0	230	585
Non-census family households	24,550	1625	330	100	45

Divided by the totals for each household category

Total	24,550	19,345	10,050	8,035	4,495

Equals

Peel Low Income households (2016)					
	Number of Persons/ Household Size				
	1 person	2 persons	3 persons	4 persons	5 persons
Without children	-	60%	-	-	-
With children	-	-	48%	71%	65%
One lone-parent census family without other persons in the household	-	32%	34%	15%	8%
One couple census family households with additional persons	-	-	8%	7%	13%
One lone-parent census family with additional persons in the household	-	-	6%	3%	-
Multiple-family households	-	-	-	3%	13%
Non-census family households	100%	8%	3%	1%	1%

2. For each income category, retrieve the projected number households in 2026 by household family type ratios

Peel Low Income households (2016)					
	Number of Persons/ Household Size				
	1 person	2 persons	3 persons	4 persons	5 persons
Without children	-	60%	-	-	-
With children	-	-	48%	71%	65%
One lone-parent census family without other persons in the household	-	32%	34%	15%	8%
One couple census family households with additional persons	-	-	8%	7%	13%
One lone-parent census family with additional persons in the household	-	-	6%	3%	-
Multiple-family households	-	-	-	3%	13%
Non-census family households	100%	8%	3%	1%	1%

Multiply by

Peel Estimated Households (2026)	
	Low income
1 person	33,661
2 persons	26,015
3 persons	11,488
4 persons	9,031
5+ persons	4,660

Equals in number of households by family type

Peel Low Income households (2016)					
	Number of Persons/ Household Size				
	1 person	2 persons	3 persons	4 persons	5 persons
Without children	-	15,506	-	-	-
With children	-	-	5,544	6,452	3,022
One lone-parent census family without other persons in the household	-	8,324	3,961	1,321	394
One couple census family households with additional persons	-	-	954	596	591
One lone-parent census family with additional persons in the household	-	-	652	292	-
Multiple-family households	-	-	-	259	606
Non-census family households	33,661	2,185	377	112	47
Total	33,661	26,015	11,488	9,031	4,660

3. For each income category, calculate bedroom requirements for projected households using bedroom conversion rules from Appendix D

Peel Low Income households (2016)						
Required bedrooms	Number of Persons/ Household Size					
	1 person	2 persons	3 persons	4 persons	5 persons	Total
1 bed	33,661	15,506				49,167
2 beds		10,510	5,544	259		16,312
3 beds			5,944	6,452	606	13,002
4 beds				2,321	3,022	5,343
5 beds					1,032	1,032

4. Sum up bedroom requirements for each household size category and income group.

Peel Housing Unit Composition by Income Group and Number of Bedrooms (2026)						
Required bedrooms	Very Low Income	Low Income	Moderate Income	Median Income	High Income	All incomes
1 bed	13,251	49,167	38,490	36,462	37,868	175,238
2 beds	3,746	16,312	18,791	25,202	49,277	113,328
3 beds	1,777	13,002	21,641	31,994	83,500	151,914
4 beds	579	5,343	11,660	13,034	27,478	58,094
5 beds	137	1,032	3,946	5,903	14,743	25,760

Note that this table is an estimate of the total number of units by type and with reference to an income category that is needed to house a community's estimated population in 2026. We provide the total estimated housing unit composition mix rather than an estimate of additional units needed as a way for communities to compare what will likely be needed in 2026 with community knowledge about issued permits, estimated construction completions, estimated started constructions, tear-downs, as well as strategic goals and policy directives.

