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# Quarterly Demographic Estimates

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## Notice to readers

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

These estimates are not to be mistaken with the 2016 Census counts.

The analysis in this publication is based on preliminary data. These data will be revised over the coming years, and it is possible that some trends described in this publication will change as a result of these revisions. Therefore, this publication 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**

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**Table of contents**

**Notice to readers** ..... 3

**Acknowledgements**..... 4

**Quarterly Demographic Estimates** ..... 6

    Highlights..... 6

**Analysis** ..... 7

**Data quality, concepts and methodology** ..... 8

    Methodology ..... 8

    Quality of demographic data ..... 16

    Explanatory notes for the tables..... 24

    Endnotes ..... 25

**Appendix 1: Glossary** ..... 26

**Appendix 2: Sources and remarks**..... 29

**Related products** ..... 32

## Quarterly Demographic Estimates

### Highlights

- Canada's population surpassed the 38-million mark during the second quarter of 2020 to reach 38,005,238 on July 1, 2020. This was an increase of 25,384 (+0.1%) from April 1, 2020. This is the lowest growth for a second quarter over the period for which equivalent data are available (second quarters for 1972 to 2020). Comparatively, the second quarters of both 2018 and 2019 had two of the highest growth rates over the same period (both at +0.5% - the growth rate in the second quarter of 1989 was also +0.5%). The slower growth in the second quarter of 2020 is due mainly to the impact of the COVID-19 pandemic.
- The COVID-19 pandemic first came to Canada in January 2020. The demographic effects of the pandemic began in March, with 96 deaths and the international borders being restricted mid-month. The impacts accelerated in the second quarter, with the Public Health Agency of Canada (PHAC) reporting 8,495 deaths in the quarter and with the border restrictions resulting in significant reductions in international migration
- Also based on PHAC data, most of the COVID-19 deaths in the second quarter were concentrated in Quebec (5,472) and Ontario (2,639). According to preliminary estimates, there were 79,050 deaths in the second quarter of 2020, which is 8,532 (12.1%) more than in the second quarter of 2019, and the most deaths reported in a second quarter since the beginning of the current demographic accounting system.
- International migration (immigrants and net non-permanent residents minus net emigration<sup>1</sup>) is usually the main driver of Canada's population growth, but the restrictions on international borders in mid-March had a significant impact on this factor of growth. International migration has accounted for more than 50% of growth in every second quarter since 1994, reaching a height of 86.5% in the second quarter of 2019. However, this dropped to 38.2% (+9,700 persons) in the second quarter of 2020.
- The remainder of the growth, 61.8% (+15,684 persons), came from natural increase, or the number of births (94,734) minus the number of deaths (79,050). However, due to the COVID-19 pandemic, natural increase was negative in Quebec (-400) for the first time in any quarter since comparable record keeping began (1971).
- Canada welcomed 34,271 immigrants in the second quarter of 2020, down from 94,281 in the second quarter of 2019 (-63.7%). This was the lowest number of immigrants received in a second quarter since 1986 (24,418).
- The net number of non-permanent residents in the second quarter of 2020 was negative for the first time since 1994. This means that Canada lost more non-permanent residents than it gained over the second quarter of 2020, resulting in a net loss of 24,768. Much of these losses were in study permit holders and in a reduction in the number of asylum claimants, which is consistent with pandemic-related travel restrictions.
- For the second quarter of 2020, the highest population growth was recorded in Nunavut (+1.0%). Newfoundland and Labrador (-0.2%), Saskatchewan (-0.1%) and the Northwest Territories (-0.1%) all lost population during the second quarter of 2020. Compared to the growth rates from the second quarter of 2019, all provinces had lower growth in the second quarter of 2020. This is also the first time Saskatchewan recorded a population loss in the second quarter since 2005.
- British Columbia (+7,940) and Nova Scotia (+1,443) gained the most from interprovincial migration in the second quarter. The greatest losses of population to interprovincial migration were found in Saskatchewan (-2,874), Alberta (-2,733), Manitoba (-1,837), and Ontario (-1,435).

1. Net emigration here refers to the total of the emigration components of population estimates (emigrants + net temporary emigrants – returning emigrants).

## Analysis

Quarterly demographic estimates for Canada, the provinces and the territories are available in Tables [17-10-0009-01](#), [17-10-0020-01](#), [17-10-0040-01](#), [17-10-0045-01](#) and [17-10-0059-01](#), which are listed in the *Related products* section.

The “[Quarterly demographic estimates, provinces and territories: Interactive dashboard](#)” (71-607-X) is available. This interactive dashboard can be used to visualize the factors of Canada’s population growth and how they have changed over time for Canada, the provinces and territories.

The article “[Technical Supplement: Production of Demographic Estimates for the Second Quarter of 2020 in the Context of COVID-19](#)” (91F0015M) is now available.

## Data quality, concepts and methodology

### Methodology

This section describes the concepts, data sources and 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 and territorial levels.

Postcensal estimates are based on the 2016 Census.

### Population Estimates

#### Estimates of the total population

##### Types of estimates

Population estimates can be either intercensal or postcensal. Intercensal estimates are produced using the counts from two consecutive censuses adjusted for census net undercoverage (CNU)<sup>1</sup> and postcensal estimates. The production of intercensal estimates involves updating the postcensal estimates using the counts from a new census adjusted for CNU.<sup>1</sup>

Postcensal estimates are produced using data from the most recent census adjusted for CNU<sup>1</sup> and the components of demographic growth. In terms of timeliness, postcensal estimates are more up-to-date than data from the most recent census adjusted for CNU,<sup>1</sup> but as they get farther from the date of that census, they become more variable.

##### Levels of estimates

The production of the population estimates between censuses entails 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. All tables indicate the level of the estimates they contain.

##### Calculation of postcensal population estimates

Population estimates – preliminary, updated and final – are produced by the component method. This method consists of taking the population figures from the most recent census, adjusted for the CNU<sup>1</sup> (census undercoverage minus census overcoverage), and adding or subtracting the number of births, deaths, and components of international and interprovincial migration.



