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Annual Demographic Estimates: Subprovincial Areas, July 1, 2021

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Cette publication est aussi disponible en français.

Notice to readers

Estimates released in this publication are based on 2016 Census counts adjusted for census net undercoverage and incompletely enumerated Indian reserves to which are added the population change for the period from May 10, 2016 to the date of the estimate.

These estimates are also based on the 2016 Standard Geographical Classification.

This analysis is based on preliminary data. Since these data will be revised in the coming year, some trends described in this analysis may change as a result of these revisions. Therefore, this analysis should be interpreted with caution.

Most of the components, used to produce preliminary population estimates, are estimated using demographic models or based on data sources less complete or reliable, albeit more timely, than those used for updated or final estimates.

Acknowledgements

The completion of this publication and the dissemination of the annual demographic estimates for subprovincial areas rest on the assiduous and meticulous work of the members of the Population Estimates Section of the Centre for Demography.

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Demographic estimates for Canada's subprovincial areas are available in Tables [17-10-0135-01](#) to [17-10-0142-01](#), which are listed and linked in the section *Related products*.

Interactive dashboards are available to visualize the factors of population growth and how they have changed over time ([71-607-X](#)):

- [Annual demographic estimates, census metropolitan areas and census agglomerations: Interactive dashboard](#)
- [Annual demographic estimates, census divisions: Interactive dashboard](#)
- [Annual demographic estimates, economic regions: Interactive dashboard](#)
- [Annual demographic estimates, rural and urban regions: Interactive dashboard](#)

Highlights

Population growth in Canada's urban regions large and small slowed for a second consecutive year in 2020/2021. New permanent immigrants to Canada accounted for the majority of population growth seen in 2020/2021, while net losses of non-permanent residents contributed in significantly reducing the growth.

These estimates, the first to give us a look at a subprovincial level for an entire year of the COVID-19 pandemic, tell of an accelerating trend in migration from large urban centres, leaving their continued growth largely supported by international migration.

Census metropolitan areas

- On July 1, 2021, 27,465,137 people, or just over 7 in 10 Canadians (71.8%), were living in one of the 35 census metropolitan areas (CMAs) in Canada. This proportion remained essentially unchanged from a year prior as growth seen in CMAs decreased (+0.5% vs +1.4% in 2019/2020).
- The majority of CMAs (32 of 35) saw their population growth rate reduced compared to the preceding year, with Thunder Bay (Ont.) (-1.1%), Windsor (Ont.) (-0.9%), Montréal (Qué.) (-0.6%) and Peterborough (Ont.) (-0.1%) recording population decreases.
- Only three CMAs are estimated to have seen a growth rate at or above 2.0% in the last year, similar to the previous year. Kelowna (B.C.) saw the fastest growth (+2.6%), followed by Oshawa (Ont.) (+2.3%) and Halifax (N.S.) (+2.0%).
- Net international migration to Canada was down more than half compared to 2018/2019, before the pandemic. The slowdown in international migration remained the leading factor behind reduced population growth experienced in CMAs for a second year in a row.
- Interprovincial and intraprovincial migration patterns changed with all CMAs in Ontario and Alberta recording net losses from people moving to other provinces (except for Ottawa-Gatineau, Ontario and Lethbridge, Alberta). This contrasts with all CMAs in British Columbia and the Atlantic Provinces seeing net gains from interprovincial migration flows.
- A record number of people have opted to relocate outside the biggest CMAs. Toronto (Ont.) (-64,121) and Montréal (Qué.) (-39,904) both saw the largest net losses to migratory exchanges with other regions of their respective provinces since at least 2001/2002, while losses in Vancouver (B.C.) remained stable (-12,245).
- Although it remains negative in some provinces, net intraprovincial migration to rural areas (those outside CMAs and census agglomerations) increased across the country in 2020/2021. Rural areas in Ontario (+13,680) and Québec (+25,831) saw the highest gains from intraprovincial migration since at least 2001/2002.

Census agglomerations

- In 2020/2021, 70.9% of all census agglomerations (CAs) saw positive demographic growth, similar to a year prior (72.6% in 2019/2020).
- In 2020/2021, the CA of Carleton Place (Ont.) experienced the highest growth (+3.7%), a place it has held for the last four years. The second and third largest increases occurred in Cowansville (Qué.) (+3.6%) and Wasaga Beach (Ont.) (+3.4%). The main contributor to the growth of these CAs was the influx of migrants from elsewhere in their corresponding province.
- The CA of Lacombe (Alb.) recorded the highest rate of decline in 2020/2021 at -2.1%, mainly driven by losses to other parts of the province. The CAs of Thompson (Man.) (-2.0%) and Estevan (Sask.) (-1.8%) came in second and third place, both experiencing losses to other provinces and the rest of their province.

Census divisions

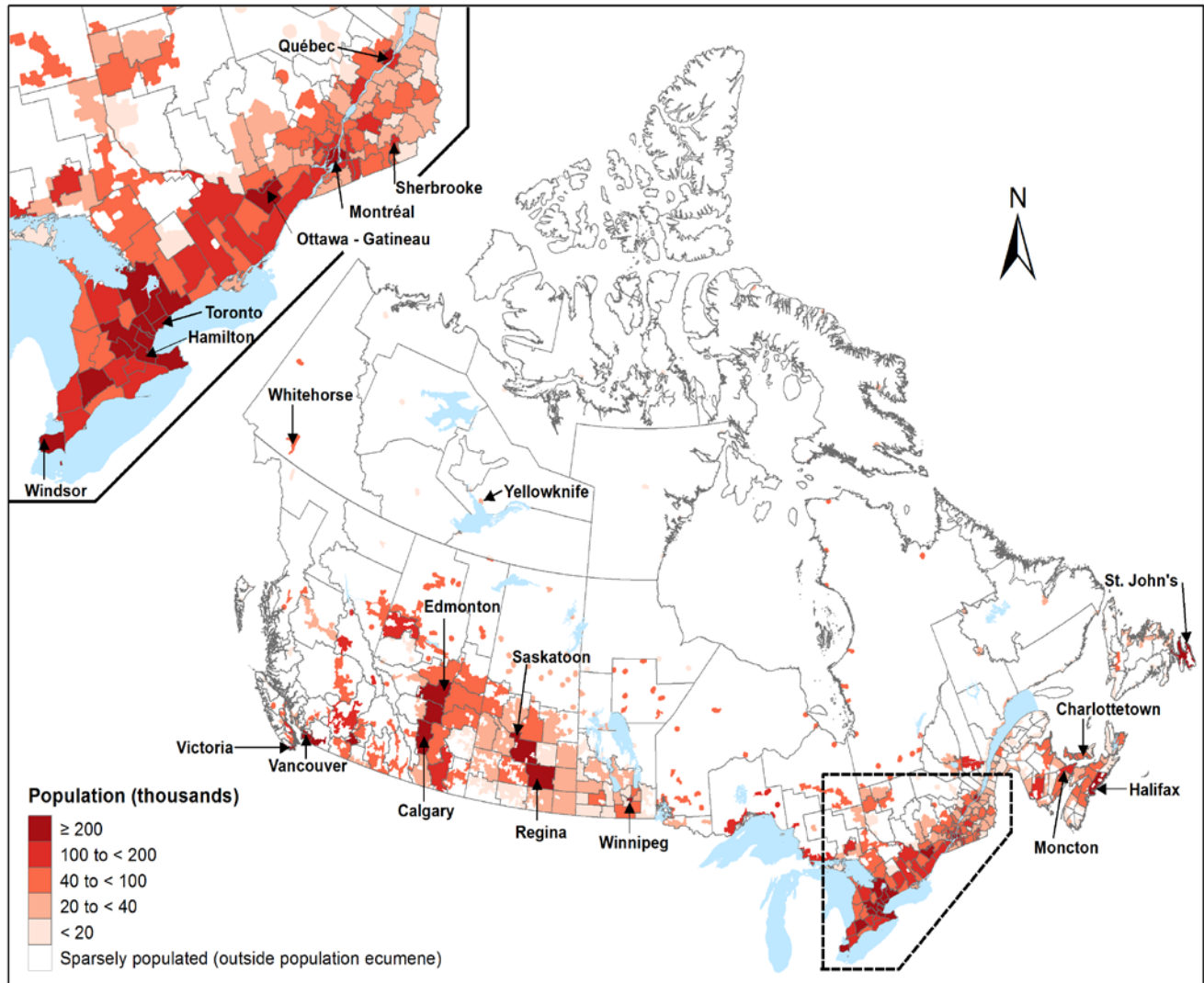
- The census division (CD) of Montcalm (Qué.) recorded the highest rate of population growth in 2020/2021 at +4.4%. It was followed by the CDs of Mirabel (Qué.) (+4.1%) and Brome-Missisquoi (Qué.) (+3.9%).
- All of the fourteen fastest growing CDs in Canada are located in Québec and near the CMAs of Montréal, Québec and Sherbrooke. The main driver of this growth was the influx of people from other parts of the province. The fifteenth fastest growing CD, and first outside of Québec, is that of Central Okanagan (B.C.) (+2.5%) which made significant gains from people moving from other provinces.
- The CD showing the most pronounced population decline in 2020/2021 is that of Montréal (Qué.) (-2.3%). It is the first time this CD recorded a population loss since 2006/2007. The population of the CD of Toronto (Ont.) also decreased by -0.6%, the first annual loss since 2003/2004. In both cases, higher losses from migration to other parts of their respective province and reduced level of international migration were the leading factors for the decline.

Census subdivisions

- Among the census subdivisions (CSDs) with a population of at least 5,000, The Blue Mountains (Ont.) (+7.9%), Langford (B.C.) (+6.3%), Brock (Ont.) (+5.9%) and Saint-Hippolyte (Qué.) (+5.9%) saw the highest growth rates in 2020/2021. Such fast growing CSDs continue to be found mostly in the periphery of CMAs, away from the core of large urban centres.
- CSDs with the highest rates of population decrease are also typically located outside large urban centres, but usually in more remote settings. Among municipalities with a population of at least 5,000, Westmount (Qué.) (-3.9%), Bulkley-Nechako A (B.C.) (-3.2%), Slave Lake (Alb.) (-3.2%) and Whitecourt (Alb.) (-2.7%) saw the fastest decrease in 2020/2021.