What is not included in projections

Our simple projection methodology assumes that historical growth patterns continue. That is to say, this projection assumes that past patterns of growth will remain for the next ten years as they have for the previous ten. Future policy changes that impact for instance federal immigration numbers or housing supply, changes in population as a result of major events (e.g. COVID-19) as well as demographic transition are not included in these projections. In particular, this method does not include cohort adjustments, which impacts assumptions around mortality and birth rates in a 10-year projection. Importantly, while we provide regional projections to provide context for municipalities, our methods do not incorporate the effects of regional spill-overs. Regional spill-overs are likely significant in shaping household growth in large, connected urban regions such as Metro Vancouver and the Greater Toronto Area. Lastly, our projection methodology does not include economic development impacts. For example, growth or decline in key industries could induce changes in household growth trends in localities that are dependent on specific industries for the majority of the community's employment.

Despite the challenges and assumptions inherent in making projections, testing our projection methodology for household growth in Canada for 2016-2021 were within 2% of actual households in the 2021 Census.

How communities could build upon these projections

Household growth and housing stock influence each other, which makes household projections difficult. However, it also points to additional information communities may leverage to fine-tune their projections.

Incorporating information on planned development is likely fruitful. Official community plans (OCPs) typically identify what kind of housing is being prioritized in terms of supply. Development cost charges (DCC), fees levied on new developments to offset cost of infrastructure (such as sewer and water) required to service the constructed units, are a part of many municipalities' 10-year plans and can indicate what types of developments are most likely to happen. In addition, local Finance and Planning departments often set estimates and goals regarding the number of dwellings planned for a ten-year period. These could be used to project changes in housing stock, which could refine estimates of unit mix.

Secondly, while birth/mortality rates, international and intra-provincial migration are too detailed to incorporate into our projection methodology- which aims to be replicable over time, accessible, and comparable across geographies - they may be more reasonably integrated at the local scale and may help to fine-tune community projections. Communities are experts in their local dynamics and are best suited to make such adjustments. Similarly, changing demographics, e.g., age cohort structures, divorce rates, and changes in single person-household formation, for instance, could help fine-tune household growth projections. Moreover, many municipalities have already been conducting population projections; these projections could be used to triangulate projections produced via the HART methodology.

Any projections come inherently with the caveat that government rarely proceeds BAU, in addition to the wide variances in population projections.

Appendix A: Limitations to housing needs assessment data

HART relies on the Canadian Census, which is collected every five years by Statistics Canada. While the Census is the most consistent, reliable, nationwide source of disaggregated data, there are gaps and flaws in its data capture. These carry over to our model.

For one, only private, non-farm, non-reserve, owner- or renter-HHs with incomes greater than zero and shelter-cost-to-income ratios less than 100% are assessed for 'Core Housing Need.' This means there are critical gaps especially within indigenous communities living on reserve and the homeless.

Other groups that are excluded from measurement include:

- Non-family HH with at least one HH maintainer aged 15 to 29 attending school.[7]
- HH within Single Resident Occupancy (SRO) homes, long-term housing, and other forms of congregate housing (including long-term care or rooming houses).[8]
- Unsheltered households (in encampments or sleeping rough)
- Those in emergency homelessness or domestic violence shelters
- People in any form of congregate housing (long term care homes, rooming houses)
- Those in illegal apartments
- Students (their poverty is considered "temporary")

Census data also (beyond data on overcrowding according to National Occupancy Standards), does not adequately capture the housing need experienced by individuals or households who would prefer to be living in other circumstances: adults still living with their parents or roommates who would prefer to have their own homes, or people living in violent relationships. Similarly, this does is not well suited to capture migration pressure and HH displacement/replacement in communities outside of major centers due to affordability concerns.[9]

As a result, our data likely estimates the floor, not the ceiling, and core housing need will nearly always be greater than our calculations, especially among those in the lower income categories. In addition to these data gaps, further caution should be exercised in relation to 2021 Census data: this was a point in time when many low-income households obtained Canada Emergency Recovery Benefits (CERB)

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[7] These HH are considered not to be in Core Housing Need, regardless of their housing circumstances. Attending school is considered a transitional phase, and low incomes earned by student households are viewed as being a temporary condition: Statistics Canada.