## A. Provincial / territorial estimates of total population

Population estimates are produced for the provinces and territories first; then they are summed to obtain an estimate of the population of Canada.

The component-method formula for estimating the total provincial / territorial populations is as follows:

$$P_{(t+i)} = P_{(t)} + B_{(t,t+i)} - D_{(t,t+i)} + I_{(t,t+i)} - [E_{(t,t+i)} + \Delta TE_{(t,t+i)}] + RE_{(t,t+i)} + \Delta NPR_{(t,t+i)} + \Delta Ninter_{(t,t+i)} - Resid_{(t,t+i)}$$

where, for each province and territory:

(t,t+i)	interval between times t and t+i;
$P_{(t+i)}$	estimate of the population at time t+i;
$P_{(t)}$	base population at time t (census adjusted for (CNU) <sup>1</sup> or most recent estimate);
B	number of births;
D	number of deaths;
I	number of immigrants;
E	number of emigrants;
$\Delta TE$	net temporary emigration;
RE	number of returning emigrants;
$\Delta NPR$	net non-permanent residents;
$\Delta Ninter$	net interprovincial migration;
Resid	residual deviation (for intercensal estimates).

## B. Levels of estimates

The difference between preliminary<sup>2</sup> and final postcensal population estimates lies in the timeliness of the components. When all the components are preliminary, the population estimate is described as preliminary postcensal (PP). When they are all final, the estimate is referred to as final postcensal (PD). Any other combination of levels is referred to as updated postcensal (PR).

## Base population and components of demographic growth

### A. Base population

The base populations are derived from the quinquennial censuses between 1971 and 2016. The population universe of the 2016<sup>3</sup> 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;
- 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.

For census purposes, the last three groups are referred to as non-permanent residents (NPR). They have been included in the census universe since 1991 but foreign residents are not included. 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 CNU;
- addition of independent estimates for incompletely enumerated Indian reserves in 1991, 1996, 2001, 2006, 2011 and 2016;
- adjustment for early enumeration in 1991 and 1996 in parts of Northern Quebec, Newfoundland and Labrador, the Yukon and the Northwest Territories;
- addition of estimates of NPRs in 1971, 1976, 1981 and 1986. Since 1991, NPRs are included in the census universe;
- estimation of the July 1 base population by addition or subtraction of the components of growth between Census Day and June 30.

### **Adjustment for the census net undercoverage (CNU)**

The adjustment for CNU is important. 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).

Coverage studies provide undercoverage estimates for the 1991, [1996](#), [2001](#), [2006](#), [2011](#) and [2016](#) censuses at the provincial and territorial levels, and for the 1971, 1976, 1981 and 1986 censuses at the provincial level only. Estimates of overcoverage at the provincial and territorial levels are available only for the last six censuses (1991 to 2016). Overcoverage for previous censuses was estimated by assuming that the overcoverage-to-undercoverage ratio for each census between 1971 and 1986 was the same as in 1991. The CNU for the Yukon and the Northwest Territories prior to 1991 was estimated by assuming that the ratio between the CNU for each territory and the 10 provinces for each census between 1971 and 1986 was the same as in 1991.

For consistency, the 1991 Census undercoverage and overcoverage were revised in 1998 to take into account the methodological improvements made in the 1996 Census coverage studies. This revision altered CNU in all censuses between 1971 and 1986. Similarly, the 1996 Census undercoverage and overcoverage were revised in 2003.

### **B. Births and deaths**

The numbers of births and deaths 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 this information to Statistics Canada.

The vital statistics universe applied to the population estimates includes births and deaths occurring in Canada, in which the usual place of residence of either the birth mother or the deceased is Canada. Any death or birth occurring outside of Canada, even if the mother or the deceased is Canadian, is excluded from the vital statistics population.

Vital statistics by province or territory of residence are used to produce our final estimates of births and deaths. However, before 2011, the final estimates may differ from the data released by the Centre for Population Health Data due to the imputation of certain unknown values. In addition, for estimates of deaths, the age represents age at the beginning of the period (July 1<sup>st</sup>) and not the age at the time of occurrence, as with the Centre for Population Health Data data. The Centre for Population Health Data releases preliminary data that the Centre for Demography will use. However, this data will not be final.

When there are no vital statistics, the number of births is estimated using fertility rates by the mother's age group. The number of deaths is estimated by using mortality rates by age group and sex. These methods are used to calculate preliminary<sup>2</sup> estimates.

### **Special treatment for preliminary<sup>2</sup> estimates for Quebec and British Columbia**

Quebec and British Columbia provide their most recent estimates of births and deaths. The figures are used to produce preliminary<sup>2</sup> estimates. For the final estimates, the two provinces' births and deaths are derived from the vital statistics compiled by the Centre for Population Health Data.

### **Levels of estimates**

For information on the differences between preliminary<sup>2</sup> and final estimates, see section **B. Births and Deaths**, above.

### **C. 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 immigrants' administrative files. It then provides Statistics Canada with information from Global Case Management System (GCMS) files (until December 2010, data come from the Field Operational Support System files (FOSS)). 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.

### **Levels of estimates**

The difference between preliminary<sup>2</sup> and final postcensal estimates lies in the timeliness of the source used to estimate this component. Since the GCMS files are continually being updated, new calculations are carried out each year to update the immigration estimates. Immigration estimates are preliminary the first year and final the second year.

### **D. 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 immigrants and NPRs in Canada. It then provides Statistics Canada with information from Global Case Management System (GCMS) files (until June 2011, data come from the Field Operational Support System files (FOSS)). The information is used to estimate the number and characteristics of people granted non-permanent resident 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. NPRs 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.

The number of people in IRCC's administrative system is estimated on a specific date 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 NPRs used in the calculation of the population estimates.