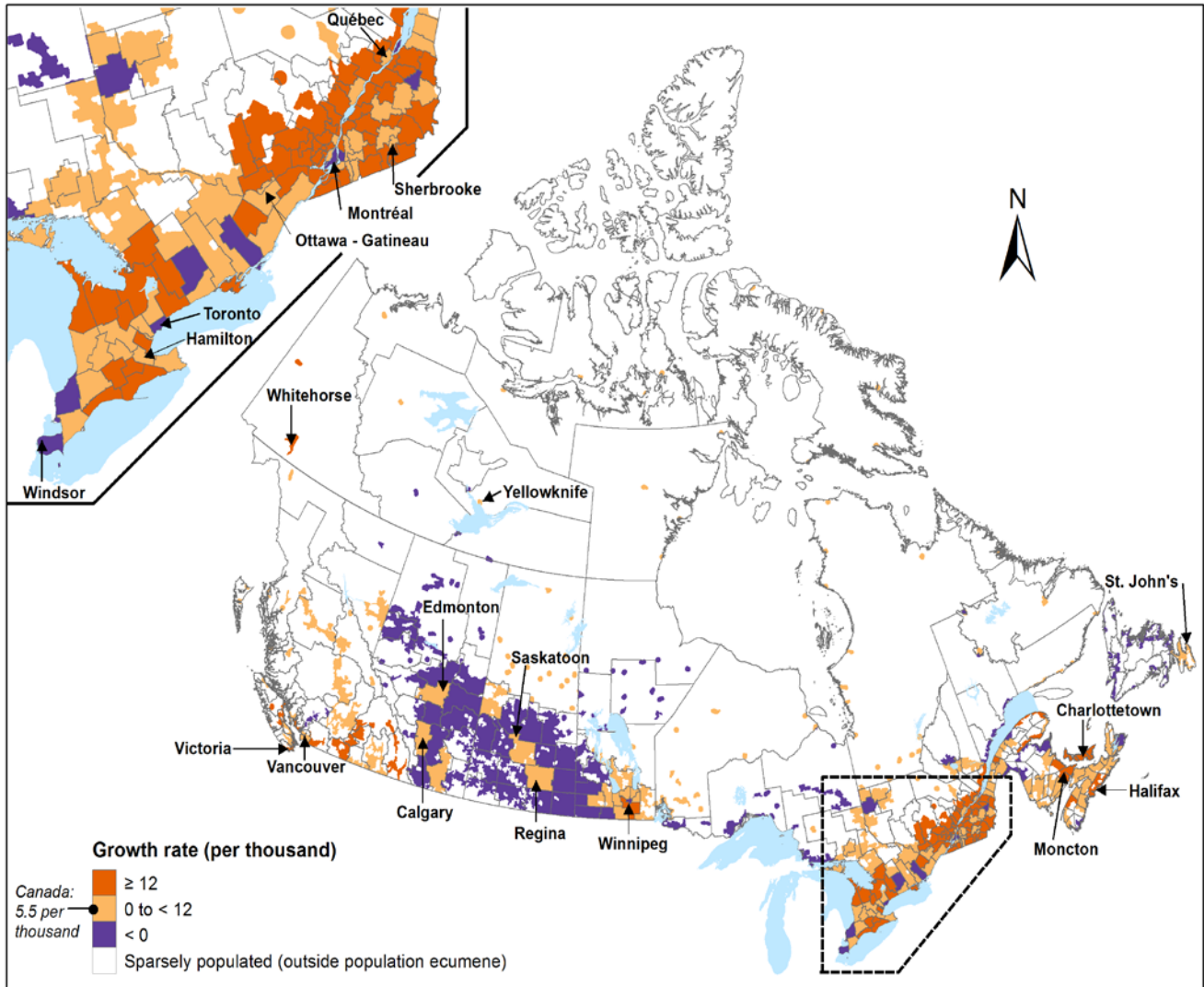
Section 1: Maps

Map 1.1
Population distribution as of July 1, 2021, by census division, Canada



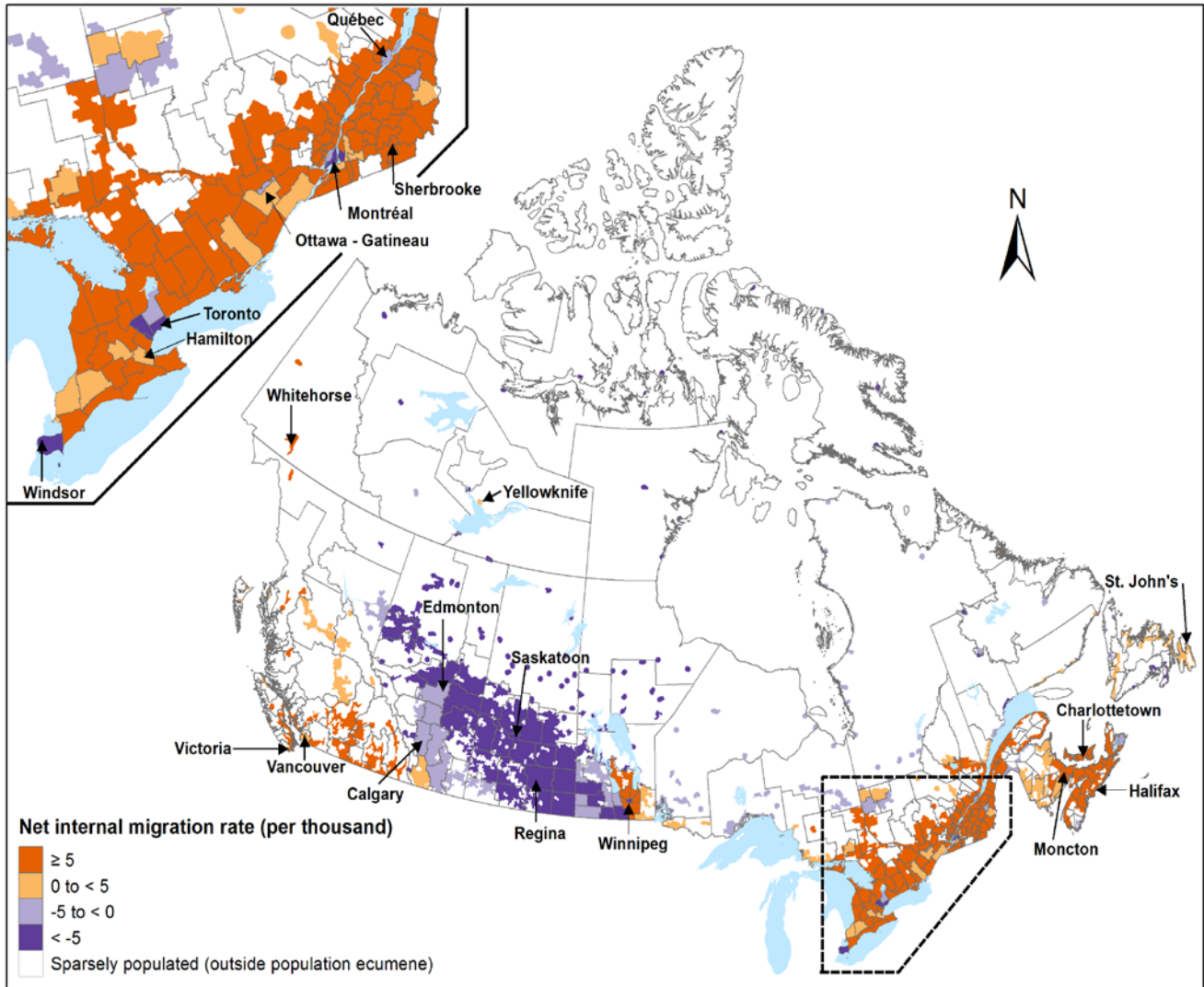
Source: Statistics Canada, Centre for Demography.

Map 1.2
Population growth rate, July 1, 2020 to June 30, 2021, by census division, Canada



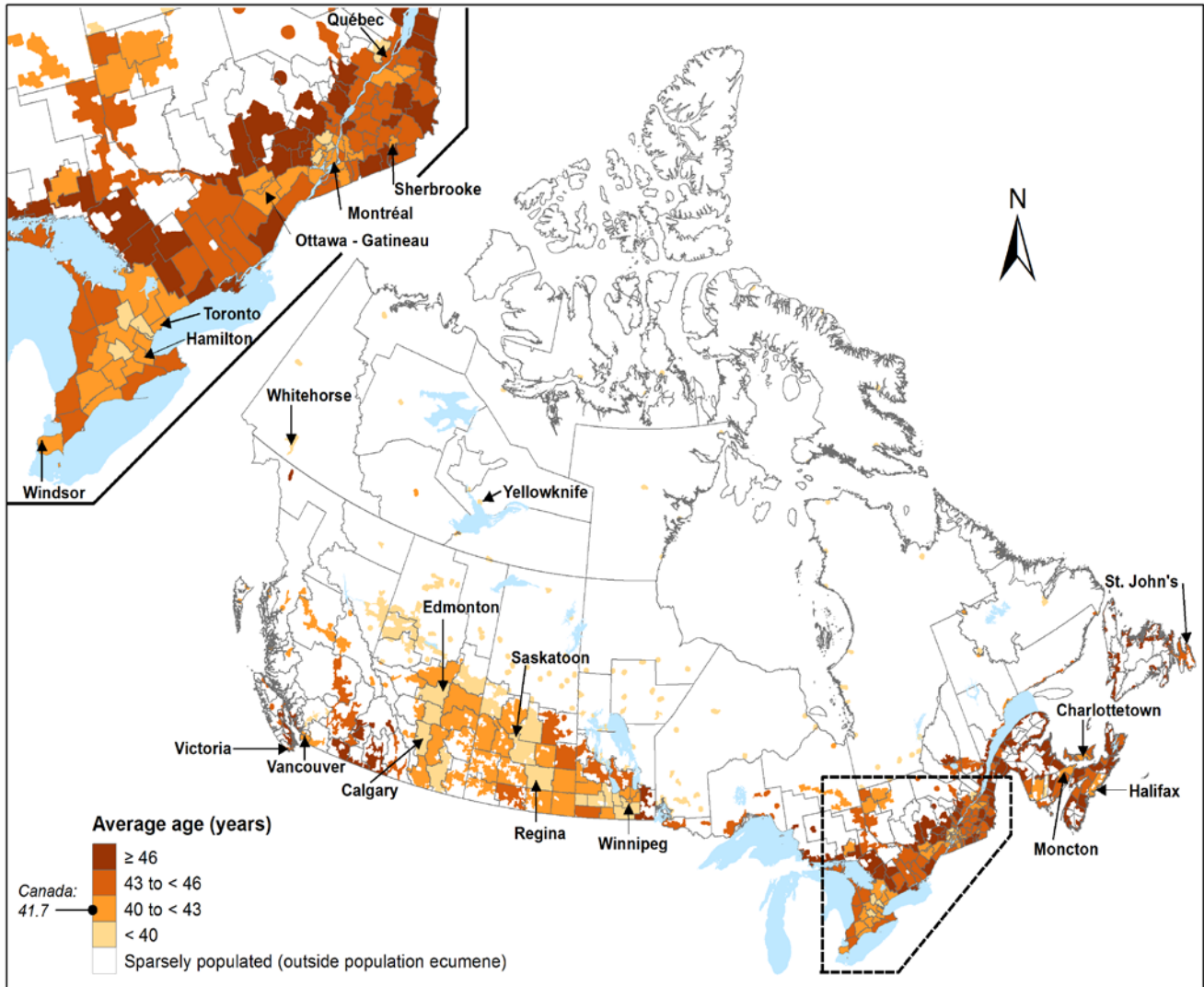
Source: Statistics Canada, Centre for Demography.

Map 1.3
Net internal migration rate, July 1, 2020 to June 30, 2021, by census division, Canada



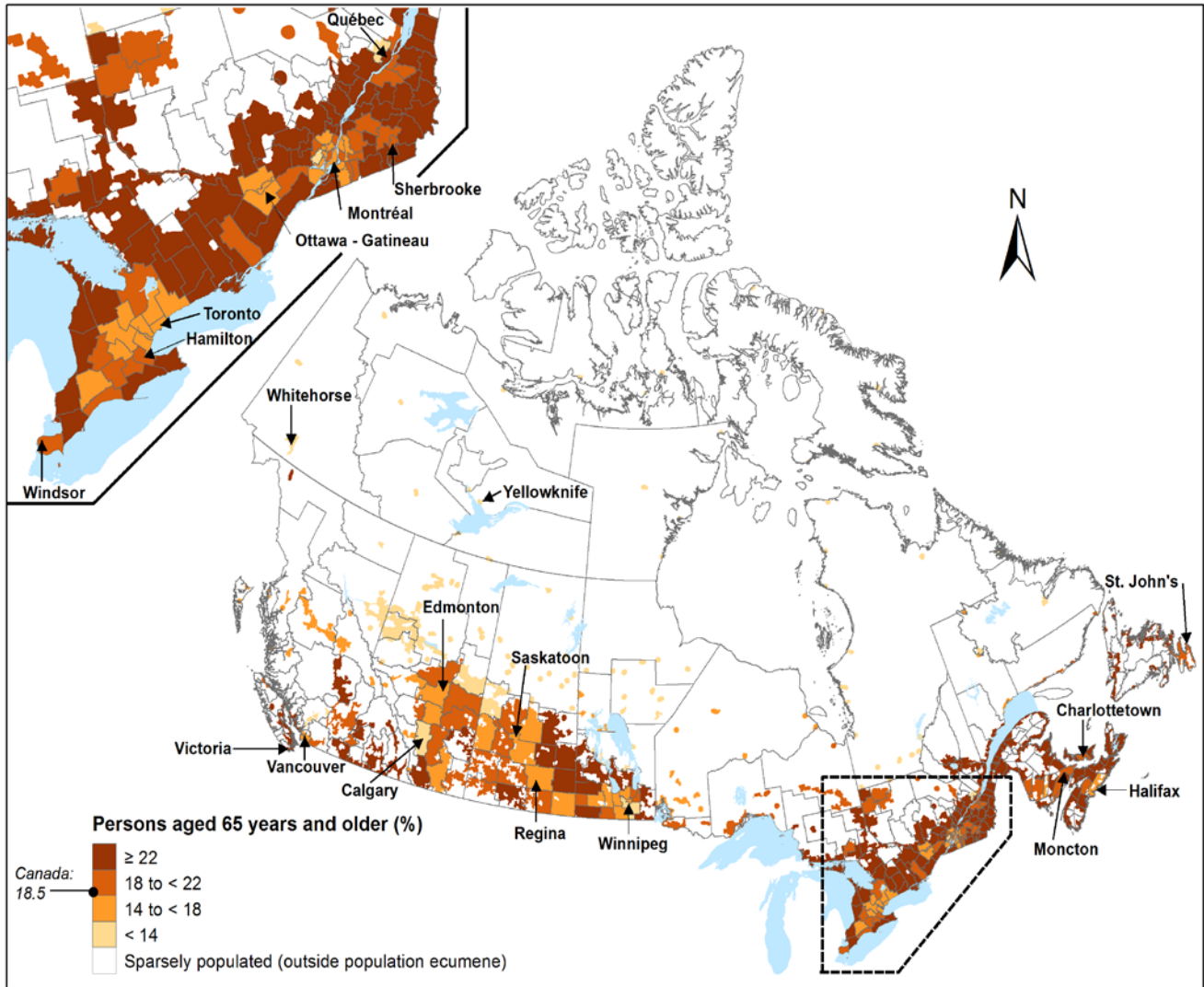
Source: Statistics Canada, Centre for Demography.

Map 1.4
Average age as of July 1, 2021, by census division, Canada



Source: Statistics Canada, Centre for Demography.

Map 1.5
Proportion of persons aged 65 years and older as of July 1, 2021, by census division, Canada



Source: Statistics Canada, Centre for Demography.

Quality of demographic data

Notes related to the quality of demographic estimates

In this case, the adjustment for the census net undercoverage (CNU) also includes the incompletely enumerated Indian reserves.

Unless otherwise noted, the term preliminary includes both preliminary and updated estimates.

The estimates contain certain inaccuracies stemming from two types of errors:

- errors in the Census data;
- imperfections in other data sources and the method used to estimate the components.

Census Data

Coverage, response and imputation errors

The errors attributable to census data can be divided into two groups: Response and processing errors, and coverage errors. The first group implies non-response error, misinterpretation by respondents, incorrect coding and non-response imputation. Errors in the second group primarily result from census undercoverage and, to a lesser extent, overcoverage. It should be noted that both types of errors are intrinsic to any survey data.

Coverage errors occur when individuals are missed, enumerated more than once or enumerated while not being part of the census universe (this last aspect is not estimated because it is deemed negligible). Following each census, Statistics Canada undertakes coverage studies to measure these errors. The main studies are the *Reverse Record Check Survey (RRC)* and the *Census Overcoverage Study (COS)*. Based on these studies, estimates of undercoverage and overcoverage are produced for each province and territory. The Centre for Demography adjusts the population enumerated in the census by province and territory using these estimates. At the subprovincial level these rates are applied to all geographic regions in the province or territory by age and sex.