[8] For census purposes, households are classified into three groups: private households, collective households and households outside Canada. These examples are forms of collective households, and only private households are assessed for CHN.

[9] This has implications for housing policy which could consider commuter communities and migration data, which are outside of the scope of this project.

during the first phase of COVID, leading to incomes greater than other welfare benefits. This may artificially lower core housing need in 2021 census.

With this in mind, the census likely grossly underestimates households in housing need. In turn, our housing need assessment tool indicates the floor, not the ceiling of actual housing need in Canada.

Appendix B: Priority Populations

Priority population	Census variable	Definition	Rationale
Women-led HH	PHM is female	A female-led HH.	Female-led HHs are almost twice as likely to be in housing need than male-led HHs.
Single mother-led HH	PHM is a female lone-parent	A female-led sole parent HH with children, defined as a priority population by the CMHC.	In 2016, 27% of female-led sole parent families were in housing need, as compared to 16% of male-led sole parent families.
Indigenous HH	Indigenous HH status	Indigenous HH status is defined as 50% or more of HH members self-identifying as Indigenous in the census. In contrast to other populations, we found that there was a significant difference in the number of HHs identified when PHM was used instead of HH status. To achieve best coverage of this population, and limit the risk of statistical suppression, we elected to use HH status instead of PHM.	Indigenous people are much more likely to experience homelessness and housing need, due to intergenerational trauma, poverty and violence caused by government policy, and are identified as a priority population by the CMHC. 18% of Indigenous HHs were in Core Housing Need in 2016, with much higher proportions in overcrowded or uninhabitable homes.
Racialized HH	Visible Minority HHs	Racialized HH status is defined as 50% or more of HH member self-identifying as a Visible Minority in the census. HH status was used rather than PHM. In contrast to other populations, we found that there was a significant difference in the number of HHs identified when PHM was used instead of HH status. To achieve best coverage of this population, and limit the risk of statistical suppression, we elected to use HH status instead of PHM.	In 2018, racialized groups were twice as likely to be in housing stress, and during the COVID-19 pandemic. The term 'racialized' is used instead of Visible Minority, as it better reflects that race is a social construct imposed on people.
Black-led HH	PHM is Black	A HH where the PHM self-identifies as Black. This indicator was chosen in addition to Racialized HHs to capture the recognizably distinct experience of Black persons in Canada.	Black and Indigenous people have been 2.7 times as likely to be in rent arrears.
New migrant-led HH	PHM is a recent immigrant (immigrated 2016 - 2021)	A HH led by an individual who immigrated within 5 years of the census, defined as a priority population by the CMHC.	
Refugee claimant-led HH	PHM immigrated with a refugee status	A HH led by an individual who immigrated with refugee status.	Refugees who are not privately sponsored often struggle to find affordable and well-located housing. Because of trauma associated with countries of origin, as well as difficulties in accessing employment and social services, 10.1% of newcomer youth experience homelessness.

Priority population	Census variable	Definition	Rationale
HH head under 25	PHM is 24 years or under	A HH led by an individual who is 24 years old or younger. This census measure (PHM is 24 years or under) is under-represented in the survey for CHN because non-family HHs with at least one maintainer aged 15 to 29 attending school are considered not to be in 'Core housing need' regardless of their housing circumstances. Thus, this population is likely experiencing more housing challenges than Census data suggests.	Young adults aged 18-25 form approximately 1.7% of the Canadian population but almost one-quarter of those not living with parents are in housing need.
HH head over 65	PHM is between 65 years and over	A HH where a senior, 65 years of age or older, is the PHM.	One-quarter of seniors living alone are in housing need. Well-located accessible homes, often with on-site or nearby health services, are particularly important for this group as they age in place and as many move from independent to assisted living.
HH head over 85	PHM is between 85 years and over	A HH where a senior, 85 years of age or older, is the PHM. This category is a subset of HH head over 65.	
HH with physical activity limitation	HH has at least one person with activity limitations reported for (Q11a, Q11b, Q11c or Q11f or combined)	A HH with one or more persons with an activity limitation.16 HH status rather than head of HH was chosen for this measure because an activity limitation would require special consideration regardless of whether the individual with the activity limitation was the head of HH or not.	Activity limitations are utilized here as a rough proxy for disability. Incidence of disability within very low income HHs is high: about 45% of those who are chronically homeless have a disability.
HH with mental activity limitation	HH has at least one person with activity limitations reported for Q11d and Q11e or combined Q11d and Q11e health issues	A HH with one or more persons with an activity limitation related to mental health.17 HH rather than PHM was chosen for this measure as these activity limitations would require special consideration regardless of whether the individual with the activity limitation was the PHM or not.	There is a national deficit of at least 100,000 supportive homes for people with intellectual disabilities, including at least 13,000 people over age 30 who still live with parents due to absence of other options, and another 10,000 under the age of 65 who have been institutionalized in hospitals or long-term care facilities. Most could live in their own homes with adequate support.