Anyone who received non-permanent resident status prior to the observation date is counted. For refugee claimants, the date of their application is used. 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.

Since GCMS files are continually being updated, the figures are recalculated each year until the estimates of net NPR are final.

### Levels of estimates

The difference between preliminary<sup>2</sup> and final estimates lies in the timeliness of the source used to estimate this component. Since the GCMS files are continually being updated, the figures are recalculated each year to update the estimates of the net number of NPRs. Non-permanent resident (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.

### E. Emigration

The number of emigrants 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).<sup>4</sup> 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 taken into account:

- 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 when the estimates are used before this date. 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 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 T1FF;<sup>4</sup>
- 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<sup>4</sup> 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<sup>4</sup> file. We calculate a ratio of the number of emigrant adults to the number of emigrant children from the T1FF<sup>4</sup> 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.

Please note that the estimates for the most recent periods are expected to be very similar. In the absence of more up-to-date data sources, the emigration rate of the last available year is applied to the beginning of the year population estimate to be estimated.

### Levels of estimates

For information on the differences between preliminary<sup>2</sup> and final estimates, see section **E. Emigration**, above.

### F. Net temporary emigration

Some people leave Canada to live temporarily in another country while others who were temporarily outside of 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 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 the 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.

The five-year net temporary emigration is calculated first at the national level. It is then disaggregated by province or group of provinces based on 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.

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 can be estimated only for the intercensal period preceding the most recent census. For the postcensal period, the rate of the last available year (2015/2016) is applied to the beginning of the year population estimate to be estimated.

### Levels of estimates

The difference between preliminary<sup>2</sup> and final estimates lies in the timeliness of the emigration estimate used to calculate the seasonal adjustment for the net temporary emigration. The same estimation method is used.

## G. 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 from Canada Revenue Agency (CRA) and T1FF<sup>4</sup> file are used to estimate the number of returning emigrants. 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:

- 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 when the estimates are used before this date. 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;<sup>4</sup>
- the adult/child ratio, which is based on the data from the 2016 Census.

Please note that the estimates for the most recent periods are expected to be identical or very similar. In the absence of more up-to-date data sources, the assumption is made that levels remain similar.

### Levels of estimates

For information on the differences between preliminary<sup>2</sup> and final estimates, see section **G. Returning emigrants**, above.

## H. 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.<sup>4</sup>

Final estimates of interprovincial migration are obtained by comparing addresses indicated on personal income tax returns over two consecutive tax years. 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. From 2001/2002 to 2005/2006, the adjustment was slightly modified (for further information, see [Wilkinson, 2004](#)). From 2006/2007, this adjustment has been slightly modified (Cyr, 2008 – Internal document).

Since income tax returns are not available at the time preliminary<sup>2</sup> estimates are produced, the estimation of preliminary<sup>2</sup> interprovincial migration is based on CCB administrative files, which provide counts of child migrants (aged 0 to 17) registered to the program. The estimates have to be adjusted later for children who are not registered to the CCB program. Finally, the number of adult migrants is calculated using the number of child migrants and factors derived from the T1FF.<sup>4</sup> As a result, three adjustment factors are used to take into account:

- the program's partial coverage, that is, people who are not registered to the CCB program. 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 migrate between children who are registered to the CCB program and children who are not. This factor is obtained by comparing the out-migration rates of children registered to the CCB program 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 available year of T1FF;<sup>4</sup>
- the differential propensity to migrate between adults and children. This factor generates the out-migration rate of the population aged 18 and over for each province / territory of origin and destination. It is obtained by calculating the ratio of the central migration rate for adults to the rate for children. It is estimated using data from the last three available years of T1FF.<sup>4</sup>

The adult migration rate is then applied to the estimated adult population. The number of adult migrants is then added to the number of child migrants to produce the number of interprovincial migrants for the entire population.

Since 2015, the method to estimate the interprovincial migration has been modified. This new method is applied from July 2011 onward. In order to reduce the differences between the preliminary annual series (which was derived from the sum of 12 monthly migration matrices) and the final annual series, CCB microdata have been used. Using microdata is allowing estimating migration for various periods (monthly, quarterly and annually). It also allows improving the comparability between preliminary<sup>2</sup> and final estimates. Final annual estimates (T1FF)<sup>4</sup> are now distributed by quarter on the basis of preliminary<sup>2</sup> quarterly estimates derived from CCB microdata. It is important to note that, as a result of using CCB microdata, it is not possible to add the quarterly interprovincial in-migrants and out-migrants estimates to get the annual estimates. It is however possible to add the quarterly net interprovincial migration estimates to get the annual estimates.

### Levels of estimates

For information on the differences between preliminary<sup>2</sup> and final estimates of total interprovincial migration, see section **H. Interprovincial migration** above.

### 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 adjusted for the CNU.<sup>1</sup>

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

- calculation of the error of closure;
- linear distribution of the error of closure.

The 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 CNU.<sup>1</sup>

The error of closure is spread uniformly over the intercensal period of days within each month.

## Quality of demographic data

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

#### A. 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 undercoverage and, to a lesser extent, overcoverage. It should be noted that both types of errors are intrinsic to any survey data.

The coverage errors occur when dwellings and/or individuals are missed, incorrectly included (except for the 2006, 2011 and 2016 censuses, where people incorrectly included were not considered in the Census Overcoverage Study) or counted more than once. 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 census undercoverage and overcoverage are produced. The Centre for Demography adjusts the population enumerated in the census by province and territory using these estimates.

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 modelled. Furthermore, it is assumed that the coverage rates estimated for a province or territory apply to the regions within that geographic area. Prior to 1993<sup>5</sup>, the DEP used census data that was unadjusted for coverage errors. Coverage studies had been done to measure undercoverage, but none measured overcoverage. Following the decision to integrate a correction for the coverage to the enumerated population in 1991, the DEP had to revise the population estimates for the period from 1971 to 1992. The correction is based on the findings of the coverage studies conducted during this period and on hypotheses regarding the ratio between the overcoverage and undercoverage levels based on the findings of subsequent coverage studies.