Table 1
Estimated census net undercoverage, Canada, provinces and territories, 2001 to 2016 censuses

| | Census population | Census net undercoverage | Incompletely enumerated Indian reserves | Adjusted population | Rate |
|---------------------------|-------------------|--------------------------|---|---------------------|-------------|
| | A | B | C | D=A+B+C | (B+C)/D*100 |
| | number | | | | percent |
| 2016 | | | | | |
| Canada | 35,151,728 | 849,727 | 27,790 | 36,029,245 | 2.44 |
| Newfoundland and Labrador | 519,716 | 9,774 | 0 | 529,490 | 1.85 |
| Prince Edward Island | 142,907 | 3,464 | 0 | 146,371 | 2.37 |
| Nova Scotia | 923,598 | 17,809 | 0 | 941,407 | 1.89 |
| New Brunswick | 747,101 | 15,735 | 0 | 762,836 | 2.06 |
| Quebec | 8,164,361 | 35,191 | 11,985 | 8,211,537 | 0.57 |
| Ontario | 13,448,494 | 381,542 | 11,640 | 13,841,676 | 2.84 |
| Manitoba | 1,278,365 | 31,895 | 0 | 1,310,260 | 2.43 |
| Saskatchewan | 1,098,352 | 34,844 | 0 | 1,133,196 | 3.07 |
| Alberta | 4,067,175 | 115,968 | 4,043 | 4,187,186 | 2.87 |
| British Columbia | 4,648,055 | 197,267 | 122 | 4,845,444 | 4.07 |
| Yukon | 35,874 | 2,370 | 0 | 38,244 | 6.20 |
| Northwest Territories | 41,786 | 2,939 | 0 | 44,725 | 6.57 |
| Nunavut | 35,944 | 929 | 0 | 36,873 | 2.52 |

Table 1
Estimated census net undercoverage, Canada, provinces and territories, 2001 to 2016 censuses

| | Census population | Census net undercoverage | Incompletely enumerated Indian reserves | Adjusted population | Rate |
|---------------------------|-------------------|--------------------------|---|---------------------|-------------|
| | A | B | C | D=A+B+C | (B+C)/D*100 |
| | number | | | | percent |
| 2011 | | | | | |
| Canada | 33,476,688 | 759,125 | 37,392 | 34,273,205 | 2.32 |
| Newfoundland and Labrador | 514,536 | 10,192 | 0 | 524,728 | 1.94 |
| Prince Edward Island | 140,204 | 3,386 | 0 | 143,590 | 2.36 |
| Nova Scotia | 921,727 | 21,911 | 0 | 943,638 | 2.32 |
| New Brunswick | 751,171 | 3,930 | 0 | 755,101 | 0.52 |
| Quebec | 7,903,001 | 73,240 | 16,882 | 7,993,123 | 1.13 |
| Ontario | 12,851,821 | 369,874 | 14,926 | 13,236,621 | 2.91 |
| Manitoba | 1,208,268 | 21,698 | 608 | 1,230,574 | 1.81 |
| Saskatchewan | 1,033,381 | 29,580 | 768 | 1,063,729 | 2.85 |
| Alberta | 3,645,257 | 128,584 | 4,094 | 3,777,935 | 3.51 |
| British Columbia | 4,400,057 | 91,280 | 114 | 4,491,451 | 2.03 |
| Yukon | 33,897 | 1,356 | 0 | 35,253 | 3.85 |
| Northwest Territories | 41,462 | 1,977 | 0 | 43,439 | 4.55 |
| Nunavut | 31,906 | 2,117 | 0 | 34,023 | 6.22 |
| 2006 | | | | | |
| Canada | 31,612,897 | 868,658 | 40,115 | 32,521,670 | 2.79 |
| Newfoundland and Labrador | 505,469 | 5,046 | 0 | 510,515 | 0.99 |
| Prince Edward Island | 135,851 | 1,903 | 0 | 137,754 | 1.38 |
| Nova Scotia | 913,462 | 24,558 | 0 | 938,020 | 2.62 |
| New Brunswick | 729,997 | 16,059 | 0 | 746,056 | 2.15 |
| Quebec | 7,546,131 | 60,751 | 16,600 | 7,623,482 | 1.01 |
| Ontario | 12,160,282 | 465,824 | 15,391 | 12,641,497 | 3.81 |
| Manitoba | 1,148,401 | 34,330 | 0 | 1,182,731 | 2.90 |
| Saskatchewan | 968,157 | 22,594 | 739 | 991,490 | 2.35 |
| Alberta | 3,290,350 | 111,353 | 7,272 | 3,408,975 | 3.48 |
| British Columbia | 4,113,487 | 121,551 | 113 | 4,235,151 | 2.87 |
| Yukon | 30,372 | 1,805 | 0 | 32,177 | 5.61 |
| Northwest Territories | 41,464 | 1,620 | 0 | 43,084 | 3.76 |
| Nunavut | 29,474 | 1,264 | 0 | 30,738 | 4.11 |
| 2001 | | | | | |
| Canada | 30,007,094 | 924,430 | 34,539 | 30,966,063 | 3.10 |
| Newfoundland and Labrador | 512,930 | 9,401 | 0 | 522,331 | 1.80 |
| Prince Edward Island | 135,294 | 1,325 | 0 | 136,619 | 0.97 |
| Nova Scotia | 908,007 | 24,521 | 0 | 932,528 | 2.63 |
| New Brunswick | 729,498 | 20,095 | 0 | 749,593 | 2.68 |
| Quebec | 7,237,479 | 140,232 | 12,648 | 7,390,359 | 2.07 |
| Ontario | 11,410,046 | 436,349 | 15,960 | 11,862,355 | 3.81 |
| Manitoba | 1,119,583 | 30,903 | 110 | 1,150,596 | 2.70 |
| Saskatchewan | 978,933 | 21,231 | 581 | 1,000,745 | 2.18 |
| Alberta | 2,974,807 | 69,857 | 4,977 | 3,049,641 | 2.45 |
| British Columbia | 3,907,738 | 164,542 | 263 | 4,072,543 | 4.05 |
| Yukon | 28,674 | 1,423 | 0 | 30,097 | 4.73 |
| Northwest Territories | 37,360 | 3,295 | 0 | 40,655 | 8.10 |
| Nunavut | 26,745 | 1,256 | 0 | 28,001 | 4.49 |

Note: The levels and rates are based on the Reverse Record Check (RRC) and the Overcoverage Study and include non-permanent residents.

Source: Statistics Canada, Centre for Demography.

When creating base populations, the Demographic Estimates Program (DEP) corrects the census populations only for coverage errors. This correction, which is based on the findings of coverage studies, is primarily subject to sampling errors, and to a lesser extent, processing errors. Statistical tests indicate that coverage adjustments improve the quality of census data. The DEP uses the estimates from coverage studies for the provinces and territories. However, given the size of the samples in these studies, estimates by age and sex are modeled. Furthermore, it is assumed that the coverage rates estimated for a province or territory apply to the regions within that geographic area. With respect to the coverage studies, statistical analysis concluded that the adjustment, although not without errors itself, improved the quality of census data (Royce, 1993). They were deemed to be

consistent over time and across geographical areas, and to provide logical results. Users should also be aware that when calculating census net undercoverage (CNU) rates for small areas, it is likely that the underlying assumptions may be violated. If this is true, the resulting CNU rate would be misleading. Errors associated with these assumptions are, however, very difficult to quantify.

The corrections to the census data due to CNU improved, in general, the quality of the estimates by compensating for the differential undercoverage by age, sex and by province/territory across censuses.

The adjustment also incorporates the results of a study on the estimates of the number of people living on incompletely enumerated Indian reserves to complete the corrections for coverage errors in the census. The results of the coverage studies contain mainly sampling errors.

These adjustments have a direct impact on:

- The error of closure and its distribution by age and sex within a province or a territory as well as by province/territory as the CNU and its distribution vary from one census to another;
- within-cohort consistency of population estimates. If for example, the male cohort in age group 0 to 4 in 1981 was tracked up to the 2001 Census (unadjusted for CNU) the age group 20 to 24 would be noticeably smaller in 2001 than the age group 15 to 19 in 1996. Since Canada receives many immigrants within these age groups, the opposite would be expected. However, only after adjustment for CNU, the cohort size increases from 1996 to 2001.

For further information regarding the main coverage studies, please see the following document on Statistics Canada's web site: [1996](#), [2001](#), [2006](#), [2011](#), and [2016](#) Census Technical Report on Coverage.

Components

Errors due to estimation methodologies and data sources other than the census can also be significant.

A. Births and deaths

Since the law requires the recording of vital statistics, the final estimates for births and deaths data meet very high quality standards. Nevertheless, since preliminary estimates are derived, they can be slightly different from final estimates.

B. Immigration and non-permanent residents

With respect to immigrants and non-permanent residents (NPRs), *Immigration, Refugees and Citizenship Canada* (IRCC) administers special data files on both of these components. Since immigration is controlled by law, data on immigrants and NPRs are compiled upon arrival in Canada. These data represent only "legal" immigration and exclude illegal immigrants. Thus, for the "legal" part of international movement into Canada, the data are considered to be of high quality. However, some biases such as the difference between the stated province of intended residence at the time of arrival and the actual province of residence, may persist. Finally, since information provided by the *Visitor Data System* (VDS) from IRCC is not complete (age and sex of dependents, province of residence for certain groups of permit holders), estimates of NPRs are more prone to error than data on immigrants.

C. Emigration, returning emigration and net temporary emigration

Of all the demographic components that are used in the DEP, emigration, returning emigration and net temporary emigration are the most difficult to estimate with precision. Canada does not have a complete border registration system. While immigration and non-permanent residents (NPRs) are well documented by the federal government, Statistics Canada has always used indirect techniques for the estimation of the number of persons leaving the country. For this reason, available statistics regarding these three components have historically been of a lower quality than other components.

Estimates of the number of emigrants and returning emigrants are both derived using *Canada Child Benefit* (CCB) data provided by *Canada Revenue Agency* (CRA). Data are adjusted to take into account the incomplete coverage of the program and to derive the emigration and returning emigration of adults.

These adjustments and the delay in obtaining the data are the two main sources of errors. As current information on the number of persons living temporarily abroad does not exist, estimates are based on the *Reverse Record Check* (RRC) and the census. Estimates for the intercensal period are distributed equally among the five years. Moreover, assumptions were made to allow for the distribution of provincial/territorial data by subprovincial regions. Any geographical or quarterly variation may introduce error in the estimation of these components.

D. Interprovincial migration and intraprovincial migration

Preliminary interprovincial and intraprovincial migration estimates are based on data from the Canada Revenue Agency (CRA). Canada child benefit (CCB) data is used for children while T1FF data from the prior year is used for adults as that data is not yet available for the most recent year when preliminary estimates are produced.

Final estimates are obtained by comparing addresses indicated on personal income tax returns over two consecutive tax years, by making use of the latest T1FF files (with the exception of Quebec's subprovincial areas¹). An adjustment is also required to take into account migrants who do not file income tax returns.

E. Level of detail of components

As a more detailed breakdown of the data introduces a greater risk of inaccuracy into the estimates, the possibility of error in the components is augmented by the method used to distribute the estimates by age and sex. It seems that, in general, the initial errors should be minimal where the distribution of annual estimates of births, deaths and immigrants is concerned, and more significant with regard to the distribution of other components (non-permanent residents, emigrants, returning emigrants, net temporary emigrants and interprovincial and intraprovincial migrants). Finally, the size of error due to the age and sex distribution may vary by period and errors in some components may have a greater impact on a given age group or sex.

Geographical changes

Subprovincial geographical boundaries may change from one census to another. In order to facilitate chronological studies, population estimates for CDs, CMAs and ERs were produced for the 2001 to 2021 period according to the Standard Geographical Classification (SGC) 2016.

In order to clarify the demographic significance of geographical boundary changes, the 2011 population Census counts are converted in SGC 2016. Afterward, we compare the converted counts with the population counts of the 2011 Census in SGC 2011. Data presented here apply to population enumerated in the 2011 Census without adjustment for census net undercoverage.

Census metropolitan areas (CMAs)

With the adoption of the SGC 2016, Belleville (Ont.) and Lethbridge (Alta.), which were both a census agglomeration (CA) with the SGC 2011, became census metropolitan areas (CMAs). Among the 33² CMAs as defined in the SGC 2011, 13 have undergone geographical boundary changes in the SGC 2016. Had the latter been applied in 2011, population in all 33 CMAs would have reached 23,123,441 instead of 23,280,726 representing an increase of 157,285 persons or 0.7%.

In all CMAs, the demographic repercussion of boundary changes was relatively small (under 5%), for St. John's, Moncton, Saint John, Saguenay, Québec, Sherbrooke, Montréal, Ottawa – Gatineau, Kitchener - Cambridge – Waterloo, Greater Sudbury / Grand Sudbury, Regina, Saskatoon and Victoria.

Census Agglomerations (CAs)

With the transition from the SGC 2011 to the SGC 2016, eight new CAs have been created: Gander (N.L.), Sainte-Marie (Que.), Arnprior (Ont.), Carleton Place (Ont.), Wasaga Beach (Ont.), Winkler (Man.), Weyburn (Sask.) and Nelson (B.C.). As well, the CAs of Amos (Que.) and Temiskaming Shores (Ont.) were removed because their core

1. See sub-section K of the section on Methodology.

2. Excluding Belleville and Lethbridge CMAs, created in 2016, and grouping the two parts of Ontario and Quebec from the Ottawa-Gatineau CMA.

population dropped below 10,000 in 2011. By applying the new boundaries to the 2011 data, the CA³ population would have been 4,007,306, not 3,989,935, an increase of 17,371 (0.4%).

Of the 109 CAs, 32 experienced border changes. In 10 cases, these changes exceeded $\pm 5\%$.

Economic Regions (ERs)

Seven ERs out of the 76 have undergone geographical boundary changes between the 2011 and the 2016 Census. As ERs cover the entire country and because their number did not change, changes are rather simple. In Manitoba, there were boundary changes between Southeast and South Central, as well as between South Central and North Central. In British Columbia, the ER of Lower Mainland–Southwest received part of the Thompson–Okanagan ER. The differences are around 1%.

Census divisions (CDs)

Boundary changes affected 25 of the 293 CDs in Canada and population in 11 CDs was only slightly affected with relative gains/losses not exceeding 0.1%.

In New Brunswick, the boundary between Gloucester and Northumberland was changed so that the former received part of the population of the second, resulting in a population gain of 2.8%. Manitoba experienced three boundary changes in its census divisions. Division No. 2 and Division No. 3 had boundary modifications resulting in a 1.0% population growth in Division No. 2. The impact of the boundary change between Divisions No. 4 and 8 resulted in a 7.3% population growth in Division No. 4. Similarly, the population of Division No. 7 increased by 1.2% due to a boundary change with Division No. 15. Lastly, two CDs have undergone a change in their boundaries in the Northwest Territories, Region 5 and Region 6, the latter having gained 1.4% of its population to the detriment of Region 5.

Quality assessment

In order to assess the quality of our estimates, two evaluation measures are used: precocity errors and errors of closure.