Transgender or Non-binary HH	HH includes a Transgender or Non-binary person	Transgender person: a man or woman whose gender does not correspond with sex assigned at birth Non-binary person: an individual who is not exclusively a man or a woman. For example, agender, fluid, queer, or Two-Spirit. Note that we were not able to order this data for the 3 Territories as they do not meet the 100k population requirement for crossing 3 variables within the data.	According to the 2018 Canadian Housing Survey (link), non-binary individuals were more likely to live in a dwelling requiring major repairs (29%) than men or women (7%).

Appendix C: Sample interpretations

Figure 1: Income Categories and Affordable Shelter Costs

This table shows the breakdown of what the 2020 dollar values of income and affordable shelter costs are at each income category.

AMHI is an annual dollar value calculated by Statistics Canada for the purposes of assigning all households in the corresponding area to one, and only one, of five income categories. This table can answer questions such as: "What is an affordable shelter cost for a Low Income Household in this community?"

			Peel (CD, ON)
Income Category	% of Total HHs	Annual HH Income	Affordable Shelter Cost (2020 CAD$)
Area Median Household Income		**$108,000**	**$2,700**
Very Low Income (20% or under of AMHI)	2.08%	<= $21,600	<= $540
Low Income (21% to 50% of AMHI)	14.82%	$21,600 - $54,000	$540 - $1,350
Moderate Income (51% to 80% of AMHI)	19.65%	$54,000 - $86,400	$1,350 - $2,160
Median Income (81% to 120% of AMHI)	24.26%	$86,400 - $129,600	$2,160 - $3,240
High Income (121% and more of AMHI)	39.18%	>= $129,601	>= $3,241

Sample Interpretation:

In the above example, the community's AMHI is $108,000. A household in the Low Income category would be earning no more than $54,000 annually. This annual income corresponds to an affordable shelter cost of no more than $1,350 per month.