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.



**Table D1**  
**Estimated census net undercoverage, Canada, provinces and territories, 2001 to 2016 censuses**

Geography	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
<b>2016<sup>1</sup></b>					
<b>Canada</b>	<b>35,151,728</b>	<b>849,727</b>	<b>27,790</b>	<b>36,029,245</b>	<b>2.44</b>
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
<b>2011<sup>1</sup></b>					
<b>Canada</b>	<b>33,476,688</b>	<b>759,125</b>	<b>37,392</b>	<b>34,273,205</b>	<b>2.32</b>
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
<b>2006<sup>1</sup></b>					
<b>Canada</b>	<b>31,612,897</b>	<b>868,658</b>	<b>40,115</b>	<b>32,521,670</b>	<b>2.79</b>
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

**Table D1**  
**Estimated census net undercoverage, Canada, provinces and territories, 2001 to 2016 censuses**

Geography	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
<b>2001<sup>1</sup></b>					
<b>Canada</b>	<b>30,007,094</b>	<b>924,430</b>	<b>34,539</b>	<b>30,966,063</b>	<b>3.10</b>
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

1. 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.

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<sup>1</sup> and its distribution vary from one census to another;
- within-cohort consistency of population estimates. If for example, the male cohort of children in age group 0 to 4 in 1981 was tracked up to the 2001 Census (unadjusted for CNU)<sup>1</sup> 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,<sup>1</sup> 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 standards. Nevertheless, since preliminary<sup>2</sup> 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, 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 by the DEP, the 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). Estimates must be 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 national estimates by province and territory and of annual estimates to a quarterly level. Assumptions must also be made to establish the variation for the postcensal period. Any geographical or quarterly variation may introduce error in the estimation of these components.

### **D. Interprovincial migration**

Since July 1993, preliminary<sup>2</sup> interprovincial migration estimates have been based on Canada child benefit (CCB) files. As this program covers only children, various adjustments must be done in order to derive the migration of adults. Consequently, preliminary<sup>2</sup> CCB based estimates are subject to larger error than final estimates derived from Canada Revenue Agency (CRA) tax files.

## **Quality assessment**

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

### **A. Precocity error**

The quality of preliminary estimates of components is analyzed 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, the most up-to-date postcensal population estimate. It can be calculated for both population and component estimates.

The precocity error allows for useful comparisons between components, as well as between provinces and territories of different population size. Note that when compared to the total population for an area, the differences between preliminary and final estimates of the components are quite small. There are, however, differences in the amount of impact on the population estimates between components and between provinces and territories.

Generally speaking, net interprovincial migration yields the greatest precocity errors. This is 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 yield 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 a different method (method of rates) for preliminary estimates.

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

For more information on annual precocity error analysis, see publication [91-215-XWE 2020001](#) (Quality of demographic data section).

