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THE HUMAN DEVELOPMENT INDEX IN CANADA:  
RANKING THE PROVINCES AND TERRITORIES  
INTERNATIONALLY, 2000-2015: AN UPDATE

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# The Human Development Index in Canada: Ranking the Provinces and Territories Internationally, 2000-2015: An Update

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## Abstract

We develop internationally comparable estimates of the Human Development Index (HDI) for the Canadian provinces and territories over the 2000-2015 period. The HDI is a composite index composed of three dimensions (life expectancy, education and income) measured by four indicators (life expectancy at birth, average years of education, expected years of schooling and GNI per capita). We first replicate the Canadian estimates from the most recent Human Development Report (HDR) using data from Statistics Canada. Next, we generate estimates for the provinces and territories following the same methodology and using the same Canadian data sources. We make these estimates internationally comparable by scaling each province or territory's estimate to Canada's in the most recent HDR. This allows the provinces and territories to be ranked in the most recent HDR international rankings for all four component variables as well as the overall HDI. The highest HDI score in 2015 among the provinces and territories belongs to both Alberta and Ontario, which would be tied for fifth in the international rankings. The lowest ranking region is Nunavut, which would be in 45<sup>th</sup> place. Overall, our report highlights the diverse human development experiences of Canadians that are concealed by Canada's overall HDI.

# The Human Development Index in Canada: Ranking the Provinces and Territories Internationally, 2000-2015: An Update

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## Executive Summary

The Human Development Index (HDI) is an internationally recognized measure of socio-economic well-being. It is a composite index composed of three dimensions: life expectancy, education and income. In the most recent Human Development Report (HDR) produced by the United Nations Development Program, life expectancy is measured by life expectancy at birth, education is measured by average educational attainment and expected years of schooling, and income is measured by Gross National Income (GNI) per capita. Although the HDI is by no means a comprehensive measure of human development, it is a substantial improvement over the standard income-based metrics.

Canada falls into an impressive tenth place in the international 2015 HDI rankings published in the most recent HDR released in March 2017. However, this ranking hides significant regional variations among the Canadian provinces and territories. This report aims to calculate an internationally comparable HDI for each of the Canadian provinces and territories in order to evaluate their respective levels of human development relative not only to each other and the Canadian average, but also to the rest of the world.

To estimate the provincial and territorial HDIs, the Centre for the Study of Living Standards (CSLS) employs data sources that allow a breakdown by province and territory and used the methodology of the most recent HDR to replicate the estimates:

- In terms of the HDI, Alberta and Ontario ranked first among the provinces and territories in 2015 and Nunavut last;
- For life expectancy, British Columbia was the top region and Nunavut again ranked last;
- For average educational attainment; the Yukon had the highest among Canadian provinces and territories while Nunavut had the lowest;
- For expected years of schooling, Quebec ranked at the top and Nunavut came in last;
- For GNI per capita, Northwest Territories was in first place and Prince Edward Island was in last.

Using internationally comparable index values for the Canadian provinces and territories, we can then rank the provinces against the index values of other countries. Of the 188 countries in the most recent HDR rankings, Canada's provinces and territories ranked between:

- Fifth and 45th place in overall HDI;
- Fourth and 103<sup>rd</sup> in life expectancy;
- Second and 40<sup>th</sup> in average educational attainment;
- 13<sup>th</sup> and 85<sup>th</sup> in expected years of schooling;
- Second and 35<sup>th</sup> in GNI per capita.

Although most Canadian provinces and territories achieve impressive ranks in the international context, evidently Canada's overall HDI masks substantial variation among the different regions. For example, according to the HDI, Canadians living in Alberta and Ontario enjoy a quality of life similar to those residing in Singapore or Denmark, while Canadians in Nunavut face a quality of life similar to Latvians or Argentineans.

All provinces and territories experienced improvements in the HDI between 2000 and 2015, with the HDI index advancing between 0.29 per cent per year and 0.54 per cent per year. The two jurisdictions with the greatest improvement were Newfoundland and Labrador and Nunavut, which experienced HDI growth of 0.50 per cent per year and 0.54 per cent per year, respectively. Despite its rapid HDI growth, Nunavut remained the lowest ranked jurisdiction in both 2000 and 2015. There is some evidence of convergence in the HDI as three of the regions with the highest HDI in 2015 (Alberta, Ontario, and British Columbia) had below average growth in the HDI between 2000 and 2015, while two of the three bottom ranked regions (Nunavut and Prince Edward Island) had above average growth in the HDI.

# The Human Development Index in Canada: Ranking the Provinces and Territories Internationally, 2000-2015: An Update<sup>1</sup>

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## Introduction

The Human Development Index (HDI) is an internationally recognized measure of socio-economic well-being. It was first published by the United Nations Development Program (UNDP) in 1990 and estimates of the HDI have been released on an annual basis ever since.<sup>2</sup> The HDI has become a popular tool, particularly because its simple structure facilitates international comparisons of human development and well-being. The most recent Human Development Report contains HDI estimates for 188 of the 193 member countries of the United Nations.

Canada falls into an impressive tenth place in the international HDI rankings of the 2016 Human Development Report (HDR), which reports results up to 2015. However, this ranking glosses over regional variations among the Canadian provinces and territories. An earlier CSLS research report by Hazell *et al.* (2012) calculated an internationally comparable HDI for the provinces and territories in order to compare their respective levels of human development not only with each other and the Canadian average, but also with the rest of the world. Ugucioni (2016) reprised the work of Hazell *et al.* to update their findings. This report updates the work completed by Ugucioni (2016) by extending the HDI to 2015.

This report is divided into three major sections. In the first section, the Human Development Index is discussed. Next, the Centre for the Study of Living Standards (CSLS) replicates the estimates for Canada in the three dimensions of the HDI (life expectancy, education and income) published in the most recent HDR. The difficulties in precisely matching these numbers are also discussed. Finally, the provincial and territorial HDIs are calculated for the 2000-2015 period and the ranking results are discussed. These estimates as well as estimates for the pre-2000 period for all variables are provided in the Appendix Tables online.<sup>3</sup>

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<sup>1</sup> This report is an updated and revised version of Ugucioni (2016). The paper was presented at the annual meeting of the Canadian Economics Association at St. Francis Xavier University, Antigonish, Nova Scotia, June 2-4, 2017. The authors thank Gordon Anderson for comments. The Centre for the Study of Living Standards thanks the Government of Alberta for financial assistance to update the HDI database which is posted with this report. Comments are welcome and should be sent to [andrew.sharpe@csls.ca](mailto:andrew.sharpe@csls.ca).

<sup>2</sup> All of the twenty-six annual HDR reports, containing estimates for HDI in each respective year, are available on the UNDP website. The most recent report is available at <http://hdr.undp.org/en/2016-report>.

<sup>3</sup> Appendix tables are available at: <http://www.csls.ca/reports/csls2017-06Appendix.pdf>



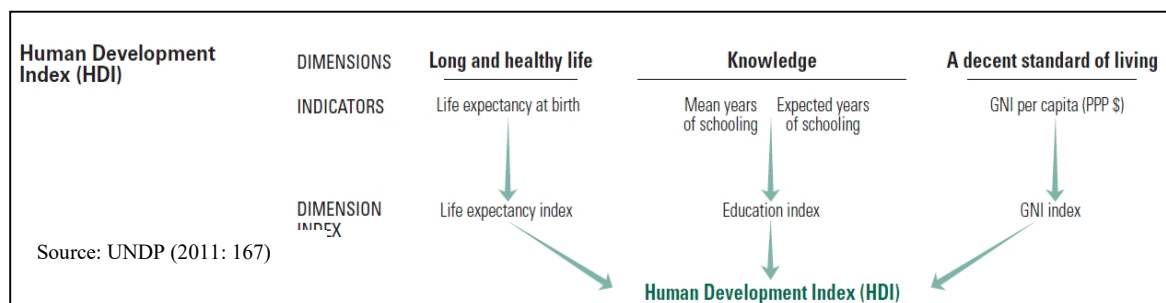
## I. The Human Development Index

In the past two decades, the HDI has become a common tool for evaluating the level of human development in a country or a region. Its popularity has arisen for two main reasons. First, it captures more elements which encompass quality of life than standard income measures do, namely education and life expectancy. In this sense, it presents a broader measure of human development than GDP per capita or other common measures of income and consumption. Second, it is relatively easy to calculate and has minimal data requirements, allowing it to be calculated for most developing countries. Thus, it is particularly useful for international comparisons of human development and well-being.

However, this measure of human development is not without its weaknesses. Its primary failing is that it only considers three elements of economic well-being: education, life expectancy and income. It does not take into account other critical elements of well-being such as income inequality, gender inequality, morbidity, political freedom, civil liberties, corruption, pollution, or economic security. To address this shortcoming, the most recent HDR supplements its HDI estimates with additional information on human development, including estimates of an Inequality-adjusted HDI, a Gender Development Index, a Multidimensional Poverty Index and data on environmental sustainability, human development effects of environmental threats, and perceptions about well-being and the environment, in addition to more detailed health and education statistics. Indeed, the authors of the HDR reports emphasize that the HDI alone is not a complete description of human development.

Still, the HDI is a very useful tool, particularly because it is easily understood and widely used owing to its simple structure. Moreover, the UNDP is a high profile organization with significant reach across the world. As noted, the HDI is a composite index composed of three dimensions: life expectancy, education, and income. In the most recent HDR, life expectancy is measured by life expectancy at birth, education is measured by average educational attainment in years and expected years of schooling, and income is measured by Gross National Income (GNI) per capita. Exhibit 1, taken from the 2011 HDR, illustrates the fundamental structure of the HDI.

**Exhibit 1: Structure of the Human Development Index**



Before estimating the provincial and territorial HDIs, it is important to understand not only how the HDI is constructed, but also how the most recent HDR differs from

earlier reports. This is particularly important because the 2010 report instituted major changes in how the HDI is calculated in response to the concerns of researchers in economic development.<sup>4</sup>

The HDI estimates in the most recent HDR are calculated in the following manner. First, the estimates for the life expectancy, average educational attainment, expected years of schooling and GNI per capita data for each country are scaled into indices using the following equation:

$$Index = \frac{\text{actual value} - \text{minimum value}}{\text{maximum value} - \text{minimum value}} \quad (1)$$

The maximum and minimum values for each dimension are taken from the most recent HDR, and follow a simple rationale. The minimum values are based on the concept of subsistence, that is, they are set at the lowest value needed in that indicator for a society to function, or, in the case of income, the lowest value in recorded history. The maximum values are set as “aspirational goals” which allow for this standardization to take place.<sup>5</sup>

The life expectancy index calculation is a straightforward application of equation (1), while the income index requires taking the natural logarithm (ln) of each income statistic before applying it in equation (1). The education index is slightly more complicated to calculate, as it involves creating two sub-indices and then combining them to create the dimension index. The two education sub-indices are constructed for mean years of schooling and expected years of schooling, respectively, using equation (1). The education index is then created by taking the arithmetic mean of the two sub-indices. Notably, prior to the 2015 HDR the education index was created by taking the geometric mean of the two sub-indices and rescaling the number that results by using the maximum and minimum values listed for this purpose in the technical notes of the HDR.

The HDI itself is calculated as the geometric mean<sup>6</sup> of the three indices already discussed, i.e.:

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<sup>4</sup> For critiques of earlier versions of the HDI, see Srinivasan (1994), Sagar and Najam (1998) and McGillivray (1991). As a result of the changes, HDI estimates presented in HDR reports from 2010 onwards are not comparable to those published in previous HDR reports, but represent an improvement in methodology in many respects. The current methodology has been to generate estimates prior to 2010 which are comparable to the post-2010 estimates.

<sup>5</sup> **Life Expectancy:** minimum=20.0 years based on long-run historical evidence from Maddison (2010) and Riley (2005), maximum=85.

**Education:** minimum=0 years for both average educational attainment and expected years of schooling since survival is possible without education, maximum=15 years for average educational attainment and maximum=18.0 years for expected years of schooling.

**Income** (PPP adjusted 2011 US\$): maximum= \$75,000 as Kahneman and Deaton (2010) showed that there is essentially no gain in human development and well-being beyond an annual income of \$75,000, minimum= \$100.