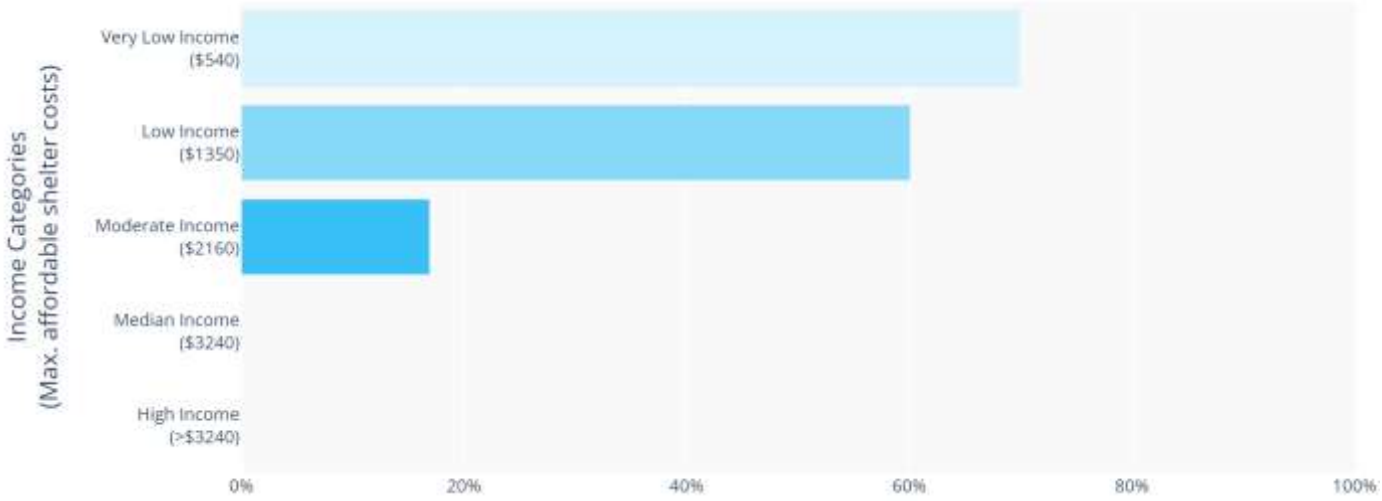
Figure 2: Percent of HHs in Core Housing Need, by Household Income Category

This chart uses the aggregate count data for all HH types from Statistics Canada to show the percentage of HHs in CHN by income category.

For each income category, the total number of HHs in CHN are listed, and the proportion of this income category in CHN (represented by the bar).

The vertical axis lists the income categories, and in brackets the 2020 the maximum affordable shelter cost for that income category, for the community in question.

This graph can answer questions such as: "Which income categories are most in need of housing solutions?"



Sample Interpretation:

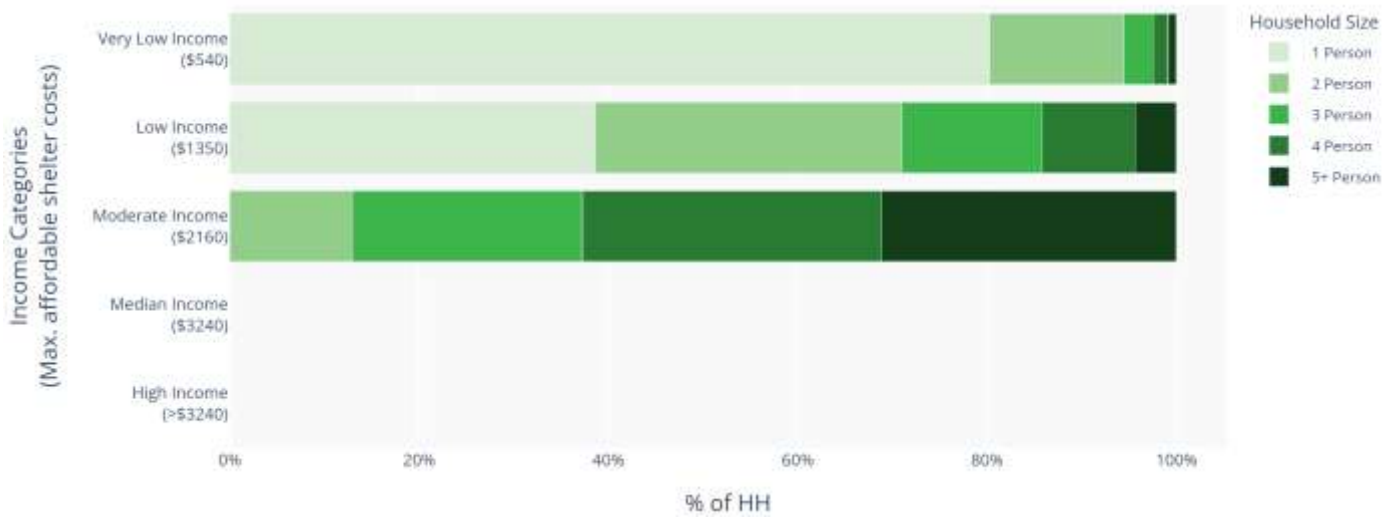
In the above example, the Very Low Income category has the highest proportion of HHs in CHN (approx. 70%), and an affordable shelter cost for this group is maximum $540.