**Table D2**  
**Quarterly precocity errors for components, Canada, provinces and territories**

Year/Component	Canada	N.L.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Y.T.	N.W.T.	Nvt.
	per thousand													
<b>Births</b>														
2018Q01	0.12	0.20	0.40	0.21	0.18	0.00	0.18	0.06	0.19	0.30	-0.01	-0.90	0.07	-0.53
2018Q02	0.07	0.10	0.20	0.18	0.09	-0.01	0.09	-0.05	0.03	0.25	-0.01	-0.30	0.71	0.95
2018Q03	0.11	0.26	0.37	0.09	0.15	-0.01	0.15	0.21	0.12	0.25	0.00	0.00	-0.04	0.31
2018Q04	0.06	0.07	0.04	0.21	-0.01	0.00	0.08	0.14	0.14	0.14	0.00	-0.02	-0.60	0.39
<b>Deaths</b>														
2018Q01	0.01	0.27	-0.07	0.07	-0.06	-0.02	0.03	-0.10	0.06	0.06	-0.01	0.50	-0.02	0.29
2018Q02	-0.01	0.17	-0.44	-0.10	-0.05	-0.03	0.00	0.02	0.02	-0.04	-0.02	0.02	-0.09	0.13
2018Q03	0.00	0.12	-0.09	0.05	0.18	-0.10	0.01	0.10	0.00	0.05	-0.02	0.00	0.16	-0.34
2018Q04	0.03	-0.02	0.01	-0.04	-0.08	0.04	0.05	0.10	0.00	0.05	-0.02	0.00	-0.02	-0.24
<b>Immigration</b>														
2019Q01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2019Q02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2019Q03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2019Q04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Emigration</b>														
2017Q03	0.16	0.11	0.33	0.04	-0.01	0.12	0.23	0.17	0.01	0.14	0.14	-0.13	-0.18	0.05
2017Q04	0.10	0.06	0.10	0.01	0.00	0.09	0.12	0.03	0.00	0.13	0.13	-0.15	-0.09	0.00
2018Q01	0.08	0.03	0.09	-0.06	-0.04	0.10	0.09	0.16	0.02	0.09	0.10	-0.10	-0.09	0.03
2018Q02	0.08	0.07	0.07	0.00	-0.04	0.07	0.09	0.03	0.04	0.12	0.08	0.12	0.00	0.00
<b>Returning emigration</b>														
2017Q03	-0.02	0.00	0.01	-0.05	-0.08	-0.02	-0.04	0.04	-0.02	0.03	0.02	0.00	-0.18	0.05
2017Q04	0.00	0.00	0.01	-0.01	-0.03	0.00	-0.01	0.02	0.00	0.02	0.01	0.00	-0.07	0.00
2018Q01	0.00	0.00	0.01	-0.01	-0.02	0.00	0.00	0.02	0.00	0.02	0.01	0.00	-0.07	0.00
2018Q02	0.01	-0.02	-0.04	0.02	-0.03	0.02	-0.01	0.03	-0.01	0.01	0.04	0.02	-0.11	0.00
<b>Net temporary emigration</b>														
2017Q03	-0.07	-0.01	-0.01	-0.01	-0.01	-0.08	-0.13	0.01	-0.07	0.00	0.03	-0.08	-0.04	-0.05
2017Q04	-0.05	-0.01	-0.01	-0.01	-0.01	-0.07	-0.11	0.01	-0.06	0.00	0.02	-0.05	-0.04	-0.05
2018Q01	-0.06	-0.01	-0.01	-0.01	-0.01	-0.07	-0.12	0.01	-0.06	0.00	0.01	-0.07	-0.04	-0.08
2018Q02	-0.01	0.00	-0.01	0.00	0.00	-0.01	-0.01	0.00	0.00	-0.01	-0.01	-0.02	-0.02	-0.03
<b>Net non-permanent residents</b>														
2017Q03	0.04	0.08	0.29	0.22	0.09	-0.24	0.18	0.20	0.15	0.13	-0.07	0.28	0.00	-0.03
2017Q04	-0.01	0.20	-0.10	-0.21	-0.01	-0.02	0.02	0.09	0.08	0.00	-0.10	0.03	-0.07	0.08
2018Q01	-0.01	-0.17	-0.41	0.19	0.03	-0.14	0.12	-0.11	-0.07	-0.09	-0.04	-0.02	0.27	-0.03
2018Q02	0.03	0.10	0.35	0.26	0.10	0.02	0.08	0.21	0.07	-0.04	-0.14	-0.07	0.26	0.03
<b>In-migrants</b>														
2018Q03	0.26	0.07	0.82	0.24	0.19	0.11	0.23	0.11	0.52	0.95	0.00	-0.64	0.60	3.28
2018Q04	0.18	0.03	0.39	0.14	0.11	0.06	0.15	0.08	0.43	0.70	0.01	-0.17	-0.31	2.25
2019Q01	0.23	0.09	0.66	0.28	0.28	0.08	0.16	0.13	0.54	0.89	0.00	-1.03	-0.11	7.61
2019Q02	0.37	0.29	0.80	0.68	0.56	0.13	0.25	0.25	1.00	1.07	0.19	0.51	1.97	6.75
<b>Out-migrants</b>														
2018Q03	0.26	1.11	2.27	0.57	1.09	0.07	0.06	0.66	0.92	0.15	0.61	5.93	1.98	1.02
2018Q04	0.18	0.87	1.21	0.29	0.70	0.05	0.04	0.48	0.57	0.11	0.43	3.36	0.80	0.94
2019Q01	0.23	1.26	1.31	0.61	0.71	0.04	0.06	0.57	0.88	0.13	0.50	4.79	2.19	1.17
2019Q02	0.37	1.51	1.91	0.74	0.91	0.08	0.16	0.68	0.99	0.51	0.68	4.48	1.55	5.87
<b>Net interprovincial migration</b>														
2018Q03	...	-1.04	-1.45	-0.33	-0.90	0.04	0.18	-0.56	-0.40	0.80	-0.62	-6.57	-1.38	2.25
2018Q04	...	-0.84	-0.82	-0.15	-0.58	0.01	0.10	-0.40	-0.14	0.59	-0.42	-3.53	-1.11	1.31
2019Q01	...	-1.17	-0.66	-0.33	-0.43	0.03	0.10	-0.44	-0.34	0.76	-0.50	-5.81	-2.30	6.44
2019Q02	...	-1.22	-1.10	-0.06	-0.35	0.05	0.10	-0.43	0.01	0.56	-0.49	-3.97	0.42	0.88

... not applicable

Source: Statistics Canada, Centre for Demography.

## B. Error of closure

The error of closure measures the accuracy 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<sup>1</sup>). A positive error of closure means that the postcensal population estimates have overestimated the population.

The error of closure comes from three sources: errors primarily due to sampling when measuring the starting (2011) and end of period (2016) censuses 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.<sup>1</sup> The error of closure can be calculated for the total population of each province and territory as well as by age and sex. For the moment, the error is only available for total population by province and territory.

Table D3 shows postcensal population estimates on May 10, 2016 and census counts adjusted for CNU<sup>1</sup> and the errors of closure for Canada, provinces and territories from 2001 to 2016.

For Canada as a whole, the error of closure was estimated at 110,310 or 0.31% in 2016. This is a decrease over the error for 2011 (0.42%).

The population estimates overestimated the population of eight provinces, one territory and Canada as a whole. Five provinces posted errors of closure greater than 1% or less than -1%. Of these jurisdictions, only British Columbia's estimated population differed from the adjusted census population by more than 2% (-2.07%). In 2011, four provinces and two territories posted errors of closure greater than 1% or less than -1%.

By considering the variance in CNU, it is possible to identify errors of closure that are statistically significant. Table D3 shows the results of this analysis.

The error of closure is statistically significant for Canada and seven provinces. This means that the population estimates significantly overestimated or underestimated the adjusted census population in these jurisdictions. As noted above, these results are due to both the sampling for census coverage studies and errors in the components of population growth over the intercensal period. Among these components, interprovincial migration and emigration are mostly associated with large errors of closure.