A. Precocity errors

The quality of preliminary estimates of components is evaluated using precocity errors. Precocity error is defined as the difference between preliminary and final estimate of a particular component in terms of its relative proportion of the total population for the relevant geographical area. It can be calculated for both population and component estimates. The precocity error measures the impact of the trade-off of accuracy in favour of timeliness on the estimated population. The precocity error is calculated as:

$$PE_{(t-1,t)} = \frac{(N_{(t-1,t)}^{preliminary} - N_{(t-1,t)}^{final})}{P_{(t-1)}^{postcensal}} \times 1,000$$

where:

- $PE_{(t-1,t)}$ = the precocity error for the period from t-1 to t;
- $N_{(t-1,t)}^{preliminary}$ = the preliminary estimate of a component of demographic change;
- $N_{(t-1,t)}^{final}$ = the final estimate of a component of demographic change;
- $P_{t-1}^{postcensal}$ = postcensal estimates of population for the relevant geographical area at time t-1.

3. Excluding Amos (Que.) and Temiskaming Shores (Ont.) CAs, retired in 2016.

The precocity error of a component gives us information on the size of the error between the preliminary and the final population estimate. Analysis of precocity errors allows for useful comparisons between components, as well as between geographical areas of different population size. Precocity error can either be positive or negative. A positive precocity error denotes that the preliminary estimate is larger than the final estimate while a negative precocity error indicates the opposite. Note that when compared to the total population for an area, the differences between preliminary and final estimates of the components are quite small. However, this type of error has a different impact on each component and geographical area.

Generally speaking for subprovincial estimates, net interprovincial and intraprovincial migration yields the greatest precocity errors. This is likely the result of the use of different data sources for preliminary and final estimates. In most years and for most provinces/territories, births, deaths and immigration estimates yielded the smallest precocity errors. For immigration estimates, this reflects the completeness of the data source and the availability of data for the more timely preliminary estimates. In the case of births and deaths, small precocity errors can be explained by the use of short-term projections for preliminary estimates.

According to the analysis of the most recent precocity errors and assuming that the quality of the basic data remains constant, the present postcensal estimates should have an acceptable degree of reliability.

B. Errors of closure

The error of closure measures the exactness of the final postcensal estimates. It is defined as the difference between the final postcensal population estimates on Census Day and the enumerated population of the most recent census adjusted for census net undercoverage (CNU). A positive error of closure means that the postcensal population estimates have overestimated the population.

The error of closure comes from two sources: errors primarily due to sampling when measuring census coverage and errors related to the components of population growth over the intercensal period. For each five-year intercensal period, the error of closure can only be calculated following the release of census data and estimates of CNU. The error of closure can be calculated for the total population of each province and territory as well as by age and sex.

By dividing the error of closure by the census population adjusted for CNU the differences are relatively small at the national level (0.16% for 2001, 0.10% for 2006, 0.42% for 2011 and 0.31% for 2016). At the provincial and territorial level, as at the subprovincial level, differences are understandably larger, since the estimates are also affected by errors in estimating interprovincial and intraprovincial migration. Nevertheless, the provincial/territorial final postcensal estimates generally fall within 1% of the adjusted census population, except for the territories and a few other exceptions.

For census metropolitan areas (CMAs), population estimates overestimated the total CMA population (0.5%) and the population of 25 out of 35 CMAs. The difference between population estimates and adjusted census counts was higher than 2% for 2 CMAs: Kingston (4.0%) and Halifax (2.6%).

For census agglomerations (CAs), population estimates overestimated the population of 49 out of 120 CAs in the country. The most pronounced errors of closure are in Campbellton (Quebec part) (14.4%), Kenora and High River (6.9% in each case), and Canmore (5.8%). In the case of Campbellton (Quebec part), the population of the CA is less than 3,000.

Population estimates overestimated the population of 41 out of 76 economic regions (ERs). The difference between population estimates and adjusted census counts was higher than 3% for a single ER: Northern, Saskatchewan (3.2%).

Population estimates overestimated the population of 148 out of 293 census divisions (CDs). For 125 of the CDs, the difference between population estimates and adjusted census counts was less than 1%. The error of closure of 255 CDs, that is 87% of all CDs, was comprised between -3% and 3%. The most important errors of closure were observed in Stikine, British Columbia (-37.0%), in Sudbury, Ontario (-8.0%), in Central Coast, British Columbia (-7.8%) and in Division No. 1 of Manitoba (-7.7%). For the CD of Stikine, the population was less than 1,000 people and for the CD of Central Coast, less than 4,000.

Table 2
Error of closure of the estimates of population, Canada, provinces and territories, 2001 to 2016

| | 2001 | | 2006 | | 2011 | | 2016 | |
|---------------------------|---------------|-----------------|---------------|-----------------|----------------|-----------------|----------------|-----------------|
| | number | rate in percent | number | rate in percent | number | rate in percent | number | rate in percent |
| Canada | 49,948 | 0.16 | 32,129 | 0.10 | 144,554 | 0.42 | 110,310 | 0.31 |
| Newfoundland and Labrador | 11,381 | 2.18 | -1,641 | -0.32 | -11,106 | -2.12 | 975 | 0.18 |
| Prince Edward Island | 1,483 | 1.09 | -8 | -0.01 | 2,169 | 1.51 | 2,745 | 1.88 |
| Nova Scotia | 9,005 | 0.97 | -4,328 | -0.46 | 4,819 | 0.51 | 6,673 | 0.71 |
| New Brunswick | 4,587 | 0.61 | 2,681 | 0.36 | 1,446 | 0.19 | -6,100 | -0.80 |
| Quebec | -222 | 0.00 | 21,219 | 0.28 | -24,472 | -0.31 | 86,265 | 1.05 |
| Ontario | 11,288 | 0.10 | 16,311 | 0.13 | 108,846 | 0.82 | 60,683 | 0.44 |
| Manitoba | -1,035 | -0.09 | -5,987 | -0.51 | 21,425 | 1.74 | 3,644 | 0.28 |
| Saskatchewan | 16,017 | 1.60 | -3,784 | -0.38 | -7,871 | -0.74 | 11,960 | 1.06 |
| Alberta | 1,604 | 0.05 | -51,338 | -1.51 | -3,378 | -0.09 | 44,099 | 1.05 |
| British Columbia | -4,347 | -0.11 | 61,367 | 1.45 | 52,356 | 1.17 | -100,403 | -2.07 |
| Yukon | -360 | -1.20 | -1,031 | -3.20 | 103 | 0.29 | -317 | -0.83 |
| Northwest Territories | 497 | 1.22 | -924 | -2.14 | 700 | 1.61 | -58 | -0.13 |
| Nunavut | 50 | 0.18 | -408 | -1.33 | -483 | -1.42 | 144 | 0.39 |

Note: The error of closure is equal to the postcensal estimate (at the census date) minus the census count adjusted for census net undercoverage (including adjustment for incompletely enumerated Indian reserves). The percentage is: error of closure, divided by the census count adjusted for census net undercoverage and incompletely enumerated Indian reserves, multiplied by 100.

Source: Statistics Canada, Centre for Demography.

Table 3
Error of closure of estimates of population by census metropolitan area (CMA) and census agglomeration (CA), Canada, May 10, 2016

| | Error of closure | |
|--|------------------|------------|
| | number | percent |
| All census metropolitan areas and census agglomerations | 153,766 | 0.5 |
| Newfoundland and Labrador | | |
| St. John's | 3,600 | 1.7 |
| Bay Roberts | 119 | 1.1 |
| Grand Falls-Windsor | -28 | -0.2 |
| Gander | 26 | 0.2 |
| Corner Brook | -568 | -1.7 |
| Prince Edward Island | | |
| Charlottetown | 2,193 | 3.1 |
| Summerside | -392 | -2.3 |
| Nova Scotia | | |
| Halifax | 10,766 | 2.6 |
| Kentville | 818 | 3.1 |
| Truro | 774 | 1.7 |
| New Glasgow | 484 | 1.4 |
| Cape Breton | -1,233 | -1.2 |
| New Brunswick | | |
| Moncton | 990 | 0.7 |
| Saint John | -635 | -0.5 |
| Fredericton | 2,025 | 1.9 |
| Bathurst | -986 | -3.1 |
| Miramichi | -648 | -2.3 |
| Campbellton (New Brunswick part) | -7 | -0.1 |
| Edmundston | -725 | -3.0 |
| Quebec | | |
| Campbellton (Quebec part) | 420 | 14.4 |
| Matane | 34 | 0.2 |
| Rimouski | 842 | 1.5 |
| Rivière-du-Loup | 819 | 2.8 |
| Baie-Comeau | -117 | -0.4 |
| Saguenay | 58 | 0.0 |
| Alma | 576 | 1.7 |
| Dolbeau-Mistassini | 179 | 1.1 |
| Sept-Îles | -271 | -0.9 |
| Québec | 2,502 | 0.3 |
| Sainte-Marie | 182 | 1.3 |

Table 3
Error of closure of estimates of population by census metropolitan area (CMA) and census agglomeration (CA), Canada,
May 10, 2016

| | Error of closure | |
|----------------------------------|------------------|---------|
| | number | percent |
| Saint-Georges | -104 | -0.3 |
| Thetford Mines | 280 | 1.0 |
| Sherbrooke | 1,632 | 0.8 |
| Cowansville | -406 | -3.0 |
| Victoriaville | -234 | -0.5 |
| Trois-Rivières | 976 | 0.6 |
| Shawinigan | -193 | -0.4 |
| Drummondville | -203 | -0.2 |
| Granby | 412 | 0.5 |
| Saint-Hyacinthe | -973 | -1.6 |
| Sorel-Tracy | 59 | 0.1 |
| Joliette | -47 | -0.1 |
| Montréal | 58,395 | 1.4 |
| Salaberry-de-Valleyfield | 114 | 0.3 |
| Lachute | -83 | -0.6 |
| Val-d'Or | 413 | 1.2 |
| Rouyn-Noranda | -35 | -0.1 |
| Hawkesbury (Quebec part) | -82 | -4.8 |
| Ottawa - Gatineau (Quebec part) | 2,579 | 0.8 |
| Ontario | | |
| Cornwall | -1,266 | -2.1 |
| Hawkesbury (Ontario part) | 330 | 3.1 |
| Ottawa - Gatineau (Ontario part) | 7,849 | 0.8 |
| Arnprior | -501 | -3.1 |
| Carleton Place | -1,763 | -5.5 |
| Brockville | 206 | 0.5 |
| Pembroke | -292 | -1.2 |
| Petawawa | -1,107 | -6.2 |
| Kingston | 6,657 | 4.0 |
| Belleville | -713 | -0.7 |
| Cobourg | -1,020 | -5.1 |
| Port Hope | -116 | -0.7 |
| Peterborough | 932 | 0.7 |
| Kawartha Lakes | -564 | -0.7 |
| Centre Wellington | 79 | 0.3 |
| Oshawa | 5,528 | 1.4 |
| Ingersoll | -428 | -3.3 |
| Toronto | 74,634 | 1.2 |
| Hamilton | 7,532 | 1.0 |
| St. Catharines - Niagara | -1,603 | -0.4 |
| Kitchener - Cambridge - Waterloo | 654 | 0.1 |
| Brantford | 1,708 | 1.2 |
| Woodstock | -1,722 | -4.1 |
| Tillsonburg | -671 | -4.1 |
| Norfolk | 908 | 1.4 |
| Guelph | -1,229 | -0.8 |
| Stratford | -19 | -0.1 |
| London | 5,372 | 1.1 |
| Chatham-Kent | 795 | 0.8 |
| Leamington | -1,018 | -2.0 |
| Windsor | 248 | 0.1 |
| Sarnia | 506 | 0.5 |
| Wasaga Beach | -2,279 | -10.8 |
| Owen Sound | 246 | 0.8 |
| Collingwood | -543 | -2.4 |
| Barrie | 4,013 | 2.0 |
| Orillia | -334 | -1.0 |
| Midland | 448 | 1.2 |
| North Bay | 1,291 | 1.8 |
| Greater Sudbury | -540 | -0.3 |
| Elliot Lake | 343 | 3.1 |

Table 3
Error of closure of estimates of population by census metropolitan area (CMA) and census agglomeration (CA), Canada,
May 10, 2016

| | Error of closure | |
|----------------------------------|------------------|---------|
| | number | percent |
| Timmins | 37 | 0.1 |
| Sault Ste. Marie | -107 | -0.1 |
| Thunder Bay | 473 | 0.4 |
| Kenora | 1,076 | 6.9 |
| Manitoba | | |
| Winnipeg | 8,560 | 1.1 |
| Winkler | -290 | -0.9 |
| Steinbach | -4,578 | -28.2 |
| Portage la Prairie | -836 | -6.1 |
| Brandon | 736 | 1.2 |
| Thompson | 494 | 3.5 |
| Saskatchewan | | |
| Regina | 882 | 0.4 |
| Yorkton | 34 | 0.2 |
| Moose Jaw | 425 | 1.2 |
| Swift Current | -526 | -2.8 |
| Saskatoon | 3,464 | 1.1 |
| North Battleford | -38 | -0.2 |
| Prince Albert | 2,126 | 4.7 |
| Estevan | 36 | 0.3 |
| Weyburn | 490 | 4.4 |
| Lloydminster (Saskatchewan part) | -261 | -1.7 |
| Alberta | | |
| Medicine Hat | 853 | 1.1 |
| Brooks | 48 | 0.2 |
| Lethbridge | 787 | 0.7 |
| Okotoks | -575 | -1.9 |
| High River | 951 | 6.9 |
| Calgary | 10,931 | 0.8 |
| Strathmore | -624 | -4.4 |
| Canmore | 835 | 5.8 |
| Red Deer | 2,541 | 2.5 |
| Sylvan Lake | 18 | 0.1 |
| Lacombe | -791 | -5.9 |
| Camrose | -302 | -1.6 |
| Edmonton | 21,715 | 1.6 |
| Lloydminster (Alberta part) | 73 | 0.4 |
| Cold Lake | -929 | -6.0 |
| Grande Prairie | -1,244 | -1.9 |
| Wood Buffalo | 1,506 | 2.0 |
| Wetaskiwin | 392 | 3.0 |
| British Columbia | | |
| Cranbrook | -973 | -3.6 |
| Nelson | -543 | -2.9 |
| Penticton | -431 | -1.0 |
| Kelowna | -2,359 | -1.2 |
| Vernon | -1,726 | -2.7 |
| Salmon Arm | -448 | -2.4 |
| Kamloops | -2,950 | -2.7 |
| Chilliwack | -1,278 | -1.2 |
| Abbotsford - Mission | -299 | -0.2 |
| Vancouver | -51,990 | -2.0 |
| Squamish | -102 | -0.5 |
| Victoria | -6,522 | -1.7 |
| Duncan | -687 | -1.5 |
| Nanaimo | -4,304 | -3.9 |
| Parksville | 622 | 2.1 |
| Port Alberni | -455 | -1.8 |
| Courtenay | -938 | -1.7 |
| Campbell River | -1,154 | -2.9 |
| Powell River | -731 | -4.2 |

Table 3
Error of closure of estimates of population by census metropolitan area (CMA) and census agglomeration (CA), Canada, May 10, 2016

| | Error of closure | |
|------------------------------|------------------|---------|
| | number | percent |
| Williams Lake | -377 | -2.0 |
| Quesnel | -847 | -3.5 |
| Prince Rupert | -40 | -0.3 |
| Terrace | -469 | -2.9 |
| Prince George | -1,983 | -2.2 |
| Dawson Creek | -439 | -3.4 |
| Fort St. John | -63 | -0.2 |
| Yukon | | |
| Whitehorse | -605 | -2.0 |
| Northwest Territories | | |
| Yellowknife | 627 | 3.0 |

Note: The error of closure is equal to the postcensal estimate (at the census date) minus the census count adjusted for census net undercoverage (including adjustment for incompletely enumerated Indian reserves). The percentage is: error of closure, divided by the census count adjusted for census net undercoverage and incompletely enumerated Indian reserves, multiplied by 100.