Figure 3: Percent of Household Size Categories in Core Housing Need, by Household Income Category

This chart shows for each income category the breakdown of HH in CHN by HH size (i.e. number of individuals in a given HH). Looking only at those HHs in CHN within each income category, the percentages of HH size types were calculated by dividing the number of HHs in each HH size category (e.g. one-person HHs) by the total number of HHs in core housing need within that income category. All HHs fall into exactly one of the household size categories, which ensures a total of 100% for each bar.

The vertical axis lists the AMHI categories, and in brackets the maximum affordable shelter cost (2020 CAD$) for that income bracket for the community is shown.

This chart can answer questions such as: "Among Low Income HHs in Core Housing Need, how many are one-person HHs compared to HHs with two or more individuals?"



Sample Interpretation:

In the above example, approximately 80% of all HH in CHN that fall within the Very Low Income category are one-person HHs, whereas those HHs in CHN within the Moderate Income category show more need for three, four and five person households (about 25-30% each).

Figure 4: 2021 Affordable Housing Deficit

This table provides the number of HHs in Core Housing Need for each household size-income category as well as totals be income and by HH size.

This table can answer questions such as: "What is my community's housing deficit for low income, two-person households?"

						Peel (CD, ON)
Income Category (Max. affordable shelter cost)	1 Person HH	2 Person HH	3 Person HH	4 Person HH	5+ Person HH	Total
Very Low Income ($540)	5,095	895	200	100	55	6,345
Low Income ($1350)	15,010	12,575	5,795	3,820	1,695	38,895
Moderate Income ($2160)	0	1,880	3,525	4,600	4,520	14,525
Median Income ($3240)	0	0	0	0	0	0
High Income (>$3240)	0	0	0	0	0	0
Total	20,105	15,350	9,520	8,520	6,270	59,765

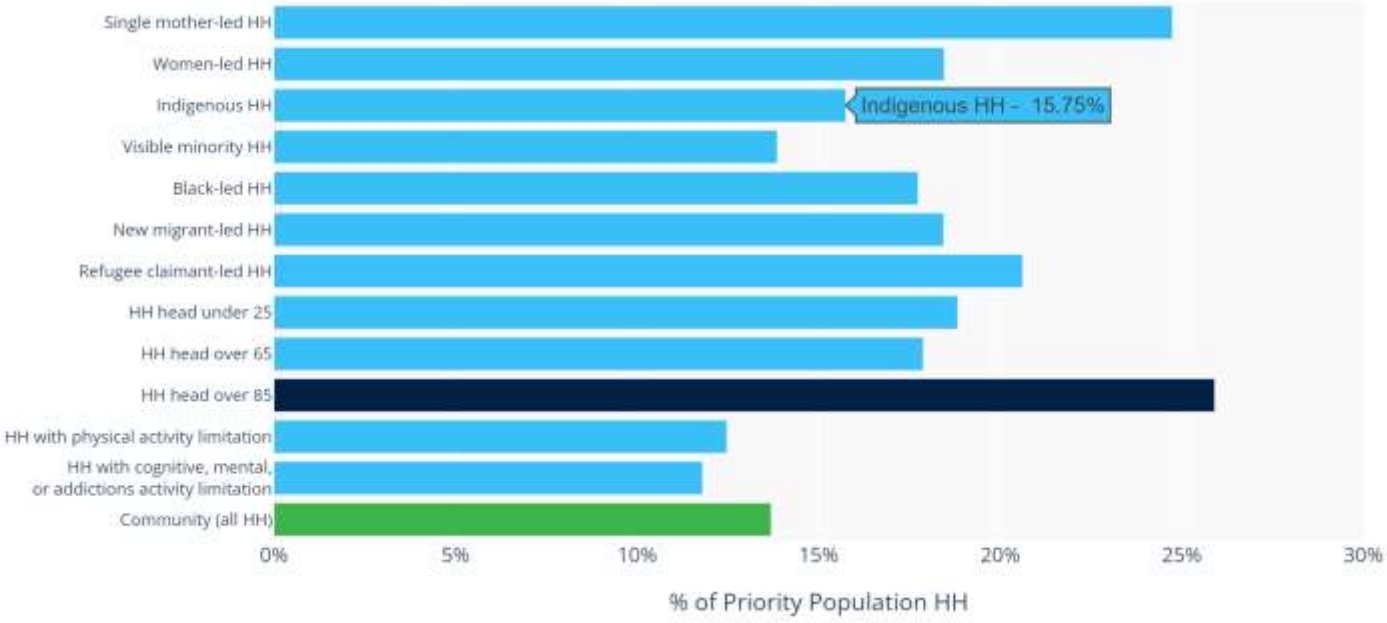
Sample Interpretation:

In the above example, to address the lack of affordable housing for Very Low Income households, the community needs additional units to house 5,095 one-person HH, 895 two-person HH, 200 three-person HH, 100 four-person HH, and 55 households with five or more people; 6,345 homes total that must be affordable to households in the Very Low Income category.

Figure 5: Percentage of Households (HHs) in Core Housing Need by Priority Population

This chart compares the share of HHs in Core Housing Need across populations that CMHC has identified to be at high risk of experiencing Core Housing Need.

This chart can answer questions such as: "In my community, how common is it for single mother-led HHs to be in core housing need?"



Sample interpretation:

In the above example, over one quarter of very elderly-led HHs (26%) are in CHN, the highest rate among those populations most at risk. This community also faces a significant proportion (24%) of single mother HHs in CHN.

Appendix D: Family type bedroom requirements

We use the National Occupancy Standards (NOS) as our basic set of assumptions. However, the NOS allows for children to share a bedroom if they are the same sex which introduces some complication. For simplicity, we assume that each child needs their own bedroom.

Family Type	Description	Bedroom requirements
One couple census family without other persons in the household - Without children	Married or common-law couple. These will always be two-person households.	Couples may share a bedroom. This family type requires a minimum of 1 bedroom. Beds = 1
One couple census family without other persons in the household - With children	Married or common-law couple with child(ren).	Couples may share a bedroom. This family type requires a unit with bedrooms equal to the household size - 1. For instance, a couple with 2 children (household size = 4) requires a unit with (4 - 1=3) 3 bedrooms. Beds = HH size - 1
One lone-parent census family without other persons in the household	Single parent with child(ren).	As parent and child(ren) each require their own bedroom, the required number of bedrooms is equal to the size of the household. Beds = HH size
One couple census family households with additional persons	One census family (couple with child[ren]) with other persons in the household, such as grandparent, roommate.	The couple can share a bedroom but we assume each child needs their own bedroom. Beds = HH size - 1
One lone-parent census family household with additional persons	One lone-parent census family (single parent with child[ren]) with other persons in the household, such as grandparent, roommate.	Since adults and child(ren) each require their own bedroom, the required number of bedrooms is equal to the size of the household. Beds = HH size
Multiple-family households	A household in which two or more census families live. An example of this could be two single mothers sharing a home with their respective children, or a married couple living with one partner's parents. Household size will be four or more in nearly all cases. In most communities, this family type is rare.	We cannot infer how many members are adults or children so we assume all are adults with at least two couples who can each share a bedroom. Beds = HH size - 2
Non-census family households	A non-couple or parent household. This classification includes one-person households and two or more-person non-census family household.	Since each adult requires their own bedroom, the required number of bedrooms is equal to the size of the household. Beds = HH size