**Table D3**  
**Error of closure of the population estimates, Canada, provinces and territories, 2001 to 2016**

Geography	Postcensal estimate on Census Day	Census adjusted for CNU <sup>1</sup>	Error of closure		CNU standard error <sup>2</sup>	t value <sup>3</sup>
	A	B	C=A-B	D=C/B*100	E	F=C/E
	number			%	number	
<b>2016</b>						
<b>Canada</b>	<b>36,139,555</b>	<b>36,029,245</b>	<b>110,310</b>	<b>0.31</b>	<b>43,844</b>	<b>2.52</b>
Newfoundland and Labrador	530,465	529,490	975	0.18	2,015	0.48
Prince Edward Island	149,116	146,371	2,745	1.88	870	3.16
Nova Scotia	948,080	941,407	6,673	0.71	3,042	2.19
New Brunswick	756,736	762,836	-6,100	-0.80	2,777	-2.20
Quebec	8,297,802	8,211,537	86,265	1.05	20,613	4.18
Ontario	13,902,359	13,841,676	60,683	0.44	33,316	1.82
Manitoba	1,313,904	1,310,260	3,644	0.28	4,829	0.75
Saskatchewan	1,145,156	1,133,196	11,960	1.06	4,651	2.57
Alberta	4,231,285	4,187,186	44,099	1.05	13,530	3.26
British Columbia	4,745,041	4,845,444	-100,403	-2.07	16,561	-6.06
Yukon	37,927	38,244	-317	-0.83	191	-1.66
Northwest Territories	44,667	44,725	-58	-0.13	257	-0.23
Nunavut	37,017	36,873	144	0.39	229	0.63
<b>2011</b>						
<b>Canada</b>	<b>34,417,759</b>	<b>34,273,205</b>	<b>144,554</b>	<b>0.42</b>	<b>57,546</b>	<b>2.51</b>
Newfoundland and Labrador	513,622	524,728	-11,106	-2.12	2,912	-3.81
Prince Edward Island	145,759	143,590	2,169	1.51	923	2.35
Nova Scotia	948,457	943,638	4,819	0.51	5,346	0.90
New Brunswick	756,547	755,101	1,446	0.19	3,335	0.43
Quebec	7,968,651	7,993,123	-24,472	-0.31	23,660	-1.03
Ontario	13,345,467	13,236,621	108,846	0.82	44,121	2.47
Manitoba	1,251,999	1,230,574	21,425	1.74	6,104	3.51
Saskatchewan	1,055,858	1,063,729	-7,871	-0.74	6,306	-1.25
Alberta	3,774,557	3,777,935	-3,378	-0.09	18,046	-0.19
British Columbia	4,543,807	4,491,451	52,356	1.17	19,494	2.69
Yukon	35,356	35,253	103	0.29	303	0.34
Northwest Territories	44,139	43,439	700	1.61	323	2.17
Nunavut	33,540	34,023	-483	-1.42	608	-0.79
<b>2006</b>						
<b>Canada</b>	<b>32,553,799</b>	<b>32,521,670</b>	<b>32,129</b>	<b>0.10</b>	<b>53,926</b>	<b>0.60</b>
Newfoundland and Labrador	508,874	510,515	-1,641	-0.32	2,710	-0.61
Prince Edward Island	137,746	137,754	-8	-0.01	701	-0.01
Nova Scotia	933,692	938,020	-4,328	-0.46	4,885	-0.89
New Brunswick	748,737	746,056	2,681	0.36	3,105	0.86
Quebec	7,644,701	7,623,482	21,219	0.28	24,077	0.88
Ontario	12,657,808	12,641,497	16,311	0.13	41,363	0.39
Manitoba	1,176,744	1,182,731	-5,987	-0.51	6,469	-0.93
Saskatchewan	987,706	991,490	-3,784	-0.38	4,805	-0.79
Alberta	3,357,637	3,408,975	-51,338	-1.51	16,091	-3.19
British Columbia	4,296,518	4,235,151	61,367	1.45	16,591	3.70
Yukon	31,146	32,177	-1,031	-3.20	194	-5.31
Northwest Territories	42,160	43,084	-924	-2.14	236	-3.92
Nunavut	30,330	30,738	-408	-1.33	176	-2.32

**Table D3**  
**Error of closure of the population estimates, Canada, provinces and territories, 2001 to 2016**

Geography	Postcensal estimate on Census Day	Census adjusted for CNU <sup>1</sup>	Error of closure		CNU standard error <sup>2</sup>	t value <sup>3</sup>
	A	B	C=A-B	D=C/B*100	E	F=C/E
	number			%	number	
<b>2001</b>						
<b>Canada</b>	<b>31,016,011</b>	<b>30,966,063</b>	<b>49,948</b>	<b>0.16</b>	<b>44,749</b>	<b>1.12</b>
Newfoundland and Labrador	533,712	522,331	11,381	2.18	1,782	6.39
Prince Edward Island	138,102	136,619	1,483	1.09	775	1.91
Nova Scotia	941,533	932,528	9,005	0.97	4,170	2.16
New Brunswick	754,180	749,593	4,587	0.61	3,555	1.29
Quebec	7,390,137	7,390,359	-222	0.00	21,033	-0.01
Ontario	11,873,643	11,862,355	11,288	0.10	33,472	0.34
Manitoba	1,149,561	1,150,596	-1,035	-0.09	5,423	-0.19
Saskatchewan	1,016,762	1,000,745	16,017	1.60	4,333	3.70
Alberta	3,051,245	3,049,641	1,604	0.05	11,308	0.14
British Columbia	4,068,196	4,072,543	-4,347	-0.11	15,598	-0.28
Yukon	29,737	30,097	-360	-1.20	372	-0.97
Northwest Territories	41,152	40,655	497	1.22	362	1.37
Nunavut	28,051	28,001	50	0.18	411	0.12

1. Census net undercoverage includes the incompletely enumerated Indian reserves.

2. Census net undercoverage excludes the incompletely enumerated Indian reserves.

3. An error of closure with a t value greater than 1.96 or less than -1.96 is statistically significant at the 95% confidence level.

Source: Statistics Canada, Centre for Demography.