For more information see *Technical notes* in the most recent HDR

<sup>6</sup> A geometric mean is calculated by multiplying  $n$  numbers and then taking the  $n^{\text{th}}$  root of that product. The HDI used to be calculated with an arithmetic mean (or average), which is the sum of  $n$  numbers divided by  $n$ . This was changed because geometric means allow less substitutability between measures or dimension indices, so poor performances in one dimension are not linearly compensated for by better performances in other dimensions. For more information, see <http://hdr.undp.org/en/statistics/hdi/>.

$$HDI = I_{life}^{1/3} \times I_{education}^{1/3} \times I_{income}^{1/3}$$

This results in a number between 0 and 1, where 1 represents the highest possible human development score. A country achieves a score of 1 only if it matches the highest observed outcomes to date in all categories. The highest HDI score for 2015 belongs to Norway (0.944), followed by the lowest, belonging to Niger (0.348).

This methodology of the post-2010 HDR reports departs from prior reports in three main ways.

- First, the education index is constructed using average educational attainment and expected years of schooling, instead of literacy and the gross enrolment rate (which combines primary, secondary and tertiary enrolment rates), to offer a more complete picture of education.
- Second, income per capita is measured by GNI per capita instead of Gross Domestic Product (GDP) per capita. This switch occurred because GDP measures the amount produced in a country without capturing where the income from this production goes. In contrast, GNI reflects the income of the residents of a country regardless of where the income is generated, and is therefore a better measure of domestic purchasing power than GDP.
- Finally, the geometric mean has replaced the arithmetic mean for calculating the overall index. This reduces the substitutability of improvements across measures, so a country cannot linearly trade off performing poorly in one dimension by performing well in another. In other words, a country cannot receive a very high human development score without impressive scores in all dimensions.

One criticism that remains of the HDI is the arbitrarily determined equal weights applied to each dimension. Lind (2010) instead proposes a Calibrated Human Development Index (CDI) that employs revealed preferences to justify the weights applied to each dimension, and in doing so better reflects the relative roles of education and consumption in determining quality of life. However, the CDI is tailored to accurately rank highly developed countries, and in that way is not as useful for international comparisons as the original HDI.

## II. Replicating the most recent HDR's Estimates for Canada

In order to develop an internationally comparable HDI for the Canadian provinces and territories, the CSLS sought to employ methodologies and data sources that were as consistent as possible with those used in the most recent HDR. We use Statistics Canada data that have national, provincial, and territorial estimates for each indicator, and used these data first to replicate the official HDI results for Canada and then to develop estimates for the provinces and territories using the same methodology. This section will outline the process of replicating the most recent HDR official estimates for life expectancy, education (which includes both average educational attainment and expected years of schooling) and income for Canada. The difficulties in precisely matching the most recent HDR results are also discussed.

### A. Life Expectancy

In the most recent HDR, Canada's life expectancy at birth was estimated to be 82.2 years for 2015, which ranked at 12<sup>th</sup> place internationally.

**Table 1: Life Expectancy at Birth, Canada, 1980, 1990, 2000-2015**

Year	UNDP – HDR	Statistics Canada
1980	75.0	75.2
1990	77.2	77.6
2000	79.1	79.4
2001	79.1	79.6
2002	79.5	79.7
2003	79.8	79.9
2004	80.0	80.2
2005	80.2	80.4
2006	80.4	80.8
2007	80.6	80.9
2008	80.8	81.0
2009	81.0	81.4
2010	81.2	<i>81.6</i>
2011	81.4	<i>81.8</i>
2012	81.7	<i>82.0</i>
2013	81.9	<i>82.2</i>
2014	82.0	<i>82.4</i>
2015	82.2	<i>82.6</i>

**Sources:** The UNDP - HDR data taken from the International Human Development Indicators website (<http://hdr.undp.org/en/69206>). Statistics Canada data from CANSIM Table 102-0025 for 1980 and 1990, Table 102-0511 for 2000-2006; Table 102-0512 for 2007-2008;<sup>7</sup> the italicized values (2010-2015) are estimated by the CSLS by applying the compound annual growth rate for 1991-2008 (0.25 per cent) to each year.<sup>8</sup>

Statistics Canada's official estimates of annual Canadian life expectancy are available for 1979-2009, and are very similar to the estimates in the most recent HDR, as shown in

<sup>7</sup> Statistics Canada modified their life expectancy at birth methodology to include three years of data. An annual time series can be derived from these data.

<sup>8</sup> Note that the annual growth rate is projected using data from 1991 to 2008 because data is unavailable for the Nunavut and the Northwest Territories before 1991.

Table 1. The two estimates may differ due to rounding, the possibility of minor data revisions by Statistics Canada since the data were extracted by UNDESA, and the forecasting methods employed by UNDESA after 2009. Both sets of estimates show that Canada had a life expectancy of around 82 years in 2015 (Table 1).<sup>9</sup>

## B. Education

As mentioned earlier, the HDR reports since 2010 differ from earlier reports in that the education indicators employed to generate the education index are average and expected years of schooling, instead of literacy and gross enrolment rates. These new measures of education are used because they offer a more complete picture of education. However, the estimates of average years of schooling, calculated using the Barro and Lee (2010) methodology, are difficult to replicate. In addition, the most recent HDR extrapolates expected years of school estimates from 2002 to generate their 2015 value. Although these new measures of education may represent an improvement in theory, employing them makes the HDI's results difficult to replicate and the official estimates in the most recent HDR may not accurately reflect the situation of Canada's educational attainment in 2015.

### i. Average Educational Attainment

Overall, Canada performs well in the category of average educational attainment relative to many other nations. According to the most recent HDR, Canadians aged 25 and over have obtained, on average, 13.1 years of schooling in 2015, or sixth place in the international rankings for this measure. This estimate of average years of schooling updates the Barro and Lee (2010) estimates using UNESCO (United Nations Educational, Scientific and Cultural Organization) Institute for Statistics data on educational attainment. The HDR estimates for 1980, 1990, 2000, 2005, and 2010 to 2015 are presented in Table 2.<sup>10</sup>

Although Barro and Lee (2010) do not describe how average educational attainment is calculated for Canada specifically, their general methodology is straightforward. They first multiply the duration of each schooling level in years by the proportion of individuals in different age brackets that have achieved that level as their highest level of schooling, where "level of schooling" refers to primary, secondary and tertiary (or post-secondary) schooling levels.<sup>11</sup> The age brackets used for the average education of those 25 and older are defined by 5 year intervals (i.e. 25-29, 30-34) until age 74, with the final age category being 75 and older. Summing these results across schooling levels for each age group yields the average schooling level for each age group. The

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<sup>9</sup> CSLS's projected estimate of 82.6 years for 2015, which is estimated using historical growth rates, is 0.4 years above the most recent HDR's estimate (82.2 years). Inserting CSLS's estimate into the most recent HDR international life expectancy rankings would move Canada into eighth place, instead of its actual ranking of twelfth place.

<sup>10</sup> Barro and Lee last revised their estimates for 2010 average years of schooling in June 2014. The revised dataset estimates that average educational attainment in Canada was 12.3 years in 2010.

<sup>11</sup> Specifically, 8 years for those with at most a primary education, 12 years for those with at most a secondary education, and 14 years for those with at most tertiary schooling.

average educational attainment for the entire population is then calculated by adding together these age group average educational attainments once they have been weighted by the share of that age group in the total population aged 25 and older.

**Table 2: Estimated Average Educational Attainment, Canada, Persons aged 25 and over, 1980-2015**

Year	UNDP – HDR	LFS data
1980	9.8	-
1990	10.3	10.5
2000	11.0	11.9
2005	12.2	12.2
2010	12.7	12.5
2011	12.8	12.5
2012	12.9	12.5
2013	13.0	12.6
2014	13.1	12.6
2015	13.1	12.6

**Notes:** CSLS allocates 8 years for those with at most primary, 12 years for those with at most secondary and 14 years for those with tertiary schooling.

**Sources:** LFS data underlying our calculation from CANSIM Table 282-0004; HDR estimates can be found on the International Human Development Indicators website ([http://hdr.undp.org/sites/all/themes/hdr\\_theme/country-notes/CAN.pdf](http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/CAN.pdf)).

To develop an estimate of average years of schooling, CSLS aggregates data on all educational attainment categories to create three broad schooling level categories, and allocates individuals into these categories according to the highest level of schooling they have attained, similar to what is done in Barro and Lee (2010). Individuals are considered to have attained a certain level of schooling only if they have a certificate or diploma indicating that they have completed that program. For example, an individual is placed in the secondary school category if they have a high school diploma or certificate but no certificates, diplomas or degrees from any further education, such as a university degree, regardless of whether they attended a post-secondary institution or not.<sup>12</sup> Individuals are placed in the primary schooling category if they do not have a high school certificate or diploma or if they have no formal education.<sup>13</sup>

However, an earlier publication by the same authors (Barro and Lee, 2001), which performs almost identical calculations, does state that duration data vary between countries and are taken from the UNESCO (United Nations Educational, Scientific and Cultural)

<sup>12</sup> Calver (2015) discusses some of the issues with this methodology. First, there is the issue of completion of a degree – if an individual begins but does not complete some post-secondary program, none of their schooling is counted. Second, there is the issue of underassigning tertiary schooling. For example, suppose the most common form of post-secondary school in Country A is a two year program but in Country B it is a more rigorous four year program. If the two countries have the same enrolment rates, then Barro and Lee would estimate the same average educational attainment in the two countries. This is likely an issue in Canada, where 2011 National Household Survey data shows that 25.9 per cent of the population aged 25 to 64 had completed a university degree of some sort (corresponding to 15 years of schooling minimum). Calver uses microdata on the number of years an individual spent in school to avoid this problem. While this is likely not possible for the UNDP to do on a global scale, a better measure could use the sort of tertiary schooling completed (e.g. certificate, Bachelor's, Masters) to avoid the latter source of mismeasurement.

<sup>13</sup> In 2015, Labour Force Survey data indicate that 15.2 per cent of Canadians aged 25 and over had not graduated from high school (in the primary schooling category, allocated 8 years of schooling), 24.9 per cent had graduated high school or had attended some post-secondary schooling without completion (in the secondary schooling category, allocated 12 years), and 59.9 per cent had earned a post-secondary certificate or diploma or university degree (in the tertiary schooling category, allocated 14 years). The 2011 National Household Survey data shows similar results, with 12.7 per cent, 23.2 per cent and 64.1 per cent of Canadians in the primary, secondary and tertiary school categories, respectively.

Organization statistical year book for various years. Examining the data on duration of schooling available from the UNESCO Institute for Statistics (UIS) yields the following duration data for Canada: primary is 6 years, secondary adds another 6 years and post-secondary (tertiary) adds another 2 years.<sup>14</sup>

The estimates of average years of schooling are presented in Table 2. The LFS-based CSLS estimates are surprisingly quite similar to those in the most recent HDR, reflecting the small share of Canadians who did not finish high school in the overall population. For the majority of the period, the LFS-based estimates are marginally lower than the corresponding HDR estimate. In 2015, the HDR estimate of average years of schooling is 0.5 years higher than the LFS estimate.<sup>15</sup>

As average educational attainment is sensitive to the duration assumptions for each schooling level, it is worth checking the sensitivity of the results to alternate assumptions. One important test is to assign those with at most primary education 6 years of schooling, in line with UNESCO's definition, instead of the more realistic 8 years assumed by CSLS. When those with at most primary education are assigned 6 years of schooling, the data from the census gives estimates of 11.1 years in 2001 and 11.9 years in 2006 for those 25 and older. The LFS data similarly yield estimates of 11.4 years in 2000, 11.8 years in 2005, 12.2 years in 2011, and 12.3 years in 2014. These estimates are much closer to the results of Barro and Lee (2014) than are the first set of CSLS estimates: 12.2 years in 2011 from LFS exceeds Barro and Lee's estimate (12.1 years) by only 0.1 years. Since the assumption of 6 years of primary education is not realistic given the Canadian context, CSLS will employ the original assumption of 8 years.