Source: Statistics Canada, Centre for Demography.

Table 4
Error of closure of the estimates of population by economic region (ER), May 10, 2016

| | Error of closure | |
|--|------------------|------------|
| | number | percent |
| All economic regions | 110,310 | 0.3 |
| Newfoundland and Labrador | | |
| Avalon Peninsula | 3,904 | 1.4 |
| South Coast–Burin Peninsula | -591 | -1.6 |
| West Coast–Northern Peninsula–Labrador | -1,300 | -1.2 |
| Notre Dame–Central Bonavista Bay | -1,038 | -0.9 |
| Prince Edward Island | | |
| Prince Edward Island | 2,745 | 1.9 |
| Nova Scotia | | |
| Cape Breton | -1,966 | -1.5 |
| North Shore | 185 | 0.1 |
| Annapolis Valley | -1,341 | -1.1 |
| Southern | -963 | -0.8 |
| Halifax | 10,758 | 2.6 |
| New Brunswick | | |
| Campbellton–Miramichi | -4,718 | -3.0 |
| Moncton–Richibucto | 158 | 0.1 |
| Saint John–St. Stephen | -542 | -0.3 |
| Fredericton–Oromocto | 571 | 0.4 |
| Edmundston–Woodstock | -1,569 | -2.0 |
| Quebec | | |
| Gaspésie–Îles-de-la-Madeleine | 1,122 | 1.2 |
| Bas-Saint-Laurent | 2,800 | 1.4 |
| Capitale-Nationale | 2,982 | 0.4 |
| Chaudière-Appalaches | 2,912 | 0.7 |
| Estrie | 2,762 | 0.9 |
| Centre-du-Québec | 194 | 0.1 |
| Montérégie | 9,365 | 0.6 |
| Montréal | 40,615 | 2.1 |
| Laval | 3,932 | 0.9 |
| Lanaudière | 5,586 | 1.1 |
| Laurentides | 7,092 | 1.2 |
| Outaouais | 2,875 | 0.7 |
| Abitibi-Témiscamingue | 1,016 | 0.7 |
| Mauricie | 1,368 | 0.5 |
| Saguenay–Lac-Saint-Jean | 1,261 | 0.5 |
| Côte-Nord | -5 | 0.0 |
| Nord-du-Québec | 388 | 0.9 |

Table 4
Error of closure of the estimates of population by economic region (ER), May 10, 2016

| | Error of closure | |
|--------------------------------------|------------------|---------|
| | number | percent |
| Ontario | | |
| Ottawa | -2,520 | -0.2 |
| Kingston–Pembroke | 3,547 | 0.8 |
| Muskoka–Kawarthas | -234 | -0.1 |
| Toronto | 65,020 | 1.0 |
| Kitchener–Waterloo–Barrie | -2,839 | -0.2 |
| Hamilton–Niagara Peninsula | 4,259 | 0.3 |
| London | 2,512 | 0.4 |
| Windsor–Sarnia | -1,038 | -0.2 |
| Stratford–Bruce Peninsula | -3,300 | -1.1 |
| Northeast | -4,162 | -0.7 |
| Northwest | -562 | -0.2 |
| Manitoba | | |
| Southeast | -3,527 | -2.9 |
| South Central | -115 | -0.2 |
| Southwest | 312 | 0.3 |
| North Central | -511 | -1.0 |
| Winnipeg | 7,633 | 1.0 |
| Interlake | 165 | 0.2 |
| Parklands | -1,377 | -3.3 |
| North | 1,064 | 1.1 |
| Saskatchewan | | |
| Regina–Moose Mountain | 4,686 | 1.4 |
| Swift Current–Moose Jaw | -517 | -0.5 |
| Saskatoon–Biggar | 5,753 | 1.6 |
| Yorkton–Melville | -819 | -1.0 |
| Prince Albert | 1,611 | 0.8 |
| Northern | 1,246 | 3.2 |
| Alberta | | |
| Lethbridge–Medicine Hat | -91 | 0.0 |
| Camrose–Drumheller | -850 | -0.4 |
| Calgary | 13,640 | 0.9 |
| Banff–Jasper–Rocky Mountain House | 1,989 | 2.2 |
| Red Deer | 967 | 0.4 |
| Edmonton | 24,262 | 1.7 |
| Athabasca–Grande Prairie–Peace River | 2,391 | 0.9 |
| Wood Buffalo–Cold Lake | 1,791 | 1.2 |
| British Columbia | | |
| Vancouver Island and Coast | -19,314 | -2.3 |
| Lower Mainland–Southwest | -55,064 | -1.9 |
| Thompson–Okanagan | -12,437 | -2.2 |
| Kootenay | -6,172 | -3.9 |
| Cariboo | -4,961 | -3.0 |
| North Coast | -407 | -0.7 |
| Nechako | -537 | -1.3 |
| Northeast | -1,511 | -2.1 |
| Yukon | -317 | -0.8 |
| Northwest Territories | -58 | -0.1 |
| Nunavut | 144 | 0.4 |

Note: The error of closure is equal to the postcensal estimate (at the census date) minus the census count adjusted for census net undercoverage (including adjustment for incompletely enumerated Indian reserves). The percentage is: error of closure, divided by the census count adjusted for census net undercoverage and incompletely enumerated Indian reserves, multiplied by 100.

Source: Statistics Canada, Centre for Demography.

Table 5
Distribution of census divisions (CDs) by error of closure, Canada, provinces and territories, May 10, 2016

| | Error of closure | | | | | Total of census divisions | Average absolute error | Census divisions with positive error |
|---------------------------|------------------|-------------|-------------|--------------|-------------|---------------------------|------------------------|--------------------------------------|
| | Less than 1.0% | 1.0 to 1.9% | 2.0 to 2.9% | 3.0% to 3.9% | 4% and over | | | |
| | number | | | | | | | |
| Canada | 125 | 80 | 50 | 22 | 16 | 293 | 1.7 | 148 |
| Newfoundland and Labrador | 5 | 3 | 2 | 1 | 0 | 11 | 1.4 | 2 |
| Prince Edward Island | 1 | 1 | 0 | 1 | 0 | 3 | 1.7 | 2 |
| Nova Scotia | 7 | 8 | 2 | 0 | 1 | 18 | 1.3 | 4 |
| New Brunswick | 3 | 5 | 4 | 3 | 0 | 15 | 1.9 | 3 |
| Quebec | 55 | 24 | 15 | 2 | 2 | 98 | 1.1 | 80 |
| Ontario | 26 | 16 | 3 | 3 | 1 | 49 | 1.2 | 18 |
| Manitoba | 4 | 8 | 5 | 3 | 3 | 23 | 2.3 | 9 |
| Saskatchewan | 6 | 5 | 6 | 1 | 0 | 18 | 1.4 | 10 |
| Alberta | 8 | 5 | 1 | 4 | 1 | 19 | 1.6 | 14 |
| British Columbia | 4 | 5 | 10 | 4 | 6 | 29 | 3.8 | 2 |
| Yukon | 1 | 0 | 0 | 0 | 0 | 1 | 0.8 | 0 |
| Northwest Territories | 3 | 0 | 1 | 0 | 2 | 6 | 2.7 | 2 |
| Nunavut | 2 | 0 | 1 | 0 | 0 | 3 | 1.0 | 2 |

Note: The error of closure is equal to the postcensal estimate on census day minus the census count adjusted or net undercount. The percentage is error of closure, divided by the census count adjusted or net undercount, multiplied by 100. The absolute values of these percentages are used for the distribution in this table.

Source: Statistics Canada, Centre for Demography.

Methodology

Related methodology notes

The two-way raking method is also referred to as the “Deming method”, the “method of iterative proportions”, and calibration (see Shryock, Siegel et al., 1976: 547-549).

Unless otherwise noted, the term preliminary includes both preliminary and updated estimates.

The T1 family file (T1FF) is derived from the Canada Revenue Agency (CRA) T1 file by the Centre for Income and Socioeconomic Well-being Statistics of Statistics Canada.

This document describes the concepts, data the sources and the methodology used to produce the population estimates. Population estimates are produced to measure the population counts according to various characteristics and geographies between two censuses. The demographic estimates are the official population estimates at the national, provincial, territorial and subprovincial levels.

Postcensal estimates are based on the 2016 Census.

Population Estimates

Types of estimates

Population estimates can either be intercensal or postcensal. Intercensal estimates are produced using counts from two consecutive censuses adjusted for census net undercoverage (CNU)⁴ (including adjustment for incompletely enumerated Indian reserves (IEIR)) and postcensal estimates. The production of intercensal estimates consists of updating the postcensal estimates using the counts from a new census adjusted for CNU.

Postcensal estimates are produced using data from the most recent census adjusted for CNU and the components of population growth. In terms of timeliness, postcensal estimates are more up-to-date than data from the most recent census adjusted for CNU, but as they get farther from the date of that census, they become less reliable.

Levels of estimates

Updating population estimates between censuses requires the use of data from administrative files or surveys. The quality of population estimates therefore depends on the availability of a number of administrative data files that are provided to Statistics Canada by Canadian and foreign government departments. Since some components are not available until several months after the reference date, three kinds of postcensal estimates are produced: preliminary postcensal (PP), updated postcensal (PR) and final postcensal (PD). The time lag between the reference date and the release date is three months for preliminary estimates and two to three years for final estimates. Though it requires more vigilance on the part of users, the production of three successive series of postcensal estimates is the strategy that best satisfies the need for both timeliness and accuracy of the estimates.

Calculation of postcensal population estimates

Population estimates – preliminary, updated and final – are produced using the component method. This method consists in taking the population figures from the most recent census, adjusted for CNU (undercoverage minus overcoverage), and adding or subtracting the number of births, deaths, and components of international and internal migration.

4. In this case, the adjustment for the census net undercoverage also includes the incompletely enumerated Indian reserves.

A. Subprovincial estimates

Population estimates for census metropolitan areas, census agglomerations and census divisions

The component method is used to produce estimates for census metropolitan areas (CMAs), census agglomerations (CAs) and census divisions (CDs) by age and sex. The method is applied to each age-sex cohort in the base population.

The component method formulas for estimating the population of CMAs, CAs and CDs by age and sex are as follows:

For age 0:

$$P_{(t+1)}^0 = \frac{B_{(t,t+1)} - D_{(t,t+1)}^{-1} + I_{(t,t+1)}^{-1} - (E_{(t,t+1)}^{-1} + \Delta TE_{(t,t+1)}^{-1}) + RE_{(t,t+1)}^{-1} + NPR_{(t+1)}^0 + \Delta Ninter_{(t,t+1)}^{-1} + \Delta Nintra_{(t,t+1)}^{-1} + Resid_{(t,t+1)}^{-1}}{\Delta Ninter_{(t,t+1)}^{-1} + \Delta Nintra_{(t,t+1)}^{-1} + Resid_{(t,t+1)}^{-1}}$$

For ages 1 to 89:

$$P_{(t+1)}^{a+1} = \frac{P_{(t)}^a - D_{(t,t+1)}^a + I_{(t,t+1)}^a - (E_{(t,t+1)}^a + \Delta TE_{(t,t+1)}^a) + RE_{(t,t+1)}^a - NPR_{(t)}^a + NPR_{(t+1)}^{a+1} + \Delta Ninter_{(t,t+1)}^a + \Delta Nintra_{(t,t+1)}^a + Resid_{(t,t+1)}^a}{\Delta Ninter_{(t,t+1)}^a + \Delta Nintra_{(t,t+1)}^a + Resid_{(t,t+1)}^a}$$

For age group 90 and over:

$$P_{(t+1)}^{90+} = \frac{P_{(t)}^{89+} - D_{(t,t+1)}^{89+} + I_{(t,t+1)}^{89+} - (E_{(t,t+1)}^{89+} + \Delta TE_{(t,t+1)}^{89+}) + RE_{(t,t+1)}^{89+} - NPR_{(t)}^{89+} + NPR_{(t+1)}^{90+} + \Delta Ninter_{(t,t+1)}^{89+} + \Delta Nintra_{(t,t+1)}^{89+} + Resid_{(t,t+1)}^{89+}}{\Delta Ninter_{(t,t+1)}^{89+} + \Delta Nintra_{(t,t+1)}^{89+} + Resid_{(t,t+1)}^{89+}}$$

where, for each subprovincial region

| | | |
|-----------------|---|---|
| $(t, t + 1)$ | = | interval between times t and t+1 |
| $P_{(t+1)}$ | = | population estimates at time t+1 |
| $P_{(t)}$ | = | base population at time t (census counts adjusted for net census undercoverage or the most recent estimate) |
| B | = | number of births |
| D | = | number of deaths |
| I | = | number of immigrants |
| E | = | number of emigrants |
| DTE | = | net temporary emigration |
| RE | = | number of returning emigrants |
| NPR | = | number of non-permanent residents |
| $\Delta Ninter$ | = | net interprovincial migration |
| $\Delta Nintra$ | = | net intraprovincial migration |
| Resid | = | residual deviation (for intercensal estimates). |

To ensure concordance between the subprovincial estimates and the provincial and territorial estimates by age and sex, two-way raking is used.