## Explanatory notes for the tables

**Table D4**  
**Quarterly population estimates and factors of demographic growth**

Quarter	Population at beginning period	Natural increase	Net interprovincial migration	Net international migration	Total net migration	Total growth
Q3 2016	PD	D	D	D	D	D
Q4 2016	PD	D	D	D	D	D
Q1 2017	PD	D	D	D	D	D
Q2 2017	PD	D	D	D	D	D
Q3 2017	PD	D	D	D	D	D
Q4 2017	PD	D	D	D	D	D
Q1 2018	PD	D	D	D	D	D
Q2 2018	PD	D	D	D	D	D
Q3 2018	PD	D	D	R	R	R
Q4 2018	PR	D	D	R	R	R
Q1 2019	PR	R	D	R	R	R
Q2 2019	PR	R	D	R	R	R
Q3 2019	PR	R	R	R	R	R
Q4 2019	PR	R	R	R	R	R
Q1 2020	PR	R	R	R	R	R
Q2 2020	PR	P	P	P	P	P
Q3 2020	PP	...	...	...	...	...
Modified since <sup>1</sup>	Q4 2016	Q1 2017	Q3 2018	Q3 2016	Q3 2016	Q3 2016

... not applicable

1. **Modified since** indicates the quarter from which the data were revised since the last release. Last quarter's data were not modified as they are released for the first time.

**Note:** D: Final estimates. PD: Final postcensal estimates. R: Updated estimates. PR: Updated postcensal estimates. P: Preliminary estimates. PP: Preliminary postcensal estimates, Q1: January to March, Q2: April to June, Q3: July to September, Q4: October to December.

**Source:** Statistics Canada, Centre for Demography.

**Table D5**  
**Quarterly estimates of components of demographic growth**

Quarter	Births	Deaths	In-migrants	Out-migrants	Immigrants	Emigrants	Returning emigrants	Net temporary emigrants	Net non-permanent residents
Q3 2016	D	D	D	D	D	D	D	D	D
Q4 2016	D	D	D	D	D	D	D	D	D
Q1 2017	D	D	D	D	D	D	D	D	D
Q2 2017	D	D	D	D	D	D	D	D	D
Q3 2017	D	D	D	D	D	D	D	D	D
Q4 2017	D	D	D	D	D	D	D	D	D
Q1 2018	D	D	D	D	D	D	D	D	D
Q2 2018	D	D	D	D	D	D	D	D	D
Q3 2018	D	D	D	D	D	R	R	R	R
Q4 2018	D	D	D	D	D	R	R	R	R
Q1 2019	R	R	D	D	D	R	R	R	R
Q2 2019	R	R	D	D	D	R	R	R	R
Q3 2019	R	R	R	R	D	R	R	R	R
Q4 2019	R	R	R	R	D	R	R	R	R
Q1 2020	R	R	R	R	R	R	R	R	R
Q2 2020	P	P	P	P	P	P	P	P	P
Modified since <sup>1</sup>	Q2 2017	Q2 2017	Q3 2018	Q3 2018	Q1 2019	Q3 2016	Q3 2016	Q3 2016	Q3 2016

1. **Modified since** indicates the quarter from which the data were revised since the last release. Last quarter's data were not modified as they are released for the first time.

**Note:** D: Final estimates. R: Updated estimates. P: Preliminary estimates. Q1: January to March, Q2: April to June, Q3: July to September, Q4: October to December.

**Source:** Statistics Canada, Centre for Demography.



**Endnotes**

1. In this case, the adjustment for the census net undercoverage also includes the incompletely enumerated Indian reserves (IEIR).
2. Unless otherwise noted, the term preliminary include both preliminary and updated estimates.
3. From 1991 to 2001 Census, “persons with a usual place of residence in Canada who hold Minister’s permits (including extensions) and members of their families living with them” were included in the census universe.
4. The T1 family file (T1FF) is derived from the Canada Revenue Agency (CRA) T1 file by Statistics Canada Centre for Income and Socioeconomic Well-being Statistics.
5. In September 1993, the DEP took advantage of the integration of the 1991 Census counts to produce a series of estimates beginning in 1971 and including census net undercoverage.

## Appendix 1: Glossary

### 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.

### Components of demographic growth

Any of the classes of events generating population movement variations. Births, deaths and migrations are the components responsible for the variation since they alter the total population.

### 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).

### 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.

### International migration

International migration represents movement of population between Canada and a foreign country which involves a change in 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 movements from one province or territory to another involving a change in the usual place of 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.

### Natural increase

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

### 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 non-permanent residents

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

**Non-permanent residents**

A non-permanent resident is a person who is lawfully in Canada on a temporary basis and who holds a work, study or other (excluding visitor visas) permit issued for that person along with members of their 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 uses the term temporary resident rather than non-permanent resident.

**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.

**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**

- a. **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.
- b. **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 applicable, subtract residual deviation. It can be positive or negative.

**Precocity error**

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 either population estimates or components of population growth.

**Rate**

Refers to the ratio of the number of events estimated in a year ( $t, t+i$ ) 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.

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

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

**Overcoverage of population rate:** 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 rate:** 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 between years within the quinquennial period. This distribution is calculated by taking into account the number of days within each month.

**Returning emigrant**

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

**Total net migration**

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

**Vital statistics**

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

## Appendix 2: Sources and remarks

### Base population:

May 10, 2016 Census of Population adjusted for census net undercoverage and incompletely enumerated Indian reserves.

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.

### Births and deaths

Statistics Canada, Centre for Population Health Data.

Statistics Canada, Centre for Demography, Catalogue no. 91-002-X, Quarterly.

**Births** Fertility rates for 2019 based on preliminary count of births by age group of the mother provided by the Centre for Population Health Data applied to the female population estimates by age group at the beginning of the quarter. Births for Quebec and British Columbia were provided by their respective agencies.

**Note:** No adjustments were made to the usual estimating method as births of the 2020 second quarter were the result of fertility behaviors happening, between July and September 2019, before the start of the COVID-19 pandemic.

**Deaths** Mortality rates for 2018 based on preliminary count of deaths by age group and sex provided by the Centre for Population Health Data applied to the population estimates by age group and sex at the beginning of the quarter. Deaths for Quebec and British Columbia were provided by their respective agencies.

**Note:** No further adjustments were made to the data from Quebec and British Columbia, as they already included virus-related deaths.