The validity of CSLS's estimates is confirmed by Cohen and Soto (2007), when estimate average years of schooling is computed by employing data from surveys published by UNESCO and from an OECD database on educational attainment. Despite using the same UNESCO data source as Barro and Lee for their schooling duration assumptions, their results for Canada exceed those of both the CSLS and Barro and Lee for all available data years (11.7 years in 1990, 12.6 years in 2000, and 13.2 years in 2010).<sup>16</sup> Along with the higher estimates in the revised Barro and Lee dataset, this raises the concern that the most recent HDR may be overestimating Canada's average years of schooling relative to the rest of the world, although this issue is not directly relevant to this report. More importantly, although the CSLS results are not identical to Barro and Lee's

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<sup>14</sup> It is therefore difficult to determine how many years of education should be allocated to those with at most primary schooling (i.e. those who did not complete secondary school). Although primary schooling is listed as lasting 6 years in UNESCO's 1999 Statistical Yearbook, schooling is mandatory in Canada up to at least the age of 16, for a total of 10 years (excluding kindergarten). Thus, 6 years of schooling allocated to those who do not complete high school will grossly underestimate their years of schooling. As recently as the 1970s, however, the school leaving age was still 15 in some provinces, so there are still some the Canadian population today have received no more than 8 years of formal schooling, ignoring the kindergarten years (Oreopoulos, 2006). Indeed, according to the LFS data, 4.1 per cent of those aged 65 and over had eight or fewer years of schooling in 2016. Therefore, the CSLS allocates those with at most the primary level of schooling 8 years of education. Secondary and tertiary education are more straightforward, and the years allocated follow the UIS duration data: those with at most secondary schooling are allocated 12 years, and those with tertiary are assumed to have 14 years of schooling.

<sup>15</sup> If the CSLS estimate using LFS data for Canada in 2015 (12.6 years) is inserted into the most recent HDR international rankings for average years of schooling, Canada would be in twelfth place instead of ranking sixth.

<sup>16</sup> Data from Cohen and Soto (2007) can be found at <http://soto.iae-csic.org/Data.htm>.



results, it is clear that the CSLS estimates are not unreasonable or inconsistent with the literature.

## ii. Expected Years of Schooling

UNESCO Institute for Statistics (UIS) (2009) defines school-life expectancy, or expected years of schooling, as the “total number of years of schooling which a child of a certain age can expect to receive in the future, assuming that the probability of his or her being enrolled in school at any particular age is equal to the current enrolment ratio for that age.” Thus, school-life expectancy is simply the sum of the enrolment rates of each age in a population, where the enrolment rate of a certain age is defined as the number of people of that age enrolled in formal schooling divided by the total population of that same age.

Canada’s expected years of schooling for 2015 in the most recent HDR is 16.3 years, which places Canada in 22<sup>nd</sup> place in the most recent HDR rankings for this indicator. The most recent HDR cites UNESCO as its data source for this measure. The HDR simply uses for data on enrolment rates by age. The methodology used by the UNDP for estimating school life expectancy is described in the *UIS Educational Indicators: Technical Guidelines* (UIS, 2009), and this methodology will be followed here.

Unfortunately, the enrolment data for each age year are not publicly available in Canada. Thus two sets of estimates of expected years of schooling will be calculated using different data sources. The first will use administrative data on enrolment from Statistics Canada, and the second will employ school attendance estimates from the Labour Force Survey (LFS) for the population aged 15-29.

For the first set of estimates of expected years of schooling, administrative data on enrolment for 1996-2009 are taken from various versions of *Summary Public School Indicators for Canada, the Provinces and Territories*, a Statistics Canada publication. It should be noted that kindergarten students are included in this enrolment data, and cannot be separated out. Thus, this measure of expected years of schooling includes kindergarten while all other education measures (including expected years of schooling using LFS data) calculated in this paper do not. College and university enrolment data are taken from Statistics Canada’s CANSIM database. The enrolment rate data can be seen in Appendix Table 4.<sup>17</sup>

The CSLS calculates expected years of schooling by dividing the enrolment numbers for certain levels of education (primary and secondary, college, and university) by the total population of the age group most likely to be in that level of schooling (primary and secondary, including one year of kindergarten: 5-17 years old and university and college: 18-22 years old) to obtain the enrolment rate. It is assumed that enrolment below age 5 and above age 22 is zero.<sup>18</sup> For Canada in 2015, primary and secondary

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<sup>17</sup> Appendix tables are available at: <http://www.csls.ca/reports/csls2017-06Appendix.pdf>

<sup>18</sup> Naturally, if 85.8 per cent of individuals aged 18-22 are enrolled in some form of education, assuming the enrollment rate falls to zero at 23 is unrealistic. As such, our estimates ought to be understood to be lower bound. Our administrative estimates are purely for the sake of comparison.



school enrolment was 99.9 per cent of all those covered by the sample, college enrolment was 32.0 per cent, and university enrolment was 56.0 per cent.

These enrolment rates are then multiplied by the duration of each level (primary and secondary: 13 years (including one year of kindergarten), college: 2 years, university: 4 years) to obtain expected years of schooling. This method is by no means perfect, as many adults over age 22 enroll in secondary school or register in college or university programs and many students do not complete their programs. However, due to data limitations, this is the best approximation available.

It should be noted that the primary and secondary school enrolment data are only for publicly funded schools (including adult high schools), which account for approximately 93 per cent of Canadian students (Brockington, 2009). The exclusion of private school students results in lower enrolment rates in the primary and secondary school years and biases the estimates for expected years of schooling downwards.

The second set of estimates of expected years of schooling employs LFS data.<sup>19</sup> The LFS captures data on whether an individual is attending school (either full-time or part-time) during the regular school year (September to June) and organizes these data by age instead of level of education. Since LFS data on student status are only available for those aged 15-29 and the current school-leaving age is at least 16 in all Canadian provinces and territories, the assumption is made that 100 per cent of individuals between the ages of 6 and 14 attend school and zero per cent are enrolled below the age of 6. Enrolment over age 29 is also assumed to be zero due to lack of data beyond this age.

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<sup>19</sup> Expected years of schooling using LFS data is calculated using the data in Table 3. First, the per cent of people in school for each age group in a given year is multiplied by the number of years that age group represents (ie 15-19 is 5 years, 20-24 is 5 years and 25-29 is 5 years). These numbers are summed to obtain the expected year of schooling after age 15. Second, nine years are added to this number to approximate 100 per cent enrolment between ages 6-14 (inclusive), yielding the expected years of schooling for a child born in that year. For Canada in 2011, the calculation is as follows: Step 1:  $(5*0.837) + (5*0.419) + (5*0.142) = 6.99$ . Step 2:  $6.99 + 9 = 15.99$ . Thus, Canada's expected years of schooling result in 2011 is 15.99, rounded to 16.0 years.

**Table 3: Full-time and Part-time School Attendance by age group, Canada, 2000-2015**

Year	Ages 15-19			Ages 20-24			Ages 25-29		
	Number of Students	Population	% in school	Number of Students	Population	% in school	Number of Students	Population	% in school
2000	1685.7	2,046.9	82.4	757.2	2,021.2	37.5	247.0	2,023.5	12.2
2001	1,715.7	2,063.5	83.1	788.2	2,054.8	38.4	269.0	2,020.5	13.3
2002	1,716.3	2,074.3	82.7	807.8	2,086.3	38.7	271.9	2,032.0	13.4
2003	1,707.0	2,078.7	82.1	824.6	2,119.2	38.9	278.9	2,044.9	13.6
2004	1,715.4	2,092.6	82.0	856.2	2,150.9	39.8	284.9	2,068.1	13.8
2005	1,752.2	2,121.3	82.6	891.9	2,176.6	41.0	288.0	2,092.9	13.8
2006	1,784.3	2,151.8	82.9	876.4	2,194.2	39.9	292.5	2,125.5	13.8
2007	1,795.6	2,173.4	82.6	882.3	2,204.6	40.0	292.8	2,164.1	13.5
2008	1,800.3	2,192.3	82.1	866.4	2,210.9	39.2	297.7	2,211.6	13.5
2009	1,827.1	2,198.0	83.1	885.4	2,226.3	39.8	307.6	2,259.5	13.6
2010	1,835.8	2,191.3	83.8	938.4	2,252.4	41.7	313.1	2,293.7	13.7
2011	1,825.5	2,178.6	83.8	951.6	2,286.9	41.6	321.7	2,309.8	13.9
2012	1,799.0	2,153.9	83.5	1,012.4	2,336.0	43.3	321.7	2,327.9	13.8
2013	1,793.0	2,118.9	84.6	1,013.2	2,378.3	42.6	329.7	2,342.9	14.1
2014	1,753.2	2,076.0	84.5	1,013.2	2,398.1	42.3	317.2	2,366.4	13.4
2015	1,718.9	2,034.4	84.5	1,009.0	2,397.7	42.1	321.9	2,398.5	13.4

**Note:** Number of students and population are given in thousands.

**Source:** CANSIM Table 282-0095 (LFS).

Ideally, the number of individuals of each age (i.e. 15, 16, 17 ...) attending school would be used. However, these data are not publicly available from the LFS, which instead has attendance by age brackets. One problem with this method is that calculating expected years of schooling using a wide age bracket (i.e. 15-29) assumes that each age has a relatively similar number of individuals. Using narrower age brackets available from the LFS (15-19, 20-24 and 25-29) mitigates concerns about the age range's distributions of individuals.<sup>20</sup> When the in-school rates for these three age brackets are multiplied by the number of years they represent (5 years each) and summed together, they represent the expected years of schooling remaining for someone aged 15 years of age and over. Adding nine to this number (to represent the 100 per cent enrolment from ages 6 to 14) yields the expected years of schooling.

Table 3 gives the LFS data for those aged 15-29. In 2015, it is clear that the large majority (84.5 per cent) of youth aged 15-19 are in school, while the opposite is true for individuals aged 25-29 (just 13.4 per cent are in school). Not surprisingly, the 20-24 age group lies between these two extremes, with 42.1 per cent in school in 2015. These series have shown a slight upward trend since 2000.

<sup>20</sup> We would like to stress the importance of this point, as it avoids composition of the group biasing the estimate for expected years of schooling over time. For example, the population of 15-19 year olds only grew 1.4 per cent from 2000 to 2014, while the populations of 20-24 year olds and 25-29 year olds grew 18.7 per cent and 17.0 per cent from 2000 to 2014 respectively. As there are simply more children of the baby boomers than in the subsequent cohort, there will be more students in the older age ranges. As a result, in 2014 45.1 per cent of the population aged 15 to 29 was a student. Assuming 15 additional years of school, our expected years of school estimate is biased downwards to 15.8.

**Table 4: Expected Years of Schooling, Canada, 1990-2015<sup>21</sup>**

Year	UNDP – HDR	LFS data	Administrative Data
1990	16.7	14.8	-
2000	15.8	15.6	15.2
2001	15.8	15.7	15.2
2002	15.8	15.7	15.2
2003	15.8	15.7	15.2
2004	15.8	15.8	15.3
2005	15.8	15.9	15.2
2006	15.8	15.8	15.2
2007	15.8	15.8	15.2
2008	15.9	15.7	15.4
2009	15.9	15.8	15.6
2010	15.9	16.0	15.8
2011	15.9	16.0	15.8
2012	15.9	16.0	15.9
2013	15.9	16.1	15.9
2014	16.3	16.0	16.0
2015	16.3	16.0	16.0

**Sources:** LFS data calculated using CANSIM Table 282-0095, HDR data can be found on the International Human Development Indicators Website (<http://hdr.undp.org/en/indicators/69706>)

The estimates of expected years of schooling using LFS data are presented in Table 4. The most recent HDR relies on UNESCO data (UNDP, 2017b). The CSLS estimates based on LFS data are close to UNESCO’s estimates in 2000 and 2005 compared to the CSLS estimates based on administrative data. Our LFS-based estimate is 15.6 versus UNESCO’s 15.8 in 2000, and 15.9 years in 2005 compared to UNESCO’s 15.8. CSLS’s 2015 estimate using LFS data is also quite similar to the HDR estimate for 2015: 16.0 compared to 16.3 years, respectively.