Special treatment for postcensal estimates for Quebec

Quebec's postcensal population estimates by age and sex at the of CDs, CMAs and CAs are calculated in accordance with the equations of the component method presented above, but some components are directly taken from the *Institut de la statistique du Québec* (ISQ) estimates. Special treatment specific to those components is explained in sections D and K.

Population estimates for economic regions

A different method is used to produce population estimates for economic regions (ERs). In this case the census division's (CD) aggregate method is used. First, the ERs are defined in terms of CDs using the most recent Standard Geographical Classification (SGC) specifications. When the geographic delineation of the CDs and ERs are the same, no adjustment is required; the population estimates for the CDs that make up the ER are simply added together.

However, when the geographic delineation of the CD does not match that of the ER, i.e., when a CD is in more than one ER, distribution of the CD's demographic components are allocated on the basis of its demographic weight in each ER in question. The proportions are referred to as conversion factors. They are calculated using the most recent census counts.

Thus, demographic components (births, deaths and migration) initially measured at the CD level can be allocated to each ER. Using the census division's aggregate method by the ERs' geographic delineation, the population and demographic components of ERs can be estimated.

However, the census division's aggregate method cannot be used to estimate the number of intraprovincial in-migrants and out-migrants, since it overestimates those figures. In-migrants to a given CD from another CD in the same ER should not be counted since the migration occurred within the ER's boundaries. These are false in-migrants. The same is true for out-migrants from one CD to another CD in the same ER: they are false out-migrants. However, the net intraprovincial migration calculated with the CD aggregate method is correct because the false in-migrants and out-migrants cancel each other out. As a result, only the net intraprovincial migration of ERs can be estimated accurately using the CD aggregate method. This is why the estimates for intraprovincial in-migrants and out-migrants are not available at the ER level.

Population estimates for census subdivisions

A different method is used to produce population estimates for census subdivisions (CSDs). Postcensal estimates are based on the latest census counts adjusted for census net undercoverage (including adjustment for incompletely enumerated Indian reserves) and on the estimated population growth that occurred since that census, as calculated using fiscal data. Intercensal estimates are based on postcensal estimates and census counts adjusted of the censuses preceding and following the considered year.

Population estimates for CSDs in Quebec are provided by the *Institut de la statistique du Québec* (ISQ). Population estimates for CSDs in Alberta are provided by Alberta's *Office of Statistics and Information* (OSI) in current geography for July 1, 2016 and after. They are converted to the appropriate standard geographical classification (SGC) using geographical relationships provided by OSI. Due to this geographical difference, small discrepancies may exist between CSD populations released by Statistics Canada for Alberta and those found directly on the [OSI's website](#). CSD population estimates for Alberta prior to July 1, 2016 are produced using the same method adopted for provinces and territories that do not provide their own estimates.

Population estimates for CSDs in Yukon are not disseminated by Statistics Canada and can be found on the [Yukon Bureau of Statistics website](#). Similarly, population estimates for CSDs in the Northwest Territories are not disseminated by Statistics Canada and can be found on the [NWT Bureau of Statistics website](#).

To ensure consistency between the CSD and CD population estimates, the CSD population estimates are adjusted using two-way raking.

B. Levels of estimates

The difference between preliminary and final postcensal population estimates lies in the timeliness of the components. When all the components are preliminary, the population estimate is deemed preliminary postcensal (PP). When all the components are final, the population estimate is deemed final postcensal (PD). Any other combination of levels is considered updated postcensal (PR).

C. Base population and components of population growth

Base population

The base populations are derived from the quinquennial censuses. The population universe of the 2016 Census includes the following groups:

- Canadian citizens (by birth or by naturalization) and immigrants with a usual place of residence in Canada;
- Canadian citizens (by birth or by naturalization) and immigrants who are abroad, either on a military base or attached to a diplomatic mission;
- Canadian citizens (by birth or by naturalization) and immigrants at sea or in port aboard merchant vessels under Canadian registry or Canadian government vessels;
- Non-permanent residents:
 - persons with a usual place of residence in Canada who are claiming refugee status and the family members living with them;
 - persons with a usual place of residence in Canada who hold study permits and the family members living with them;
 - persons with a usual place of residence in Canada who hold work permits and the family members living with them.

The population universe of the 2016 Census does not include foreign residents but, since 1991, non-permanent residents are included in the population universe.

Foreign residents have not been enumerated since the 1991 Census. Foreign residents are persons who belong to the following groups:

- government representatives of another country attached to the embassy, high commission or other diplomatic body of that country in Canada, and members of their families living with them;
- members of the Armed Forces of another country who are stationed in Canada, and family members living with them;
- residents of another country visiting Canada temporarily (for example, a foreign visitor on vacation or on business, with or without a visitor's permit).

These base populations are adjusted as follows:

- adjustment of the population for census net undercoverage (CNU);
- addition of independent estimates for incompletely enumerated Indian reserves;
- Integration of population count amendments⁵
- at the provincial level, the first postcensal population estimate is July 1 of the census year. This is obtained by addition or subtraction of the components of growth between Census Day and June 30. At the subprovincial level, the estimate of the July 1 population estimate is obtained by applying to the annual components of growth, a fraction of the year that corresponds to the period between Census Day and June 30. These are adjusted to the appropriate provincial and territorial components.

5. <http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/corr/index-eng.cfm>

Adjustment for census net undercoverage (CNU)

The adjustment for CNU is important. The CNU is the difference between the number of persons who should have been enumerated but were missed (undercoverage) and the number of persons who were enumerated but should not have been or who were counted more than once (overcoverage).

To estimate census net undercoverage (CNU) at the subprovincial level, provincial and territorial CNU rates by age and sex are applied to census subdivisions (CSDs), which are aggregated to create the base population of higher subprovincial levels (census metropolitan areas (CMAs), census agglomerations (CAs), and census divisions (CDs) in the province).

D. Births and deaths

The numbers of births and deaths for census divisions (CDs), census metropolitan areas (CMAs) and census agglomerations (CAs) are derived directly from the vital statistics database of Statistics Canada's Centre for Population Health Data. Although Statistics Canada manages the National system of vital statistics, the central vital statistics registries of the provinces and territories are responsible for collecting and processing the information from those administrative files. Under provincial / territorial vital statistics statutes (or similar legislation), all live births and all deaths must be registered, and all provinces and territories provide the information to Statistics Canada.

The vital statistics universe closely parallels the census universe. Both universes include births and deaths of all Canadians, immigrants and non-permanent residents (NPR) and exclude foreign residents.

Vital statistics by province or territory of residence are used to produce our final estimates of births and deaths.

When there are no vital statistics, the number of births is estimated using fertility rates by mother's age. The number of deaths is estimated using mortality rates by age and sex. These methods are used to calculate preliminary estimates at the provincial and territorial levels.

Levels of estimates

Estimates of births and deaths are categorized as final when they are directly taken from the vital statistics of Statistics Canada's Centre for Population Health Data. They are then adjusted to the provincial and territorial totals using a two-way raking process to ensure their concordance.

When no birth or death data are available, preliminary provincial or territorial estimates are broken down, using the most recent known subprovincial distribution derived from vital statistics of Statistics Canada's Centre for Population Health Data, to produce estimates by region. In that case, estimates of births and deaths are categorized as preliminary. They are then adjusted to the provincial and territorial totals using a two-way raking process to ensure their consistency.

Special treatment for preliminary and updated postcensal estimates for Quebec and British Columbia

For birth and death components of Quebec's subprovincial areas, the estimates by age and sex of the *Institut de la statistique du Québec* (ISQ) are used as a distribution for preliminary and updated estimates. It has been decided to use those data because they are available in a more timely manner. Final estimates of births and deaths for Quebec's subprovincial areas are derived from the vital statistics database of Statistics Canada's Centre for Population Health Data.

A special case is also relevant to the provincial totals on which subprovincial estimates are prorated. Quebec and British Columbia provide their most recent estimates of births and deaths at the provincial level. These estimates are used for the preliminary and updated estimates. However, the final estimates of births and deaths for these provinces are derived directly from the vital statistics database of Statistics Canada's Centre for Population Health Data.

E. Immigration

Like the numbers of births and deaths, Canadian immigration statistics must be kept by law. In Canada, immigration is regulated by the *Immigration and Refugee Protection Act* (IRPA) of 2002. This statute superseded the *Immigration Act*, which was passed in 1976 and amended more than 30 times in the years thereafter. *Immigration, Refugees and Citizenship Canada* (IRCC) collects and processes administrative files of immigrants. IRCC then provides Statistics Canada with information from *Global Case Management System* (GCMS) files. The information is used to estimate the number and characteristics of people granted permanent resident status by the federal government on a given date. For the Centre for Demography, the terms immigrant and permanent resident are equivalent.

An immigrant is a person who is not a Canadian citizen by birth, but has been granted the right to live in Canada permanently by Canadian immigration authorities. The number of immigrants does not include persons born abroad to Canadian parents who are only temporarily outside the country.

Immigrants are usually counted on or after the date on which they are granted permanent resident status or the right to live in Canada.

To determine the subprovincial areas where immigrants settle, their postal code information coming from IRCC 'mailing address data file' is used for estimates of periods 2011-2012 and up.⁶ Making use of the postal code variable to measure the subprovincial distribution of immigrants is key to ensuring the best possible consistency with other administrative data sources, as well as with provincial and territorial estimates.

To ensure their consistency, subprovincial estimates are then adjusted to the provincial and territorial totals using two-way raking.

Levels of estimates

The difference between preliminary and final estimates lies in the timeliness of the sources used to estimate this component. Since the subprovincial estimates of immigrants are adjusted to provincial and territorial estimates, the level of subprovincial estimates will be the same. Immigration estimates are preliminary the first year and final the following year.

F. Net non-permanent residents

Like the numbers of births and deaths, Canadian immigration statistics must be kept by law. In Canada, the non-permanent residents (NPR) are regulated by the *Immigration and Refugee Protection Act* (IRPA) of 2002. This statute superseded the *Immigration Act*, which was passed in 1976 and amended more than 30 times in the years thereafter. *Immigration, Refugees and Citizenship Canada* (IRCC) collects and processes the administrative files of NPRs in Canada. It then provides Statistics Canada with information from *Global Case Management System* (GCMS) files. The information is used to estimate the number and characteristics of people granted NPR status by the federal government.

NPRs are persons who are lawfully in Canada on a temporary basis under the authority of a temporary resident permit, along with members of their family living with them. Non-permanent residents include foreign workers, foreign students, the humanitarian population and other temporary residents. The humanitarian population includes refugee claimants and temporary residents who are allowed to remain in Canada on humanitarian grounds and are not categorized as either foreign workers or foreign students. For the Centre for Demography, the terms non-permanent resident and temporary resident are equivalent.

NPR estimates are based on the number of NPRs, not on the net. The number of people in IRCC's administrative system is estimated for specific dates in each period of observation. First, the end-of-period number of NPR is estimated, and then the start-of-period number of NPR is subtracted from that estimate. That yields the net number of NPRs.

6. Estimates for periods prior to 2011-2012 from the vintage based on the Standard Geographical Classification 2016 were calculated using the information of immigrants' intended municipality of residence.

Anyone who received non-permanent resident status prior to the observation date is counted. For the refugee claimants we use the date of their demand. Permit holders and refugee claimants can be excluded for different reasons and those criteria are different for each category. Permit holders and refugee claimants are excluded from the population if their permit has expired, if they receive permanent resident status, or if they are deported. In addition, refugee claimants are excluded if their file has been inactive for two years.

To determine the subprovincial areas where NPRs settle, the information of their intended municipality of residence is used, as collected by IRCC. When this information is missing, auxiliary files from IRCC are used to determine NPRs' subprovincial region of destination, on the basis of their address's postal code. Making use of IRCC microdata to measure the subprovincial is key to ensuring the best possible consistency with provincial and territorial estimates.⁷

To ensure their consistency, subprovincial estimates are then adjusted to the provincial and territorial totals using two-way raking.

Levels of estimates

The difference between preliminary and final estimates lies in the timeliness of the source used to estimate this component. Since the subprovincial estimates of the net number of NPRs are adjusted to provincial and territorial estimates, the level of the subprovincial estimates will be the same. NPR estimates are preliminary the first year and updated the following year. They become final two to three years after the reference year, when all other components are also final.

G. Emigration

The number of emigrants at provincial or territorial level is estimated using data from the *Office of Immigration Statistics, U.S. Department of Homeland Security* data collected by the *Canada child benefit (CCB)* program, and data from the *T1 Family File (T1FF)*. The first source is used to estimate emigration to the United States. CCB data are used to estimate emigration to other countries. The estimates of the number of child emigrants have to be adjusted because the CCB is not universal and does not provide direct information on the number of adult emigrants. As a result, four adjustment factors are used to take into account:

- the incomplete coverage due to a delay in the receipt and processing of the files of children *eligible* for the CCB. Since it takes four years after the reference period for CCB administrative files to become complete, the adjustment is made if the estimates are finalized after two years. The factor is derived from the two-year ratios of emigrant children based on two versions of the CCB files;
- the program's partial coverage, that is, people who do not apply for the CCB or are not *eligible*. This factor is obtained by comparing the estimated number of children in the population with the number of children in CCB files;
- the differential propensity to emigrate between children who are *eligible* for the CCB and children who are not. This factor is obtained by comparing the emigration rates of CCB-eligible children with the rates for all children (aged 0-17). This factor is calculated for each province and territory and is based on the last three available years of T1FF;
- the differential propensity to emigrate between adults and children. This factor generates the emigration rate for the population aged 18 and over. It is obtained by (1) calculating the average ratio over three years of the adult and child emigration rates based on T1FF data, (2) calculating the average ratio over three years of the adult and child emigration rates based on data from the *Office of Immigration Statistics, U.S. Department of Homeland Security*, and (3) taking the average of the two rates. This factor is calculated for Canada only.

The adult emigration rate is applied to the adult population. Adult emigration is distributed by province and territory using data from the T1FF file. We calculate a ratio of the number of emigrant adults to the number of emigrant

7. Demographic estimates from previous vintages, which were not based on the Standard Geographical Classification (SGC) 2016, were modelled according to the distribution from the most recent census (or NHS).

children from the T1FF file. We then apply this ratio to the number of emigrant children from the CCB by province, which yields the number of adult emigrants whose provincial distribution will differ from that of the children.