### C. Income

In the most recent HDR, Canada’s Gross National Income (GNI) per capita for 2015 is \$42,582 in purchasing power parity (PPP) adjusted 2011 US dollars, the 22<sup>nd</sup> highest of all nations with an HDI ranking. The most recent HDR uses GNI estimates and population data from the UN Statistical Division National Accounts Main Aggregates Database. While the GNI estimates are nearly identical those reported by Statistics Canada, the population figures are slightly different. For the years lacking GNI estimates when the UNDP extracted data, projections were developed using information from the IMF’s World Economic Outlook publications.

National accounts estimates from Statistics Canada state that in 2015 Canada’s GNI per capita was \$54,554 in current Canadian dollars. This nominal GNI is then deflated by the gross final domestic expenditure implicit price index (2011=100), and

<sup>21</sup> Note that the CSLS’s estimates have an upward bias as a result of including part-time students in the student population. Note that in 2015, 97% of students between the ages of 15 and 19 were full-time and for students between the ages of 20 and 24, 88% were full-time.

adjusted by Canada's GDP (PPP) in 2011.<sup>22</sup> This PPP adjustment simply translates constant 2011 Canadian dollars into a common unit used in international comparisons (2011 US dollars) so that the cost of a representative basket of goods in Canada will be the same as in the United States, given the exchange rate.<sup>23</sup> Canada's GNI estimate for 2015 in 2011 US PPP adjusted dollars is \$43,185. This estimate does differ somewhat from the projection used in the HDI, which is \$42,582 (Table 5).<sup>24</sup>

**Table 5: GNI per capita, PPP adjusted 2011 US dollars, Canada, 1990, 2000, 2005-2015**

Year	UNDP – HDR	CSLS			
	PPP adjusted 2011 USD	Current dollars	Gross final domestic expenditure, implicit price index 2011=100	2011 constant CAD	PPP adjusted 2011 USD
1990	30,174	24,122	67.8	35,585	29,749
2000	36,408	34,979	81.0	43,160	35,779
2005	39,523	43,048	89.1	48,327	41,465
2006	40,306	45,083	91.2	49,421	42,601
2007	40,703	47,139	93.4	50,486	43,418
2008	40,693	48,986	95.7	51,184	44,070
2009	38,043	45,804	96.5	47,443	40,184
2010	39,919	47,910	97.9	48,962	41,471
2011	40,808	50,561	100.0	50,561	42,825
2012	41,068	51,521	101.7	50,670	43,018
2013	41,624	53,151	103.4	51,423	43,607
2014	42,298	54,878	105.8	51,875	44,094
2015	42,582	54,554	107.4	50,806	43,185

Sources: CSLS: Current dollar from CANSIM Table 380-0083, Implicit Price Index from CANSIM 380-0102, Canada's PPP for GDP in 2015 was 0.85 US dollars per Canadian dollar (PPP from CANSIM table 380-0058).

## D. Overall Human Development Index

Table 6 presents the results from the CSLS's attempt to replicate the 2015 HDI estimate for Canada. The CSLS is able to closely replicate both the life expectancy index and the income index. CSLS estimates the 2015 Canadian life expectancy index to be 0.964 compared to that from 2015 HDR data of 0.957. Similarly, using the 2015 GNI per capita projection from CSLS yields an income index of 0.917, compared to 0.914 using in the most recent HDR. While the largest discrepancy was found in the education index due to the average educational attainment component, here too it was reasonably close: 0.889 for the HDR compared to 0.865 by the CSLS. These indices produce an HDI index of 0.914 which closely approximates the official estimate of the 2015 HDI for Canada of 0.920. The insertion of the CSLS HDI estimate for 2015 would change Canada's tenth place ranking to fourteenth place.

<sup>22</sup> While GNI and GNP are equivalent in current prices, we stress that in constant price terms they are not. Income concepts like GNI ought to be deflated with the gross final domestic expenditure deflator, while output concepts like GNP ought to be deflated with the GDP deflator. The UNDP uses the GDP deflator in the most recent HDR, a minor accounting error.

<sup>23</sup> Canada's PPP for GDP in 2011 was 0.847 US dollars per Canadian dollar (PPP from CANSIM Table 380-0058).

<sup>24</sup> Employing our GNI estimate in the most recent HDR's GNI rankings increases Canada's ranking from 22<sup>nd</sup> to 21<sup>st</sup> place.

**Table 6: CSLS Replication of the Official Human Development Index Estimate for Canada, 2015**

Dimension	UNDP – HDR	CSLS estimates	
		CSLS	Proportion of HDR estimates (%)
	A	B	C = B / A
Life Expectancy at Birth (years)	82.2	82.6	100.5
<b>Life Expectancy Index</b>	<b>0.957</b>	<b>0.964</b>	100.7
Average Educational Attainment (years)	13.1	12.6	96.9
Average Educational Attainment Index	0.873	0.842	96.4
Expected Years of Schooling	16.3	16.0	98.2
Expected Years of Schooling Index	0.906	0.889	98.1
<b>Education Index</b>	<b>0.889</b>	<b>0.865</b>	97.3
GNI per capita (2011 US PPP adjusted dollars)	42,582	43,185	101.4
<b>Income Index</b>	<b>0.914</b>	<b>0.917</b>	100.7
<b>HDI</b>	<b>0.920</b>	<b>0.914</b>	99.3

**Note:** For "UNDP - HDR", CSLS uses the data listed in the most recent HDR and calculates the indices and HDI identically to the other column.

**Source:** CSLS estimates from Table 1, 2, 3, 5 and most recent HDR.

### III. Estimates of the Human Development Index for the Canadian Provinces and Territories

Though we do come quite close, it is clear from the previous section that it is not possible to precisely replicate the estimates of the HDI indicators for Canada using Canadian data sources. As a result, directly calculating each province and territory's HDI using the raw estimates developed by the CSLS is not the most exact estimation strategy. To obtain estimates which are the most internationally comparable for the provinces and territories, we take the proportion that each province and territory's estimate represents of the corresponding Canadian estimate and applying that ratio to Canada's most recent HDR official estimates.

To obtain the proportions needed to develop the internationally comparable estimates, the provincial and territorial estimates are developed using the same methodology and data sources used in replicating Canada's HDI in the previous section. This reduces as much as possible any error arising from using the proportion method of estimating the provincial and territorial HDIs. Therefore, this section will estimate the three components of the HDI (life expectancy, education and income) for each Canadian province or territory in a manner that is as consistent as possible with the most recent HDR. The HDI results and rankings for each province will then be discussed.<sup>25</sup>

<sup>25</sup> Due to data limitations, this report will focus on the period 2000 to 2015 when discussing trends over time. Full time series on all of the HDI domains are available in the Appendix Tables. Caution should be taken when interpreting education data for the Territories because of the small sample size involved.

## A. Life Expectancy

The life expectancy data for the provinces and territories are taken from the same Statistics Canada table as that for Canada, and are only available up to 2009. CSLS developed estimates for 2010-2015 by employing the historical growth rates of life expectancy in each province and territory from 1991 to 2009 (Appendix Table 1).<sup>26</sup> While extending any series five years forward is not ideal, because life expectancy moves slowly and steadily over time we do not believe it is a large source of error.

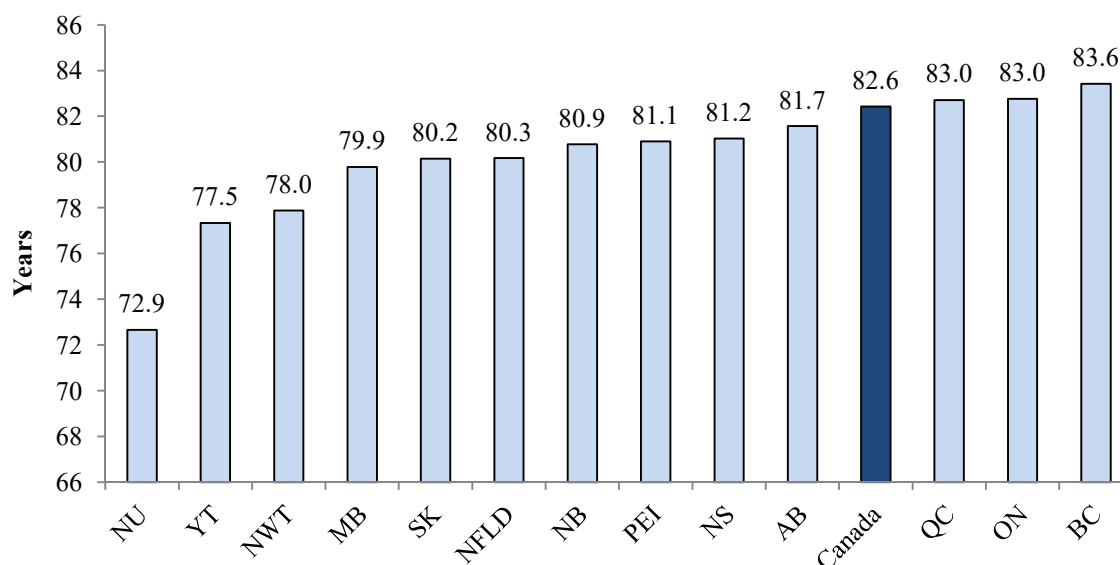
Table 7 shows these raw CSLS estimates in addition to the HDR consistent estimates and the resulting life expectancy index for 2000, 2005, 2011, and 2015. It is notable that the spread between the lowest and highest life expectancy decreased between 2000 (12.7 years) and 2015 (10.7 years). This decreased variation is largely caused by the 5.1 year increase in the average life expectancy of Nunavut between 2000 and 2015. Despite this relatively large improvement, Chart 1 illustrates that in 2015, Nunavut still had by far the lowest life expectancy of all the regions. For 2015, this territory's life expectancy was estimated to be 72.9 years, which was 4.6 years lower than the next lowest jurisdiction (Yukon, 77.5 years).

**Table 7: Life Expectancy Estimates and Index, Canada and the Provinces/Territories, 1990, 2000, 2011, and 2015**

Year	CAN	NL	PEI	NS	NB	QC	ON	MB	SK	AB	BC	YT	NWT	NU
Raw Estimates (years)														
2000	79.4	77.3	78.2	78.6	78.8	79.2	79.5	78.1	78.6	79.5	80.5	75.6	75.9	67.8
2005	80.4	78.2	79.8	79.3	79.8	80.4	80.7	79.0	79.3	80.3	81.2	77.0	78.0	72.0
2009	81.4	79.4	79.9	80.2	80.1	81.5	81.7	79.3	79.7	80.8	82.3	76.7	77.4	71.6
2015	82.6	80.3	81.1	81.2	80.9	83.0	83.0	79.9	80.2	81.7	83.6	77.5	78.0	72.9
HDR Consistent Estimates (years)														
2000	79.1	77.0	77.9	78.3	78.5	78.9	79.2	77.8	78.3	79.2	80.2	75.3	75.6	67.5
2005	80.2	78.0	79.6	79.1	79.6	80.2	80.5	78.8	79.1	80.1	81.0	76.8	77.8	71.8
2011	81.4	79.3	79.9	80.1	80.0	81.6	81.7	79.1	79.5	80.7	82.3	76.6	77.2	71.7
2015	82.2	79.9	80.7	80.8	80.5	82.5	82.5	79.5	79.8	81.3	83.2	77.1	77.6	72.5
Life Expectancy Index														
2000	0.909	0.877	0.891	0.897	0.900	0.906	0.911	0.889	0.897	0.911	0.926	0.851	0.856	0.731
2005	0.926	0.892	0.917	0.909	0.917	0.926	0.931	0.905	0.909	0.925	0.938	0.874	0.889	0.797
2011	0.945	0.912	0.921	0.925	0.923	0.947	0.949	0.909	0.915	0.934	0.959	0.870	0.880	0.795
2015	0.957	0.921	0.933	0.935	0.931	0.962	0.962	0.915	0.920	0.943	0.972	0.878	0.886	0.808

<sup>26</sup> Appendix tables are available at: <http://www.csls.ca/reports/csls2017-06Appendix.pdf>

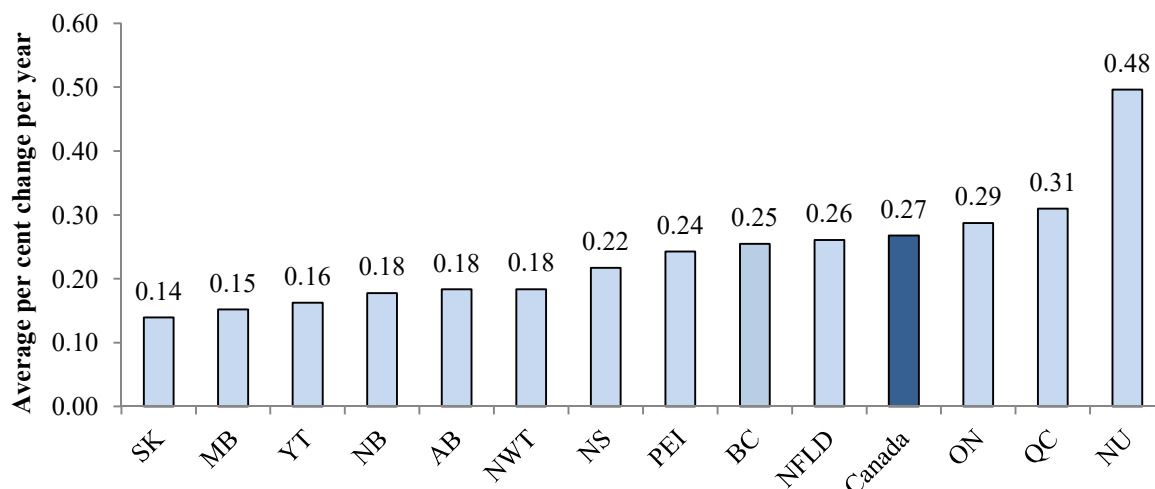
Chart 1: Life Expectancy, Raw Estimates, Canada and the Provinces/Territories, 2015



The growth rates for the provinces and territories ranged between 0.14 to 0.48 per cent per year over the 2000-2015 period. Notably, the three provinces with the fastest growth were Ontario (0.29 per cent per year), Quebec (0.31 per cent per year), and Nunavut (0.48 per cent per year) (Chart 2). As three quarters of Canada's population resides in Ontario, Quebec, and British Columbia, their high rates of growth in life expectancy result in the national growth rate exceeding 10 provinces and territories.

Table 8 shows the ranking of the provinces and territories (where 1 is the highest performing province in that indicator) for 2000, 2005, 2011, and 2015. Most of the provinces and territories maintained the same relative position between 2000 and 2015; for example, Nunavut was 13<sup>th</sup> for all three years and British Columbia remained the top province. The province that fell the most in the rankings was Saskatchewan, from sixth to ninth place. This was reflected in the compound annual growth rates, as Saskatchewan had the worst growth rates of all thirteen regions (Chart 2). On the other hand, despite the very rapid growth in life expectancy between 2000 and 2015, Nunavut continued to lag behind the other provinces and territories.

**Chart 2: Compound Annual Growth in Raw Estimates of Life Expectancy, per cent per year, Canada and the Provinces/Territories, 2000-2015**



Examining the rankings of the regions' life expectancies in the 2011 HDR international rankings highlights the discrepancies between the regions. Table 8 reports the rankings of the provinces and territories from entering each (alone) into the international rankings as if it were a country. British Columbia, the top Canadian province or territory, would rank fourth, while Nunavut, the lowest ranking province or territory, would be in 103<sup>rd</sup> place.

**Table 8: Life Expectancy Rank, Canada and the Provinces/Territories, 2000, 2005, 2011, and 2015**

Year	CAN	NL	PEI	NS	NB	QC	ON	MB	SK	AB	BC	YT	NWT	NU
Regional Rank (Based on Raw Estimates)														
2000	-	10	8	6	5	4	2	9	6	2	1	12	11	13
2005	-	10	5	7	5	3	2	9	7	4	1	12	11	13
2011	-	10	6	7	5	3	2	8	9	4	1	12	11	13
2015	-	8	6	5	7	3	2	10	9	4	1	12	11	13
2016 International HDR Rank (Based on HDR Consistent Estimates)														
2015	12	33	28	27	30	9	9	35	33	21	4	46	43	103

Note: The "2016 International HDR Rank" is based on inserting that province alone into the most recent HDR international rankings as if it were a country.



## B. Education

### i. Average Years of Education

Average educational attainment for the provinces and territories is calculated using LFS data (Appendix Table 8).<sup>27</sup> It is calculated in exactly the same manner as described for Canada, allocating 8 years for those with at most primary education, 12 years for those with at most secondary and 14 for those who have a tertiary education. The resulting estimates are reported for 2000, 2005, 2011, and 2015 in Table 9.

Examining the raw estimates for average educational attainment, the gap between the lowest and highest average educational attainment estimates were similar in 2000 (1.5 years) and 2015 (1.9 years). The primary reason for this widening of the gap was due to Nunavut's slow growth in educational attainment. Nunavut's average educational attainment was 0.7 years lower than the second lowest province or territory in 2000 (Newfoundland and Labrador, 11.4 years), slipping to be 1.3 years lower than the next lowest province or territory in 2015 (Newfoundland and Labrador, 12.2 years). These values translate into rankings between second and 40<sup>th</sup> place in the most recent HDR international rankings for every region.

**Table 9: Average Educational Attainment Estimates and Index, Canada and the Provinces/Territories, 2000, 2005, 2011, and 2015**

Year	CAN	NL	PEI	NS	NB	QC	ON	MB	SK	AB	BC	YT	NWT	NU
Raw Estimates (years)														
2000	11.9	11.4	11.5	11.8	11.6	11.6	12.1	11.7	11.7	12.2	12.2	12.2	12.2	<i>10.7</i>
2005	12.2	11.8	12.0	12.1	11.9	12.0	12.3	12.0	12.0	12.4	12.4	12.4	11.9	10.6
2011	12.5	12.1	12.3	12.4	12.1	12.3	12.6	12.3	12.3	12.6	12.7	12.7	12.2	10.7
2015	12.6	12.2	12.4	12.6	12.3	12.5	12.7	12.5	12.4	12.7	12.8	12.8	12.3	10.9
HDR Consistent Estimates (years)														
2000	11.0	10.5	10.6	10.9	10.7	10.7	11.1	10.8	10.8	11.2	11.2	11.2	11.2	9.9
2005	12.2	11.7	12.0	12.1	11.9	12.0	12.3	12.0	12.0	12.4	12.4	12.4	11.8	10.6
2011	12.8	12.4	12.6	12.7	12.4	12.6	12.9	12.6	12.6	12.9	13.0	13.0	12.5	11.0
2015	13.1	12.7	12.9	13.0	12.8	12.9	13.2	12.9	12.9	13.2	13.2	13.3	12.8	11.3
Average Educational Attainment Index														
2000	0.733	0.701	0.708	0.726	0.711	0.715	0.742	0.722	0.718	0.748	0.750	0.749	0.748	0.657
2005	0.813	0.782	0.797	0.805	0.790	0.799	0.821	0.797	0.798	0.827	0.825	0.826	0.790	0.704
2011	0.853	0.827	0.841	0.843	0.826	0.841	0.860	0.838	0.839	0.861	0.865	0.864	0.831	0.733
2015	0.873	0.845	0.859	0.868	0.851	0.863	0.879	0.862	0.861	0.880	0.883	0.887	0.853	0.751

**Source:** CANSIM Table 282-0004 (LFS). Territorial data obtained by special request from Statistics Canada. LFS data are not available for Nunavut before 2004. Since there is no clear pattern in the yearly growth rates for Nunavut, estimate for 2000 (italicized) is assumed to be equal to the 2004 estimate.

<sup>27</sup> Appendix tables are available at: <http://www.csls.ca/reports/csls2017-06Appendix.pdf>

**Chart 3: Average Educational Attainment, Raw Estimates, Canada and the Provinces/Territories, 2015**

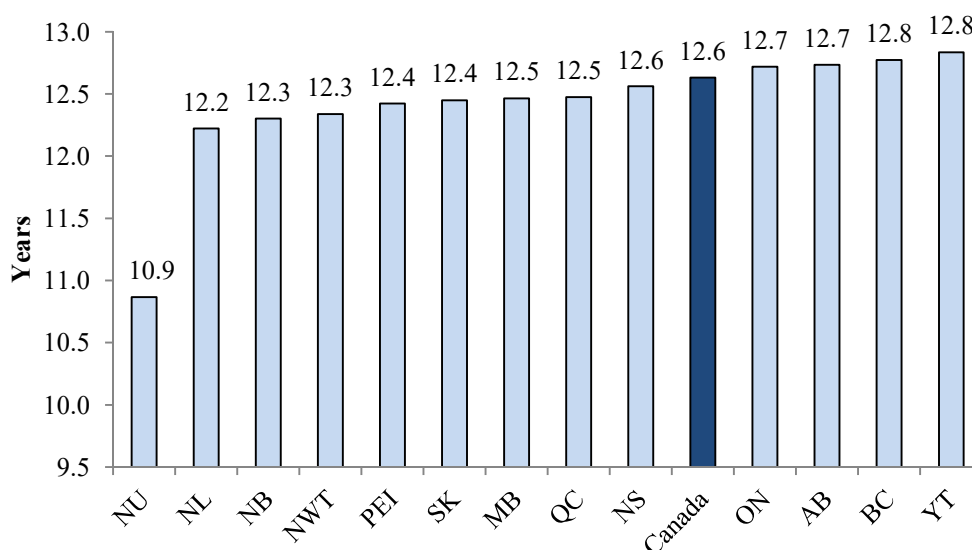
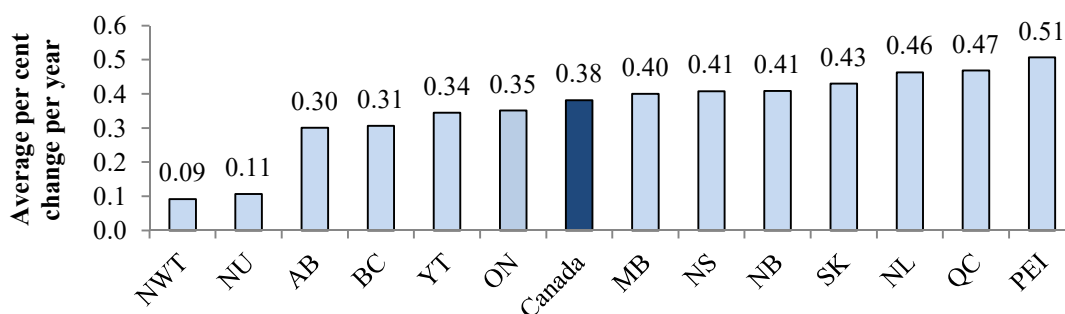


Table 10 also shows the ranking of each province and territory within Canada. There is some change between 2000 and 2015 in terms of rankings among the different provinces and territories. The rank of average educational attainment in the Northwest Territories has declined significantly since 2000, dropping from fourth to tenth place. Quebec and Ontario, conversely, improved their relative position (ninth to sixth and fifth to fourth place, respectively). British Columbia, Alberta, and Yukon are consistently among the top provinces and territories, while New Brunswick, Newfoundland and Labrador, as well as Nunavut consistently rank in the bottom four throughout the period.

**Chart 4: Compound Annual Growth in Average Educational Attainment, per cent per year, Canada and the Provinces/Territories 2000-2015**



There is some evidence that provinces and territories are converging in average educational attainment by the growth rates for 2000-2015 despite slow growth in Nunavut, which are illustrated in Chart 4. Chart 3 and Chart 4 show British Columbia and Alberta were among the top ranked provinces in 2015 but were also among the regions with the slowest growth (less than 0.35 per cent per year), while Newfoundland and Labrador and Prince Edward Island had compound annual growth rates that were above the national average (0.38 per cent per year) despite a low ranking among the provinces and territories.

The Northwest Territories and Nunavut were the exceptions, as they had both lower ranks in 2015 and the weakest compound annual growth rates of all Canadian regions.