The number of adult emigrants combined with the number of child emigrants (once adjusted for the coverage and differential emigration factors) generate the number of emigrants for the entire population.

Emigration is disaggregated by province and territory based on the number of child emigrants adjusted for coverage and differential emigration.

The distribution of emigrants at the subprovincial level is derived from the T1FF. Because the estimates are available only by broad age groups (0-17, 18-24, 25-44, 45-64, 65+), they are broken down by age and sex based on the provincial or territorial distribution. They are then adjusted to the provincial and territorial totals using two-way raking to ensure their consistency.

Levels of estimates

The difference between preliminary and final estimates lies in the timeliness of the sources used to estimate this component. Since the subprovincial estimates of emigrants are adjusted to provincial and territorial estimates, the level of the subprovincial estimates will be the same.

H. Net temporary emigration

Some people leave Canada to live temporarily in another country; others who were temporarily outside Canada return. The net result of those departures and returns is the component known as “net temporary emigration”. Estimates of the number of departures are derived from the *Reverse Record Check* (RRC), the most important census coverage study. The RRC provides an estimate of the number of people who left Canada temporarily during an intercensal period and are still out of the country at the end of the period. Estimates of the number of returns are based on two sources: the Census and the Centre for Demography’s estimates of returning emigrants. The census provides the number of people who were outside Canada at the time of the previous census and returned during the intercensal period. That number includes all returning emigrants. Then Centre for Demography’s estimate of the returning emigrants’ component is subtracted to produce the number of returning temporary emigrants. The estimated numbers of departures (RRC) and returns (Census and Centre for Demography) yield an estimate of net temporary emigration.

This estimate is for the whole intercensal period; it is disaggregated into estimates for each of the five years in the period and then into monthly estimates using a seasonal adjustment that is an average between zero seasonality and the seasonality of emigration.

Net temporary emigration is calculated first for the national level. It is then disaggregated by province or by groups of provinces based on the RRC estimates of temporary emigration. For the Atlantic provinces and the territories, the estimate for the group is disaggregated on the basis of each province / territory’s proportion of the group’s total population.

Net temporary emigration can be estimated only for the intercensal period preceding the most recent census. Net temporary emigration in the current period is assumed to be the same as in the previous period for each province and territory.

At the subprovincial level, provincial and territorial net temporary emigration estimates by age and sex are broken down based on the subprovincial distribution of emigrants. They are then adjusted to the provincial and territorial totals using two-way raking to ensure their consistency.

Levels of estimates

The difference between preliminary and final estimates lies in the timeliness of the net temporary emigration estimates. Since the subprovincial estimates of the net temporary emigration are adjusted to provincial and territorial estimates, the level of the subprovincial estimates will be the same.

I. Returning emigrants

A returning emigrant is a person who returns to Canada after having been classified as an emigrant. In a manner similar to the procedure used to calculate the number of emigrants, data from the *Canada child benefit* (CCB) file of *Canada Revenue Agency* (CRA) and from the T1FF are used to estimate the number of returning emigrants at provincial or territorial level. Adjustment factors are applied to compensate for the fact that the CCB program is not universal, and an adult/child ratio is used to estimate the number of adult returning emigrants. As a result, four adjustment factors are used to take into account:

- the incomplete coverage due to a delay in the receipt and processing of the files of children eligible for the CCB. Since it seems to take four years after the reference period for CCB administrative files to become complete, the adjustment is made if the estimates are finalized after two years. The factor is derived from the two-year ratios of returning emigrant children based on two versions of the CCB files;
- the program's partial coverage, that is, people who do not apply for the CCB or who are not eligible. This factor is obtained by comparing the estimated number of children in the population with the number of children in CCB files;
- the differential propensity to emigrate between children who are eligible for the CCB and children who are not. This factor is obtained by comparing the emigration rates of CCB-eligible children with the rates for all children (aged 0 to 17). This factor is calculated for each province and territory and is based on the last three available years of T1FFs;
- the adult/child ratio, which is based on the census by age and sex.

As with emigrants, the distribution of returning emigrants at the subprovincial level is derived from the T1FF. Because the estimates are available only by broad age groups (0-17, 18-24, 25-44, 45-64, 65+), they are broken down by age and sex based on the provincial or territorial distribution. They are then adjusted to the provincial and territorial totals using two-way raking to ensure their consistency.

Levels of estimates

The difference between preliminary and final estimates lies in the timeliness of the sources used to estimate this component. Since the subprovincial estimates of returning emigrants are adjusted to provincial and territorial estimates, the level of the subprovincial estimates will be the same.

J. Interprovincial migration

Interprovincial migration represents movements from one province or territory to another, involving a change in usual place of residence. As is the case for emigration, there is no provision for recording interprovincial migration in Canada. Consequently, such movements have to be estimated using data from the *Canada child benefit* (CCB) of *Canada Revenue Agency* (CRA) and T1FF.

Final estimates of interprovincial migration are obtained by comparing addresses indicated on personal income tax returns over two consecutive tax years, by making use of the T1FF. However, the migration status of tax filers' dependants has to be imputed. An adjustment is also required to take into account migrants who do not file income tax returns.

The estimates by broad age groups and sex are broken down by age based on distributions stemming from the most recent census or NHS (for 2011) mobility question on place of residence one year ago. Since 2011/2012, NHS and census distributions have been modelled to minimize the impact of outliers found in some subprovincial regions, mostly for smaller geographies. Subprovincial estimates are then adjusted to the provincial and territorial totals using two-way raking to ensure their consistency.

Subprovincial estimates are then adjusted to the provincial and territorial totals using two-way raking to ensure their consistency.

Levels of estimates

The difference between preliminary and final estimates lies in the timeliness of the sources used to estimate this component.

Because income tax returns are not available at the time preliminary estimates are produced, the method to estimate preliminary interprovincial migration is different. For subprovincial areas, CCB administrative files are used to determine the preliminary migration of children (aged 0 to 17), while the preliminary migration of adults is derived by using rates from the previous year, calculated with final data.

Since the subprovincial estimates of interprovincial migrants are adjusted to provincial and territorial estimates, the level of the subprovincial estimates will be the same.

K. Intraprovincial migration

Intraprovincial migration represents movement from one region to another within the same province or territory, involving a change in usual place of residence. As is the case for emigration and interprovincial migration, there is no provision for recording intraprovincial migration in Canada. Consequently, such movements have to be estimated using data from the Canada child benefit (CCB) of Canada Revenue Agency (CRA) and T1FF.

Final estimates of intraprovincial migration are obtained by comparing addresses indicated on personal income tax returns over two consecutive tax years, by making use of the T1FF. However, the migration status of tax filers' dependants has to be imputed. An adjustment is also required to take into account migrants who do not file income tax returns.

The components of intraprovincial migration derived from the T1FF for each subprovincial region are produced by broad age groups and sex. They are then broken down by age based on distributions stemming from the most recent census or NHS (for 2011) mobility question on place of residence one year ago. Since 2011/2012, NHS and census distributions have been modelled to minimize the impact of outliers found in some subprovincial regions, mostly for smaller geographies.

Levels of estimates

The difference between preliminary and final estimates lies in the timeliness of the sources used to estimate this component.

Because income tax returns are not available at the time preliminary estimates are produced, the method to estimate preliminary intraprovincial migration is different. For subprovincial areas, CCB administrative files are used to determine the preliminary migration of children (aged 0 to 17), while the preliminary migration of adults is derived by using rates from the previous year, calculated with final data.

Special treatment for Quebec's estimates

In the case of the component of intraprovincial migration for Quebec's subprovincial areas, ISQ data are used for preliminary, updated and final estimates. These estimates are based on data from the *Fichier d'inscription des personnes assurées* (FIPA), the health-insured persons register, from the *Régie de l'assurance-maladie du Québec* (RAMQ). It has been decided to use those data because the provincial data source is more complete and is available in a more timely manner.

L. Intercensal population estimates

Intercensal estimates – population estimates for reference dates between two censuses – are produced following each census. They reconcile previous postcensal estimates with the new census counts.

There are three main steps in the production of intercensal estimates:

- the correspondence of the geographic boundaries between the two censuses
- calculation of the error of closure
- linear distribution of the error of closure (residual deviation).

To ensure geographical concordance, the base populations and components of population growth must be adjusted according to geographical boundaries at the time of the most recent census. For areas whose geographical boundaries changed between the two censuses (as measured by the SGC), historical conversion factors are used based on population transfers at the census subdivision level during the most recent intercensal

period. In general, corrections to CDs, CMAs, CAs and ERs are minor (see the “Quality of demographic data” section).

Error of closure is defined as the difference between the postcensal population estimates on census day and the population enumerated in that census adjusted for census net undercoverage (CNU⁸). The error of closure is spread evenly over the intercensal period, based on the number of days in each month. Intercensal estimates by age and sex are adjusted the same way (i.e., by distributing the error of closure evenly across the age and sex cohorts). As with postcensal estimates, the intercensal subprovincial estimates by age and sex are adjusted to provincial and territorial estimates using two-way raking to ensure their consistency.

8. In this case, the adjustment for the census net undercoverage also includes the incompletely enumerated Indian reserves.

Appendix A: Glossary

Age

Age as of July 1.

Ageing (of a population)

An increase in the number of old persons as a percentage of the total population.

Average absolute error of closure

Defined as the mean of the absolute differences between the **postcensal estimates** on Census Day and the results of the **Census adjusted for the census net undercoverage**.

Average age

The average age of a population is the average age of all its members.

Census coverage

Census net undercoverage: Difference between undercoverage and overcoverage.

Overcoverage: Number of persons who should not have been counted in the census or who were counted more than once.

Undercoverage: Number of persons who were intended to be enumerated in a census but were not.

Census agglomeration (CA)

A census agglomeration (CA) is formed by one or more adjacent municipalities centred on a population centre (known as the core). A CA must have a core population of at least 10,000 based on data from the previous Census of Population Program. To be included in the CA, other adjacent municipalities must have a high degree of integration with the core, as measured by commuting flows derived from data on place of work from the previous Census Program.

If the population of the core of a CA falls below 10,000, the CA is retired from the next census. All areas inside the CA that are not population centres are rural areas.

When a CA has a core of at least 50,000, based on data from the previous Census of Population, it is subdivided into census tracts. Census tracts are maintained for the CA even if the population of the core subsequently falls below 50,000.

Census division (CD)

Census division (CD) is the general term for provincially legislated areas (such as county, municipalit  regionale de comt  and regional district) or their equivalents. Census divisions are intermediate geographic areas between the province level and the municipality (census subdivision).

In Newfoundland and Labrador, Manitoba, Saskatchewan, Alberta, Yukon, Northwest Territories and Nunavut, provincial or territorial law does not provide for these administrative geographic areas. Therefore, Statistics Canada, in cooperation with these provinces and territories, has created equivalent areas called census divisions for the purpose of disseminating statistical data. In Yukon, the census division is equivalent to the entire territory.

Census metropolitan area (CMA)

A census metropolitan area (CMA) is formed by one or more adjacent municipalities centred on a population centre (known as the core). A CMA must have a total population of at least 100,000 of which 50,000 or more must live in the core. To be included in the CMA, other adjacent municipalities must have a high degree of integration with the core, as measured by commuting flows derived from census place of work data.

Once an area becomes a CMA, it is retained as a CMA even if its total population declines below 100,000 or the population of its core falls below 50,000. Small population centres with a population count of less than 10,000 are called fringe. All areas inside the CMA that are not population centres are rural areas.

All CMAs are subdivided into census tracts.

The CMA of Ottawa-Gatineau (Ontario-Quebec) crosses provincial boundaries. When the geographic level selected is all of Canada, the totals include the CMA on both sides of the provincial border. If a province has been selected, only the part of the CMA in the province chosen is included in the totals.

Cohort

Represents a group of persons who have experienced a specific demographic event during a given year. In the case of births, persons born within a specified year are referred to as a generation.

Components of demographic growth

Any of the classes of events generating population movement variations. Births, deaths and migrations are the components responsible for the variations since they alter either the total population or the age and sex distribution of the population.

Demographic dependency ratio

The ratio of the combined population aged between 0 to 14 years old and the population aged 65 years and over to the population aged between 15 and 64 years old.

Economic region (ER)

An economic region is a grouping of complete **census divisions** (with one exception in Ontario) created as a standard geographic unit for analysis of regional economic activity.

Within the province of Quebec, economic regions (“régions administratives”) are designated by law. In all other provinces or territories, economic regions are created by agreement between Statistics Canada and the provinces or territories concerned. Prince Edward Island and the three territories each consist of one economic region. In Ontario, there is one exception where the economic region boundary does not respect **census division** boundaries: the **census division** of Halton is split between the ER of Hamilton–Niagara Peninsula and the ER of Toronto.

Emigrant

Canadian citizen or **immigrant** who has left Canada to establish a residence in another country, involving a change in usual place of residence. Emigration may be either temporary or permanent. Where the term is used alone, it references to a person’s permanent emigration which involves severing residential ties with Canada and acquiring permanent residency in another country.

Error of closure

Difference between the **postcensal estimate** at the census date and the results of the census adjusted for **census net undercoverage** (including adjustment for incompletely enumerated Indian reserves).

Generation

Unless otherwise specified, refers here to a group of persons born within a given period. The 2006 generation represents people born during the year 2006.

Immigrant

Within the framework of this publication, the terms immigrant, landed immigrant and permanent resident are equivalent. An immigrant refers to a person who is or has ever been a landed immigrant (permanent resident) and who has been granted the right to live in Canada permanently by immigration authorities. Immigrants are either Canadian citizens by naturalization (the citizenship process) or permanent residents under Canadian legislation. Some immigrants have resided in Canada for a number of years, while others have arrived recently. Most immigrants are born outside Canada, but a small number are born in Canada. Also, children born in other countries to parents who are Canadian citizens that reside temporarily in another country are not included in the category as they become Canadian citizens at birth.

Internal migration

Internal migration represents all movements of persons within Canada's geographical boundaries, involving a change in usual place of residence. Internal migration denotes movement from one province or territory to another (i.e., **interprovincial migration**) and movements from some other smaller defined geographical unit to another (i.e., **intraprovincial migration**).