**Table 10: Average Educational Attainment Rank, Canada and the Provinces/Territories, 2000, 2005, 2011, and 2015**

Year	CAN	NL	PEI	NS	NB	QC	ON	MB	SK	AB	BC	YT	NWT	NU
Regional Rank (Based on Raw Estimates)														
2000	-	12	11	6	10	9	5	7	8	3	1	2	4	13
2005	-	12	8	5	10	6	4	9	7	1	3	2	11	13
2011	-	11	7	5	12	6	4	9	8	3	1	2	10	13
2015	-	12	9	5	11	6	4	7	8	3	2	1	10	13
2016 International HDR Rank (Based on HDR Consistent Estimates)														
2015	6	8	7	7	7	7	3	7	7	3	3	2	8	40

**Note:** The "2016 International HDR Rank" is based on introducing that province alone into the most recent HDR international rankings as if it were a country.

## ii. Expected Years of Schooling

Expected years of schooling are estimated for the provinces and territories using LFS data. Once again, the methodology used here is the same as the one used to replicate the Canadian estimates. In 2015, the raw estimates for Canada closely approximate the official estimate from the most recent HDR, and as such there ought to be minimal error as a result of scaling the raw provincial values in Table 11 to obtain HDR consistent estimates.

**Table 11: Expected Years of Schooling Estimates and Index, Canada and the Provinces/Territories, 2000, 2005, 2011, and 2015**

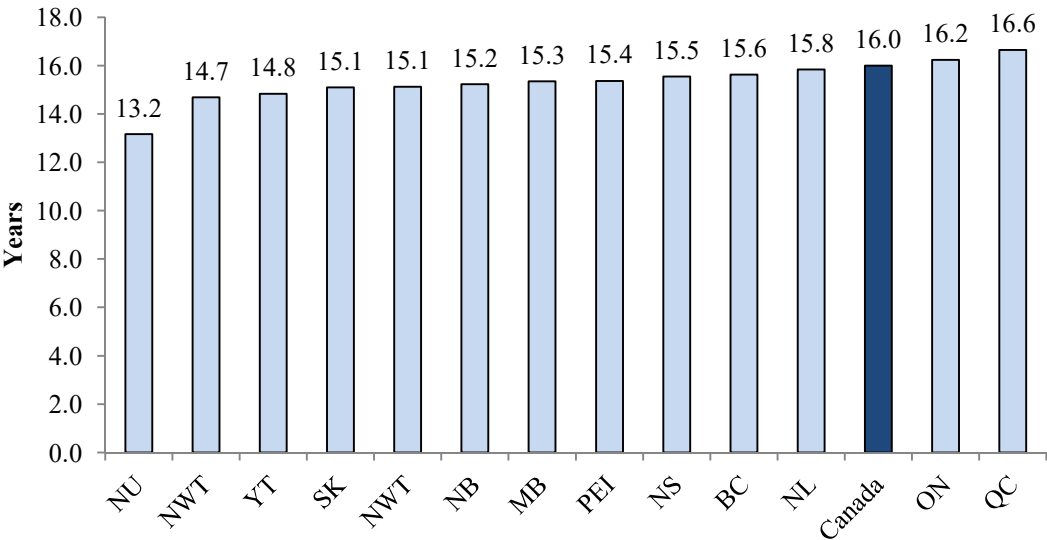
Year	CAN	NL	PEI	NS	NB	QC	ON	MB	SK	AB	BC	YT	NWT	NU
Raw Estimates (years)														
2000	15.6	15.7	15.1	15.7	14.9	15.7	15.9	15.0	15.1	14.8	15.6	15.7	14.5	<i>13.1</i>
2005	15.9	15.7	15.3	15.6	15.3	16.1	16.2	15.5	15.1	14.9	15.7	14.6	14.1	13.8
2011	16.0	15.5	15.5	15.7	15.3	16.4	16.2	15.3	15.1	15.0	15.9	14.1	14.6	13.1
2015	16.0	15.8	15.4	15.5	15.2	16.6	16.2	15.3	15.1	15.1	15.6	14.8	14.7	13.2
HDR Consistent Estimates (years)														
2000	15.8	15.9	15.3	15.9	15.1	15.9	16.1	15.2	15.3	15.0	15.8	15.9	14.7	13.3
2005	15.8	15.7	15.2	15.5	15.3	16.0	16.2	15.4	15.1	14.9	15.6	14.6	14.0	13.8
2011	15.9	15.5	15.4	15.6	15.2	16.3	16.2	15.3	15.0	15.0	15.9	14.0	14.5	13.0
2015	16.3	16.1	15.6	15.8	15.5	17.0	16.5	15.6	15.4	15.4	15.9	15.1	15.0	13.4
Expected Years of Schooling Index														
2000	0.878	0.883	0.851	0.883	0.837	0.885	0.893	0.842	0.848	0.836	0.880	0.886	0.816	0.737
2005	0.878	0.870	0.847	0.861	0.848	0.891	0.897	0.855	0.838	0.826	0.867	0.809	0.780	0.764
2011	0.883	0.859	0.855	0.869	0.845	0.907	0.897	0.849	0.833	0.831	0.881	0.778	0.808	0.725
2015	0.906	0.897	0.869	0.880	0.862	0.942	0.919	0.868	0.854	0.856	0.884	0.839	0.831	0.745

**Source:** CSLS calculations using CANSIM Table 282-0095 (LFS). Territorial data obtained by special request from Statistics Canada. LFS data are not available for Nunavut before 2004. Since there is no clear pattern in the yearly growth rates, estimate for 2000 (italicized) is assumed to be equal to the 2004 estimate.

An examination of these raw estimates shows that roughly one year and a half separates the lowest and highest ranking provinces in both 2000 and 2015 (from 15.1 years to 16.6 years), with all three territories consistently ranking below the lowest province throughout the period. The similarity in expected years of schooling across provinces is illustrated for 2015 in Chart 5. The highest expected years of schooling in 2015 was in Quebec at 16.6 years, closely followed by Ontario (16.2 years).<sup>28</sup>

Compared to average educational attainment, there was less movement in the regional rankings between 2000 and 2015 for this measure of education (Table 12). Quebec and Ontario remained in the top two positions, while the Yukon and Nunavut territories occupied the bottom two places between 2000 and 2015. None of the provinces changed their relative position by more than four places in the time frame. It is noteworthy that the top and bottom regions in 2015 are not the same for average educational attainment and expected years of schooling. Indeed, Alberta was in third place for the former and tenth place for the latter, while Newfoundland and Labrador was twelfth for the former and third place for the latter in 2015. As average educational attainment reflects the current population’s level of education and expected year of schooling estimates in part the future level of schooling, it could be the case that we will see a reversal of educational attainment levels down the road. However, it may also be the case that the educated tend to migrate to certain provinces instead of others.

Chart 5: Expected Years of Schooling, Raw Estimates, Canada and the Provinces/Territories, 2015



The growth rates indicate that the gap in expected years of schooling over time between the top and bottom ranked regions is increasing (Chart 6). Nunavut was the lowest ranked region in 2000 and experienced significant negative growth from 2000 to 2015,

<sup>28</sup> In 2015, the LFS shows that 48.8 per cent of the population aged 15 to 29 in Quebec was attending school, compared to the Canadian average of 44.6 per cent. The respective figures for the 15-19 age group were 85.1 per cent versus 84.5 per cent, for the 20-24 age group 49.7 per cent versus 42.1 per cent, and for the 25-29 age group 18.0 per cent versus 13.4 per cent.

while Quebec, the second ranked province in 2000, experienced the highest growth of all provinces. However, other than these two regions, there does not seem to be significant positive or negative correlation between the regions' ranking and their growth rate.

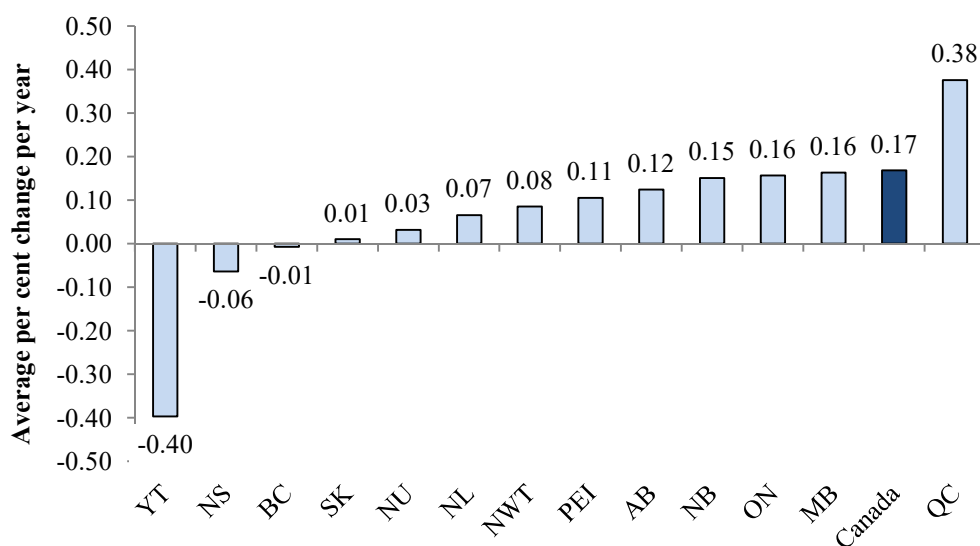
**Table 12: Expected Years of Schooling Rank, Canada and the Provinces/Territories, 2000, 2005, 2011, and 2015**

Year	CAN	NL	PEI	NS	NB	QC	ON	MB	SK	AB	BC	YT	NWT	NU
Regional Rank (Based on Raw Estimates)														
2000	-	5	7	4	10	3	1	9	8	11	6	2	12	13
2005	-	3	8	5	7	2	1	6	9	10	4	11	12	13
2011	-	5	6	4	8	1	2	7	9	10	3	12	11	13
2015	-	3	6	5	8	1	2	7	10	9	4	11	12	13
2016 International HDR Rank (Based on HDR Consistent Estimates)														
2015	22	27	35	32	36	13	18	35	38	38	31	45	47	85

**Note:** The "2016 International HDR Rank" is based on introducing that province alone into the most recent HDR international rankings as if it were a country.

Since many developed countries are clustered around the same values for expected years of schooling in the most recent HDR international rankings, the provinces and territories are remarkably spread out in terms of ranking considering how close their estimates are in absolute terms. Indeed, while Quebec would be in 13<sup>th</sup> place, Nunavut would be 85<sup>th</sup>.

**Chart 6: Compound Annual Growth in Expected Years of Schooling, per cent per year, Canada and the Provinces/Territories, 2000-2015**



## C. Income

In the most recent HDR, the indicator for the income dimension is GNI per capita. Unfortunately, Statistics Canada has not developed a GNI measure for the Canadian provinces and territories despite measuring it for the Canadian economy on the whole.<sup>29</sup> The best way to approximate this income measure is to adjust provincial and territorial GDP by the national difference observed between nominal GNI and GDP in that year (Canada's GNI was 98.2 per cent of Canada's GDP in 2011).<sup>30</sup> Once a province or territory's GDP is adjusted by the national nominal GDP to GNI ratio, population estimates are used to obtain GNI per capita.<sup>31</sup> The raw estimates for 2000, 2005, 2011, and 2015 are presented in Table 13.

It should be noted that there are no purchasing power parity (PPP) data available to correct for price differences across Canada, so one dollar is assumed to buy the same amount of goods in all provinces.<sup>32</sup> For example, when comparing food prices in Nunavut with the CPI Food Price Basket from Statistics Canada, the Nunavut Bureau of Statistics (2015) found that in general, Nunavummiut pay around twice as much as Canadians for the same basket of goods. It may well be unrealistic to ignore regional price differences altogether, but without PPP data by region no other assumptions can be reasonably made to try and capture variations in purchasing power.

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<sup>29</sup> This is largely a matter of accounting difficulties. The difference between GNI and GDP is income earned by residents abroad less income earned by non-residents domestically. At the provincial level it is harder to define what income is earned "abroad." Statistics Canada would have to somehow account for workers who cross a provincial border to work, as well as a company based in one province doing business across the country.

<sup>30</sup> Nominal GNI is by definition equal to nominal GNP, which is equal to GDP plus net production from non-residents. See Ross and Murray (2010) for a greater discussion.

<sup>31</sup> It is worth noting that the GDP to GNI ratio almost certainly differs significantly across the country. As a result of energy resources in provinces such as Newfoundland and Labrador, a significant amount of income earned in the province is attributable to corporations located outside of province.

<sup>32</sup> Thomas (2016) does provide an alternative to making no adjustment whatsoever. Thomas uses a Statistics Canada series on the consumer price in the Canadian provincial capital cities to roughly estimate purchasing power differences across provinces. While this is an alternative, it exclusively looks at consumer prices, and altogether ignores the prices faced by firms. For example, the prices faced by the Albertan oil firms who earned an extremely significant portion of the province's income would not be included in the price adjustment. Rather than introduce more assumptions, we opt not to adjust our GNI figures whatsoever.

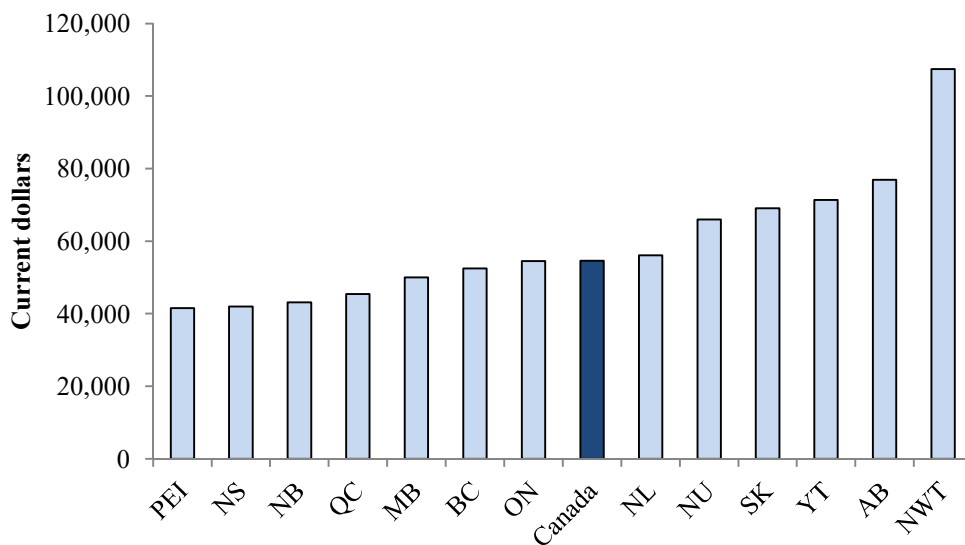
**Table 13: Gross National Income per capita Estimates and Income Index, Canada and the Provinces/Territories, 2000, 2005, 2011, and 2015**

Year	CAN	NL	PEI	NS	NB	QC	ON	MB	SK	AB	BC	YT	NWT	NU
Raw Estimates (current dollars)														
2000	34,979	26,092	24,151	26,562	27,011	30,474	37,689	29,619	33,134	47,624	32,447	40,315	64,078	31,514
2005	43,048	42,372	30,201	33,552	33,458	36,193	43,520	35,813	44,255	66,484	40,819	48,270	100,316	37,483
2011	50,561	62,670	36,944	39,111	40,903	42,236	48,799	44,688	68,837	77,529	47,272	69,059	106,675	58,355
2015	54,554	56,060	41,510	41,984	43,144	45,417	54,472	50,039	69,061	76,900	52,449	71,360	107,446	65,953
Raw Estimates (2011 PPP adjusted USD)														
2000	35,779	26,689	24,704	27,170	27,629	31,171	38,551	30,297	33,892	48,713	33,190	41,237	65,544	32,235
2005	41,465	40,814	29,090	32,318	32,227	34,862	41,920	34,496	42,627	64,039	39,318	46,495	96,627	36,104
2011	42,825	53,081	31,291	33,127	34,645	35,774	41,333	37,851	58,305	65,667	40,039	58,493	90,353	49,426
2015	43,185	44,378	32,859	33,235	34,153	35,952	43,120	39,612	54,669	60,875	41,519	56,489	85,055	52,209
HDR Consistent Estimates (2011 PPP adjusted US dollars)														
2000	36,408	27,158	25,138	27,647	28,114	31,719	39,229	30,829	34,487	49,569	33,773	41,962	66,695	32,801
2005	39,523	38,903	27,728	30,804	30,718	33,230	39,957	32,881	40,631	61,040	37,447	44,317	92,102	34,414
2011	40,808	50,581	29,817	31,567	33,013	34,088	39,386	36,068	55,559	62,574	38,153	55,737	86,097	47,098
2015	42,582	43,758	32,400	32,771	33,676	35,450	42,518	39,058	53,905	60,025	40,939	55,700	83,867	51,480
Income Index														
2000	0.891	0.847	0.835	0.849	0.852	0.870	0.902	0.866	0.883	0.937	0.879	0.912	0.982	0.875
2005	0.903	0.901	0.850	0.866	0.865	0.877	0.905	0.875	0.907	0.969	0.895	0.921	1.000	0.882
2011	0.908	0.940	0.861	0.869	0.876	0.881	0.903	0.889	0.955	0.973	0.898	0.955	1.000	0.930
2015	0.914	0.919	0.873	0.875	0.879	0.887	0.914	0.901	0.950	0.966	0.909	0.955	1.000	0.943

Source: CANSIM Table 384-0038 for GNI, PPP from CANSIM Table 380-0058, and Appendix Table 7a for population.<sup>33</sup>

Unlike the other indicators that make up the HDI, there is quite substantial variation in estimated GNI per capita between provinces and territories, ranging from \$24,151 (current dollars) to \$64,078 in 2000 and \$41,510 to \$107,446 in 2015. The Northwest Territories, the top ranking province or territory, has nearly triple the estimated GNI per capita of Prince Edward Island, the lowest ranking one (Chart 7).

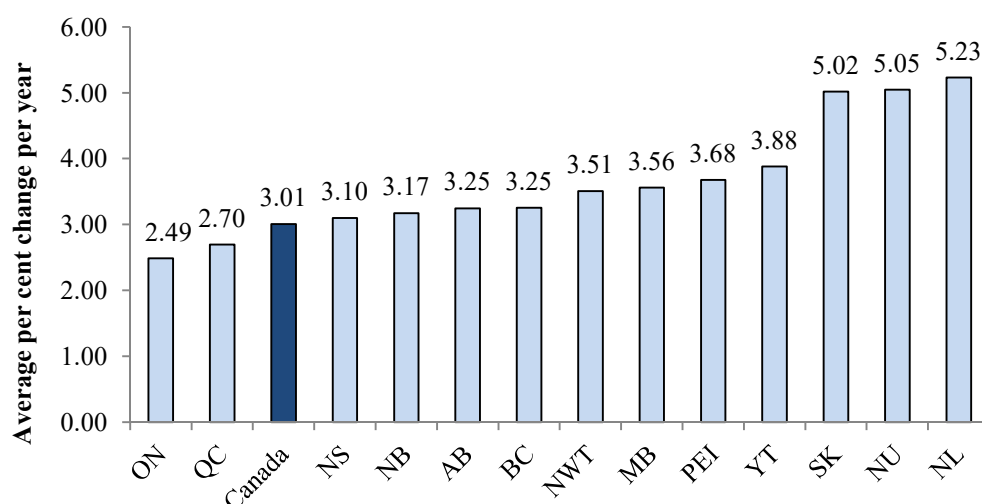
**Chart 7: GNI per capita, current dollars, Raw Estimates, Canada and the Provinces/Territories, 2015**



<sup>33</sup> Appendix tables are available at: <http://www.csls.ca/reports/csls2017-06Appendix.pdf>

Table 14 illustrates the ranking among provinces and territories in this indicator from 2000 to 2015. Most provinces and territories remain in similar positions. The Northwest Territories and Alberta dominate the rankings and Prince Edward Island ranked last throughout the period. Three provinces, however, moved significantly in the rankings: Newfoundland and Labrador rose from twelfth to sixth place, while Quebec and Ontario fell from eighth to tenth place and fourth to seventh place respectively. These substantial changes in relative position among these provinces were also reflected in the growth rates of these provinces. Newfoundland and Labrador's nominal GNI per capita grew the fastest at 5.23 per cent per year from 2000 to 2015, while Ontario and Quebec both experienced nominal GNI per capita growth below the national average of 3.01 per cent per year (Chart 8).

**Chart 8: Compound Annual Growth in Nominal GNI per capita, per cent per year, Canada and the Provinces/Territories, 2000-2015**



Looking at the provinces and territories' placements in the most recent HDR international rankings, there is an unsurprisingly substantial difference between the ranks of the top and bottom regions. The Northwest Territories would claim the second overall spot, while Prince Edward Island and Nova Scotia would rank in 35<sup>th</sup> place (Table 14).

**Table 14: Gross National Income per capita Rank, Canada and the Provinces/Territories, 2000, 2005, 2011, and 2015**

Year	CAN	NL	PEI	NS	NB	QC	ON	MB	SK	AB	BC	YT	NWT	NU
Regional Rank (Based on Raw Estimates)														
2000	-	12	13	11	10	8	4	9	5	2	6	3	1	7
2005	-	6	13	11	12	9	5	10	4	2	7	3	1	8
2011	-	5	13	12	11	10	7	9	4	2	8	3	1	6
2015	-	6	13	12	11	10	7	9	4	2	8	3	1	5
2016 International HDR Rank (Based on HDR Consistent Estimates)														
2015	22	20	35	35	32	30	23	24	11	9	24	10	2	12

**Note:** The "2016 International HDR Rank" is based on introducing that province alone into the most recent HDR international rankings as if it were a country.



## D. Overall Human Development Index

Since the CSLS's methods and Canadian data sources result in estimates that are quite close to those in the most recent HDR, the CSLS takes the ratio of each jurisdiction's raw estimate to the national raw estimate and applies it to the most recent HDR's official estimates for Canada in order to obtain an internationally comparable HDI estimate for the jurisdiction. This method results in provincial and territorial estimates that are compatible with the most recent HDR while still representing the same relationship as is shown between the raw CSLS estimates for the provinces/territories and Canada.

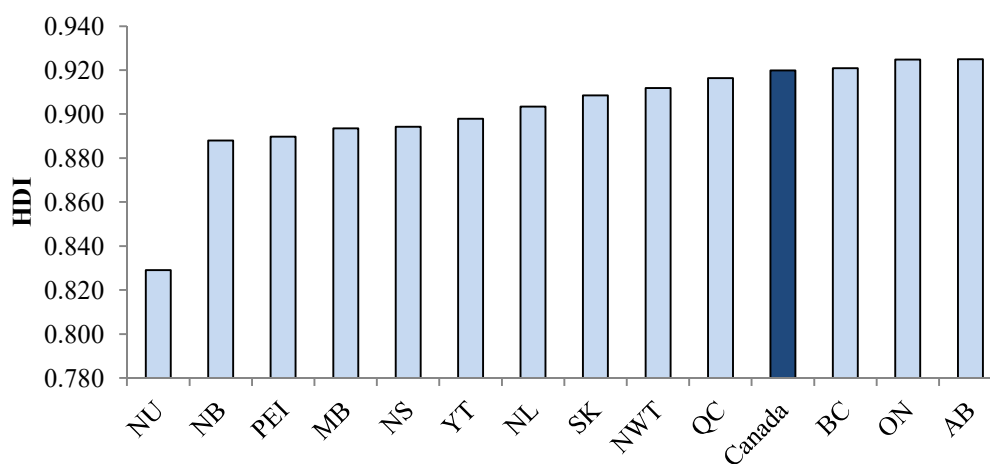
The CSLS's HDI estimates for Canada and the provinces/territories are given for 2000, 2005, 2011, and 2015 in Table 15 and the provincial and territorial ranking for 2015 is illustrated in Chart 9. Alberta and Ontario were found to have the highest HDI of all regions or jurisdictions, while British Columbia came in third. Nunavut and New Brunswick held the bottom two spots for 2015, though Nunavut was significantly lower than New Brunswick.