International migration

International migration represents movement of population between Canada and a foreign country which involves a change of the usual place of residence. A distinction is made with regard to **immigrants, emigrants, returning emigrants, net temporary emigration** and **net non-permanent residents**.

Interprovincial migration

Interprovincial migration represents all movement from one province or territory to another involving a change in the usual place residence. A person who takes up residence in another province or territory is an **out-migrant** with reference to the province or territory of origin and an **in-migrant** with reference to the province or territory of destination.

Intraprovincial migration or subprovincial migration

Intraprovincial migration or subprovincial migration represents all movement from one region to another within the same province or territory involving a change of the usual place residence. A person who takes up residence in another region is an **out-migrant** with reference to the region of origin and an **in-migrant** with reference to the region of destination.

Median age

The median age is an age "x", such that exactly one half of the population is older than "x" and the other half is younger than "x".

Natural increase

Variation of the **population** size over a given period as a result of the difference between the numbers of births and deaths.

Net internal migration

Sum of **net intraprovincial** and **net interprovincial migration**.

Net international migration

Net international migration is obtained according to the following formula: **Immigrants + returning emigrants + net non-permanent residents – (emigrants + net temporary emigrants)**.

Net interprovincial migration

Net interprovincial migration represents the difference between **in-migrants** and **out-migrants** for a given province or territory.

Net intraprovincial migration

Net intraprovincial migration represents the difference between **in-migrants** and **out-migrants** in a given region. A region can be defined as a **census division**, an **economic region** or a **census metropolitan area**.

Net non-permanent residents

Net non-permanent residents represent the variation in the number of **non-permanent residents** between two dates.

Net temporary emigration

Net temporary emigration represents the variation in the number of temporary emigrants between two dates. Temporary emigration includes Canadian citizens and **immigrants** living temporarily abroad who have not maintained a usual place of residence in Canada.

Non-permanent residents

A non-permanent resident is a person who is lawfully in Canada on a temporary basis under the authority of a valid document (work permit, study permit, Minister's permit or asylum claimant) issued for that person along with members of his family living with them. This group also includes individuals who seek refugee status upon or after their arrival in Canada and remain in the country pending the outcome of processes relative to their claim. Note that *Immigration, Refugees and Citizenship Canada* (IRCC) uses the term temporary resident rather than non-permanent resident.

Population

Estimated population and population according to the census are both defined as being the number of Canadians whose usual place of residence is within that area, regardless of where they happened to be on census Day. Also included are any Canadians staying in a dwelling in that area on census Day and having no usual place of residence elsewhere in Canada, as well as those considered **non-permanent residents**.

Population estimate

Postcensal: Population estimate produced by using data from the most recent available census adjusted for **census net undercoverage** (including adjustment for incompletely enumerated Indian reserves) and estimate of the **components of demographic growth** since that last census. This estimate can be preliminary, updated or final.

Intercensal: Population estimate derived by using **postcensal estimates** and data adjusted for **census net undercoverage** (including adjustment for incompletely enumerated Indian reserves) of censuses preceding and following the year in question.

Population growth or total growth

Variation of population size between two dates. It can also be obtained by summing the **natural increase**, **total net migration** and if possible, subtract **residual deviation**. It can be positive or negative.

Precocity error

Difference between preliminary and final estimate in terms of its relative proportion of the total population for the relevant geographical area. It can be calculated for either population estimates or components of population growth.

Rate

Refers to the ratio of the number of events estimated in a year ($t, t+1$) to the average populations at the beginning and the end of the period. In this regard, births, deaths, immigration rates, etc are calculated. Generally, the rates are expressed in per 1,000.

Demographic growth or population growth: Ratio of population growth between the year t and $t+1$, to the average **population** of both these years. The rate is generally expressed in per 1,000.

Census net undercoverage of population: Difference between **undercoverage rate** and **overcoverage rate**.

Overcoverage of population: The ratio of the number of persons who should not have been counted in the census or who were counted more than once to the total number of persons that should have been enumerated in the census. Generally, the rate is expressed in percentage.

Undercoverage of population: The ratio of the estimated number of persons not enumerated in the census (who were intended to have been enumerated) to the total number of persons that should have been enumerated in the census. Generally, the rate is expressed in percentage.

Residual deviation

Difference between demographic **population growth** calculated using **intercensal estimates of population** between two dates and that obtained by the sum of the components for the same period. This deviation results from the distribution of the **error of closure** (by using the number of days) over the five-year period concerned.

Returning emigrant

Canadian citizen or **immigrant** having previously emigrated from Canada and subsequently returned to the country.

Sex ratio

The ratio of the number of men to the number of women. This is not to be confused with the sex ratio at birth, which is the ratio of the number of live-born boys to the number of live-born girls. This ratio is usually expressed as an index, with the number of females taken to be a base of 100.

Sprague coefficients

Series of factors which, when multiplied to a population distributed by multiples age groups, give a distribution of the same population by single years of age.

Total net migration

Sum of **net international** and **net internal migration**.

Vital statistics

Vital Statistics includes all the demographic events (that is to say births, deaths, marriages and divorces) for which there are a legal requirement to inform the Provincial or Territorial Registrar's Office.

Year

Unless otherwise specified, the term “year” refers to the period beginning July 1 of a given year and ending June 30 of the following year.

Appendix B: Explanatory notes for the tables

Annual population estimates, July 1, subprovincial perspective

Population

Population estimates for July 1 are final intercensal up to 2015, final postcensal for 2016 to 2019, updated postcensal for 2020 and preliminary postcensal for 2021.

Annual estimates of demographic components

Births

The numbers of births are final up to 2018/2019, updated for 2019/2020 and preliminary for 2020/2021.

Deaths

The numbers of deaths are final up to 2018/2019, updated for 2019/2020 and preliminary for 2020/2021.

Immigrants

The numbers of immigrants are final up to 2019/2020 and preliminary for 2020/2021.

Emigrants

The numbers of emigrants are final up to 2018/2019, updated for 2019/2020 and preliminary for 2020/2021.

Returning emigrants

The numbers of returning emigrants are final up to 2018/2019, updated for 2019/2020 and preliminary for 2020/2021.

Net temporary emigrants

The numbers of net temporary emigrants are final up to 2018/2019, updated for 2019/2020 and preliminary for 2020/2021.

Net non-permanent residents

The numbers of net non-permanent residents are final up to 2018/2019, updated for 2019/2020 and preliminary for 2020/2021.

Interprovincial in-migrants

The numbers of interprovincial in-migrants are final up to 2019/2020 and preliminary for 2020/2021.

Interprovincial out-migrants

The numbers of interprovincial out-migrants are final up to 2019/2020 and preliminary for 2020/2021.

Intraprovincial in-migrants

The numbers of intraprovincial in-migrants are final up to 2019/2020 and preliminary for 2020/2021.

Intraprovincial out-migrants

The numbers of intraprovincial out-migrants are final up to 2019/2020 and preliminary for 2020/2021.

Annual population estimates and factors of growth

Natural increase

Natural increase is final up to 2018/2019, updated for 2019/2020 and preliminary for 2020/2021.

Net international migration

Net international migration numbers are final up to 2018/2019, updated for 2019/2020 and preliminary for 2020/2021.

Net interprovincial migration

Net interprovincial migration numbers are final up to 2019/2020 and preliminary for 2020/2021.

Net intraprovincial migration

Net intraprovincial migration numbers are final up to 2019/2020 and preliminary for 2020/2021.

Total net migration

Total net migration numbers are final up to 2018/2019, updated for 2019/2020 and preliminary for 2020/2021.

Total growth

Numbers for total growth are final up to 2018/2019, updated for 2019/2020 and preliminary for 2020/2021.

Table 1
Summary of levels

| | 2015 and before | 2016 to 2019 | 2020 | 2021 |
|------------|-----------------|--------------|------|------|
| Population | ID | PD | PR | PP |

ID Final Intercensal

PD Final Postcensal

PR Updated Postcensal

PP Preliminary Postcensal

Source: Statistics Canada, Centre for Demography.

Table 2
Summary of levels

| | 2018/2019 and before | 2019/2020 | 2020/2021 |
|--------------------------------------|----------------------|-----------|-----------|
| Natural increase | | | |
| Births | D | R | P |
| Deaths | D | R | P |
| Net international migration | | | |
| Immigrants | D | D | P |
| Emigrants | D | R | P |
| Returning emigrants | D | R | P |
| Net temporary emigrants | D | R | P |
| Net non-permanent residents | D | R | P |
| Net interprovincial migration | | | |
| Interprovincial in-migrants | D | D | P |
| Interprovincial out-migrants | D | D | P |
| Net intraprovincial migration | | | |
| Intraprovincial in-migrants | D | D | P |
| Intraprovincial out-migrants | D | D | P |

D Final
R Updated
P Preliminary

Source: Statistics Canada, Centre for Demography.

Appendix C: Sources and remarks

Base population

May 10, 2016 Census of Population adjusted to July 1 and corrected for census net undercoverage (including incompletely enumerated Indian reserves and population reviews).

2016 Census: Statistics Canada, Census of Canada, 2016, Catalogue no. [98-501-X](#).

Census net undercoverage: See The Daily, September 27, 2018.

Incompletely enumerated Indian reserves: See The Daily, September 27, 2018.

COVID-19 adjustments

For the 2020/2021 period, it was necessary to apply adjustments to estimated death and emigration components at the provincial/territorial level due to the impact of COVID-19. Subprovincial estimates were calibrated to adjusted provincial/territorial estimates. For more information, please see the following document: [Technical Supplement: Production of Demographic Estimates for the Second Quarter of 2020 in the Context of COVID-19](#).

Births and deaths

Statistics Canada, Centre for Population Health Data. For Quebec, preliminary and updated births and deaths were provided by the Institut de la statistique du Québec.

Immigration

The estimates are produced by the Centre for Demography using the Global Case Management System (GCMS) files from Immigration, Refugees and Citizenship Canada (IRCC) received by September 2021.

Non-permanent residents

The estimates are produced by the Centre for Demography using the GCMS files from IRCC. These files, received by September 2021, document the number of permit holders and asylum claimants.

Emigration and returning emigrants

For the subprovincial areas, the components (emigration and returning emigrants) are extracted from tax files by broad age groups and sex. They are calculated using the T1 Family File (T1FF) provided by the Centre for Income and Socioeconomic Well-being Statistics of Statistics Canada. The data is then broken down by single year of age and sex based on the provincial and territorial distribution. To ensure their consistency, the estimates are subsequently controlled to the provincial and territorial totals.

Net temporary emigrants

Statistics Canada, Centre for Demography – based on data from the Reverses Record Check (RRC) for the 2016 Census, and the 2016 Census. Data were broken down by region, single year of age and sex according to the emigrants' distribution.

Net interprovincial migration and net intraprovincial migration

For the subprovincial areas, the components (in- and out-migrants for interprovincial and intraprovincial migration) are extracted from tax files by broad age groups and sex. They are calculated using the T1FF provided by the Centre for Income and Socioeconomic Well-being Statistics of Statistics Canada as well as data from Canada Revenue Agency (CRA) Canada child benefit files (CCB) program. The data is then broken down by single year of age and sex based on the mobility information from the 2016 Census. To ensure their consistency, the components for interprovincial migration are subsequently controlled to the provincial and territorial totals.

For Quebec, intraprovincial migration data were provided by the Institut de la statistique du Québec.

Related products

Selected publications from Statistics Canada

| | |
|----------|---|
| 91-002-X | Quarterly Demographic Estimates |
| 91-003-X | Canadian Demographics at a Glance |
| 91-209-X | Report on the Demographic Situation in Canada |
| 91-215-X | Annual Demographic Estimates: Canada, Provinces and Territories |
| 91-520-X | Population Projections for Canada, Provinces and Territories |
| 91-528-X | Population and Family Estimation Methods at Statistics Canada |

Selected tables from Statistics Canada

Tables 17-10-0135 to 17-10-0142 contain data about subprovincial areas.

| | |
|------------|---|
| 17-10-0135 | Population estimates, July 1, by census metropolitan area and census agglomeration, 2016 boundaries |
| 17-10-0136 | Components of population change by census metropolitan area and census agglomeration, 2016 boundaries |
| 17-10-0137 | Population estimates, July 1, by economic region, 2016 boundaries |
| 17-10-0138 | Components of population change by economic region, 2016 boundaries |
| 17-10-0139 | Population estimates, July 1, by census division, 2016 boundaries |
| 17-10-0140 | Components of population change by census division, 2016 boundaries |
| 17-10-0141 | Interprovincial and intraprovincial migrants, by census metropolitan area and census agglomeration of origin and destination, 2016 boundaries |
| 17-10-0142 | Population estimates, July 1, by census subdivision, 2016 boundaries |
| 17-10-0005 | Population estimates on July 1st, by age and sex |
| 17-10-0006 | Estimates of deaths, by age and sex, annual |
| 17-10-0008 | Estimates of the components of demographic growth, annual |
| 17-10-0009 | Population estimates, quarterly |
| 17-10-0014 | Estimates of the components of international migration, by age and sex, annual |
| 17-10-0015 | Estimates of the components of interprovincial migration, by age and sex, annual |
| 17-10-0016 | Estimates of births, by sex, annual |
| 17-10-0020 | Estimates of the components of interprovincial migration, quarterly |
| 17-10-0021 | Estimates of the components of interprovincial migration, annual |
| 17-10-0022 | Estimates of interprovincial migrants by province or territory of origin and destination, annual |
| 17-10-0040 | Estimates of the components of international migration, quarterly |
| 17-10-0045 | Estimates of interprovincial migrants by province or territory of origin and destination, quarterly |
| 17-10-0059 | Estimates of the components of natural increase, quarterly |
| 17-10-0060 | Estimates of population as of July 1st, by marital status or legal marital status, age and sex |

Selected surveys from Statistics Canada

| | |
|------|--|
| 3601 | Estimates of Total Population, Canada, Provinces and Territories |
| 3604 | Estimates of Population by Age and Sex for Canada, Provinces and Territories |
| 3605 | Estimates of Population by Marital Status, Legal Marital Status, Age and sex for Canada, Provinces and Territories |
| 3608 | Estimates of Population by Age and Sex for Census Divisions, Census Metropolitan Areas and Economic Regions (Component Method) |