**Table 15: Human Development Index, Canada and the Provinces/Territories, 2000, 2005, 2011, and 2015**

Year	CAN	NL	PEI	NS	NB	QC	ON	MB	SK	AB	BC	YT	NWT	NU
HDI Estimates (Based on HDR Consistent Estimates)														
2000	0.867	0.838	0.834	0.850	0.840	0.858	0.876	0.844	0.853	0.878	0.872	0.859	0.869	0.764
2005	0.891	0.872	0.862	0.869	0.866	0.882	0.898	0.868	0.877	0.905	0.892	0.870	0.896	0.802
2011	0.906	0.898	0.876	0.883	0.877	0.900	0.910	0.880	0.900	0.916	0.909	0.880	0.903	0.814
2015	0.920	0.903	0.890	0.894	0.888	0.916	0.925	0.894	0.908	0.925	0.921	0.898	0.912	0.829

Source: CSLS Calculations.

**Chart 9: Human Development Index, Canada and the Provinces/Territories, 2015**



Given the relative stability in provincial and territorial rank observed within Canada for most regions in most indicators, it is not surprising to see little variation in the

provincial and territorial HDI rank over time (Table 16). Alberta, Ontario, and British Columbia were in the top four places throughout the 2000 to 2015 period. The only province or territory that changed rank significantly was Newfoundland and Labrador, which rose from 11<sup>th</sup> place in 2000 to 7<sup>th</sup> in 2015 as its income per capita increased dramatically.

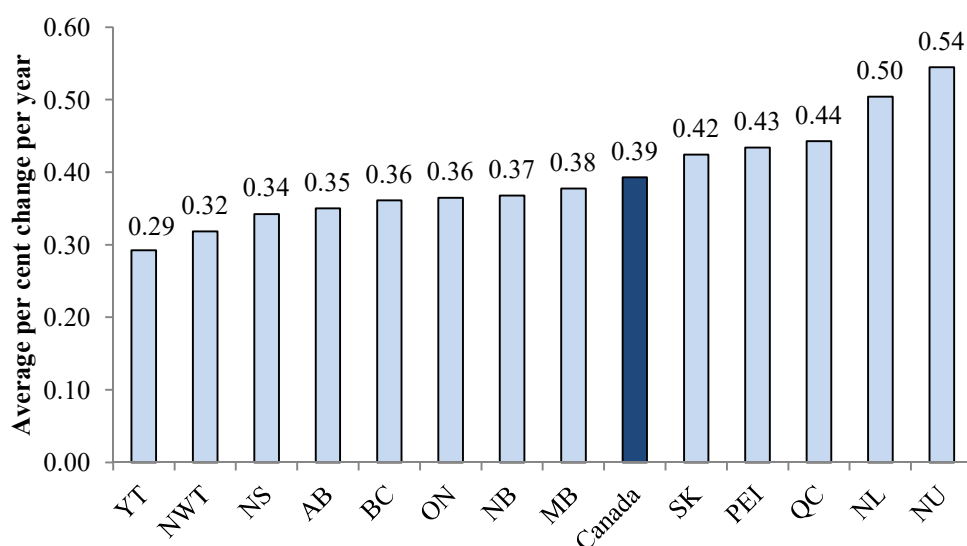
**Table 16: Human Development Index Rank, Canada and the Provinces/Territories, 1990, 2000, 2011, and 2015**

Year	CAN	NL	PEI	NS	NB	QC	ON	MB	SK	AB	BC	YT	NWT	NU
Regional Rank (Based on Raw Estimates)														
2000	-	11	12	8	10	6	2	9	7	1	3	5	4	13
2005	-	7	12	9	11	5	2	10	6	1	4	8	3	13
2011	-	7	12	8	11	6	2	10	5	1	3	9	4	13
2015	-	7	11	9	12	4	2	10	6	1	3	8	5	13
2016 International HDR Rank (Based on HDR Consistent Estimates)														
2015	10	17	25	24	26	13	5	24	17	5	9	20	15	45

**Note:** The "2016 International HDR Rank" is based on introducing that province alone into the 2016 HDR international rankings as if it were a country.

Nunavut experienced the fastest growth between 2000 and 2015 at 0.54 per cent per year, well above the national average of 0.39 per cent per year. Nunavut was followed closely by Newfoundland and Labrador at 0.50 per cent per year (Chart 10). The Yukon and Northwest Territories had the worst performances, at 0.29 per cent per year and 0.32 per cent per year, respectively. Nova Scotia, Ontario, Alberta and British Columbia displayed relatively weak growth. There may be some evidence of convergence in HDI as two of the regions with the highest HDI in 2015 (Ontario and Alberta) had below average growth in HDI, while two of the bottom three ranked regions (Nunavut, Prince Edward Island) had above average growth in HDI.

**Chart 10: Compound Annual Growth Rate in the HDI, per cent per year, Canada and the Provinces/Territories, 2000-2015**



Examining the provincial performance in the most recent HDR international rankings, Alberta and Ontario place well above all other provinces and territories, coming in fifth (Table 16). This implies that these provinces had levels of human development below Germany (fourth highest HDI in the world), but equal to levels in Denmark (0.925) and Singapore (0.925), and higher than The Netherlands (ranked seventh). Nunavut, on the other hand, comes in 45th place in the international HDI rankings, showing a similar level of human development as Latvia and Argentina. It is also important to understand why Alberta and Ontario are the top ranking regions, and why Nunavut is the lowest ranking one. Given the small differences between provinces and territories in the education indicators, it is clear that these differences are primarily driven by differences in life expectancy and income.

#### **IV. Future Research with the Human Development Index**

The HDI is a critical area of research into socio-economic well-being, thanks in large part to the global reach of the UNDP. With its annual HDR reports, the UNDP undertakes the herculean task of corraling data produced by national statistical agencies to rank 188 countries in terms of socio-economic well-being. The capacities of these national statistics agencies vary significantly, so the use of four key summary statistics in the HDI makes production of the HDR a more feasible task. Moreover, the inclusion of other components in a development index would make it more opaque for policymakers, as well as run the risk of being criticized for which components are included and which are not. Providing more niche, alternative indices is the best way to provide a bigger picture of the level of economic development in a given country, as the UNDP does in every HDR.

While HDI does a commendable job measuring socio-economic well-being, it does have a few major drawbacks in terms of its construction. Presently, the index is quite capable of differentiating between advanced economies and developing economies, but has a difficult time differentiating levels of development among economies which are closer in their levels of development. One of the primary issues with its ability differentiating between developed economies is both of the measurements of education employed.

The HDI measures average educational attainment by using statistics on the highest level of education completed. It assigns 8 years for completing primary education only, 12 for completing secondary education only, and 14 for having completed some form of tertiary education. By measuring education completed rather than years of schooling, there is a definite issue with individuals who fail to complete a degree. As suggested by Calver (2015), a better measure would simply use number of years of schooling. While this method results in underestimating the average number of years of schooling, it will not affect the integrity of the HDI rankings assuming that completion rates for degrees are similar in similar countries.

A much more consequential source of measurement error with average educational attainment is assessing 14 years of education to those who have completed some form of tertiary education. For example, if one country has a most of its students complete two year certificates whereas another country has most of its students complete four year

Bachelor's degrees, the HDI's measurement will underestimate the latter country's average educational attainment. In the advanced economies, this is especially an issue as most now have secondary school completion rates well above 90 per cent. A better measure of average educational attainment could still use the degree completed metric, but focus more on the sort of degree individuals have completed. We acknowledge that adding too many different sorts of tertiary education is unrealistic because of the number of national statistics agencies the UNDP deals with, however we believe that breaking tertiary education into three sorts of post-secondary education is realistic. We suggest that the average educational attainment metric should include: a "certificate completed" category for all those who complete a qualification below the level of a Bachelor's degree (equal to 14 years of education completed); an "undergraduate degree completed" value for all those who complete a qualification at the Bachelor's level (equal to 16 years of education completed); and finally a "postgraduate degree completed" for all those who complete a qualification beyond the Bachelor's level (equal to 18 years of education completed).<sup>34</sup>

Another issue with the measurement of education in the HDR is its use of UNESCO enrolment data in constructing the expected years of schooling. Canadian tertiary school enrolment data is not available from UNESCO, and has not been available since 2000. While the problem does not threaten the integrity of the UNESCO enrolment data, and most of the advanced economies have data to 2013 or 2014, it is still rather embarrassing that a G7 country's HDI relies on data over a decade old. Whether the burden to resolve the problem lies on Statistics Canada, UNESCO, or the UNDP, the solution should be relatively easy using the LFS microdata as we did in this paper. As mentioned in Section II, using LFS data to estimate Canada's expected years of education yields an estimate which differs very little from the UNESCO estimate.

Finally, from the perspective of Canadian researchers who endeavour to estimate HDI for the provinces (or to do any work comparing the provinces internationally for that matter), we strongly advocate that Statistics Canada create PPP estimates for a Canadian dollar in individual provinces and territories. The capital city cost of living solution proposed by Thomas (2016) will suffice in the meantime for studies dealing solely with consumer data, however at the moment there is no solution we are aware of once producers are included in the data.

## V. Conclusion

This report has estimated internationally comparable HDIs for Canada and its provinces and territories. In 2015, Alberta and Ontario held the top of the table for the overall HDI and Nunavut the lowest. For life expectancy, British Columbia ranked first while Nunavut ranked last. With respect to average educational attainment, Yukon was the highest ranked province or territory. Quebec was the highest ranking province or territory

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<sup>34</sup> Admittedly there is still an issue with unmeasured quality differences among the sorts of tertiary schooling received at these levels in different countries. While this is an issue, we believe its influence on HDI rank is minor because countries already near each other in rank due to the other components of HDI are likely to provide similar quality of schooling (e.g. Canada and Australia).

for expected years of schooling and Nunavut came last. With regards to GNI per capita, the Northwest Territories ranked first while Prince Edward Island was in last.

Most provinces experienced similar HDI growth between 2000 and 2015, with two notable exceptions: Nunavut, and Newfoundland and Labrador, where HDI grew the fastest of all provinces at territories at 0.54 and 0.50 per cent per year, respectively. This rapid growth was reflected in Newfoundland and Labrador’s rise in the rankings from eleventh place in 2000 to seventh in 2015. On the other hand, despite its fast HDI growth, Nunavut was still the lowest ranked jurisdiction in 2015. There is some evidence of convergence in regional HDI as provinces with the highest HDI in 2015 had below average HDI growth during the 2000 to 2015 period, while two of the bottom three ranked provinces had above average growth. One notable exception to this trend was Alberta, which was the beneficiary of a commodity boom throughout the period.

The of Canada’s provinces and territories in terms of human development in the international context is summarized in Table 17.

**Table 17: Summary of International HDR Ranks, Canada and the Provinces/Territories, 2015**

Dimension	CAN	NL	PEI	NS	NB	QC	ON	MB	SK	AB	BC	YT	NWT	NU
Life Expectancy	12	33	28	27	30	9	9	35	33	21	4	46	43	103
Average Educational Attainment	6	8	7	7	7	7	3	7	7	3	3	2	7	40
Expected Years of Schooling	22	27	35	32	36	13	18	35	38	38	31	45	47	85
GNI per capita	22	20	35	35	32	30	23	24	11	9	24	10	2	12
<b>HDI</b>	<b>10</b>	<b>17</b>	<b>25</b>	<b>24</b>	<b>26</b>	<b>13</b>	<b>5</b>	<b>24</b>	<b>17</b>	<b>5</b>	<b>9</b>	<b>20</b>	<b>15</b>	<b>45</b>

Of the countries in the most recent HDR rankings, Canada’s regions ranked between fourth and 103<sup>rd</sup> in life expectancy, between second and 40<sup>th</sup> in average educational attainment, between 13<sup>th</sup> and 85<sup>th</sup> in expected years of schooling and between 2<sup>nd</sup> and 35<sup>th</sup> in GNI per capita. For the overall HDI, Canada’s provinces and territories ranked between fifth and 45<sup>th</sup> place. It is therefore clear that Canada’s overall HDI masks substantial variation among the provinces and territories.

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