Death counts for the remaining provinces and territories (excluding Quebec and British Columbia) came from two sources. The Centre for Population Health Data provided provisional death counts for Newfoundland and Labrador, Prince Edward Island, Nova Scotia, Manitoba, Saskatchewan, Alberta, and the Northwest Territories. These data already included COVID-19 deaths and were not adjusted further.

For the other provinces and territories (New Brunswick, Ontario, Yukon, and Nunavut), provisional death counts from the Centre for Population Health Data were not available. For these jurisdictions, deaths were estimated according to the usual method. To account for pandemic-related excess mortality, the number of COVID-19 deaths as published by the Public Health Agency of Canada were added to these estimates.

### Immigration

Estimates are based on the immigrant files provided by Immigration, Refugees and Citizenship Canada (IRCC) received on August 18, 2020.

**Note:** No adjustments related to COVID-19 were made to the usual estimating method as IRCC data were received as usual and were of normal quality.

### Emigration

The estimates are produced by the Centre for Demography using:

- data from Canada Revenue Agency (CRA) Canada child benefit files (CCB) program. The last year of data used is 2017/2018

- tax data calculated using T1FF file provided by Statistics Canada Centre for Income and Socioeconomic Well-being Statistics. The last year of data used was 2017/2018
- data provided by the U.S. Department of Homeland Security, Office of Immigration Statistics. The last year of data used was 2017/2018
- data on the number of adult and children emigrants from T1FF file used for the provincial distribution of adults. The last year of data used was 2017/2018.

For estimates after 2017/2018, we:

- calculated the 2017/2018 emigration rate for Canada
- applied this rate to Canada's population on July 1<sup>st</sup> at the beginning of the period to be estimated
- distributed the number of emigrants for Canada by the province and territory according to the provincial distribution of 2017/2018
- distributed these data by month according to the provincial or territorial emigration seasonality of 2017/2018.

**Note:** An adjustment was made to the usual estimation method in order to take into account the travel restrictions, in Canada and in other countries, imposed within the COVID-19 context. The adjustment was applied from March to June 2020. It was calculated using the number of immigrant visas in the United States issued from U.S. consulates in Canada. The ratio between the number of immigrant visas from the United States and preliminary estimates of emigration for 2017, 2018 and 2019 was applied to the number of issued visas from March to June 2020. This adjustment resulted in lower estimates of emigration for March 2020 and a marked decrease from April to June.

## Returning emigration

The estimates are produced by the Centre for Demography using:

- data from Canada Revenue Agency (CRA) Canada child benefit files (CCB) program. The last year of data used was 2017/2018
- 2016 Census – 1 year mobility.

For estimates after 2017/2018, we:

- calculated the 2017/2018 returning emigration rate for Canada
- applied this rate to Canada's population on July 1<sup>st</sup> at the beginning of the period to be estimated
- distributed the number of returning emigrants for Canada by the province and territory according to the provincial distribution of 2017/2018
- distributed these data by month according to the provincial or territorial returning emigration seasonality of 2017/2018.

**Note:** An adjustment was made to the usual estimation method in order to take into account the travel restrictions, in Canada and in other countries, imposed within the COVID-19 context. The adjustment was applied from March to June 2020. It was calculated using two alternative sources: the number of entries in the country of Canadian citizens living abroad as given by the Frontier Counts data for Canadian airports with Primary Inspection Kiosks (PIK) and registered individuals in the Register of Canadians Abroad (ROCA). The monthly ratio between the number of PIK entries and preliminary estimates of returning emigration for 2018 and 2019 was applied to the number of entries of March to June 2020. Then, monthly rates of returning emigration were computed using ROCA for individuals who were abroad for 365 days or more. The monthly ratio between rates of returning emigration of 2020 and the average of 2018 and 2019 was applied to PIK data. This adjustment resulted in a marked increase of the number of returning emigrants in March 2020 and a decrease in the following months.

## Net temporary emigration

The estimates are produced by the Centre for Demography using:

- data from the Reverse Record Check (RRC) of the 2016 Census
- 2016 Census – question on the place of residence 5 years ago
- estimates of returning emigrants for 2011 to 2016 intercensal period.

For the postcensal estimates, we:

- calculated the 2015/2016 net temporary emigration rate for Canada
- applied this rate to Canada's population on July 1<sup>st</sup> at the beginning of the period to be estimated
- distributed the result for the year into monthly estimates using an applied seasonality that is an average between zero seasonality and the seasonality of emigration
- distributed by province and territory the monthly estimates according to the provincial distribution of the intercensal data.

**Note:** An adjustment was made to the usual estimation method in order to take into account the travel restrictions, in Canada and in other countries, imposed within the COVID-19 context. The adjustment was applied from March to June 2020. Temporary departures and returns were adjusted independently. Temporary departures were adjusted in the same way as emigration but using non-immigrant visas from the United States. Temporary returns were adjusted in a similar way as returning emigration but by using individuals who were abroad for 180 to 364 days in ROCA. This adjustment resulted in a decrease in the estimates of net temporary emigration for March 2020 and a marked diminution from April to June.

## Non-permanent residents

The estimates are produced by the Centre for Demography using the Global Case Management System (GCMS) files from IRCC. These files, received on August 18, 2020, document the number of persons holding permits/authorizations or claiming refugee status.

**Note:** No adjustments related to COVID-19 were made to the usual estimating method as IRCC data were received as usual and were of normal quality.

## Interprovincial migration

The estimates are produced by the Centre for Demography using:

- data from Canada Revenue Agency (CRA) Canada child benefit (CCB) program adjusted migration data for children
- factors ( ${}_jG$ ) corresponding to the ratio of the migration rate of all children to the migration rate of children who are registered to the CCB program calculated using 2018/2019 tax file data
- factors ( ${}_{jk}F$ ) used to calculate adult migration and corresponding to the ratio of the adult to child migration rates, calculated on a three-year basis using tax file data for 2016/2017, 2017/2018 and 2018/2019.

**Notes:** Due to a change in methodology, we remind you that the in- and out- interprovincial migrants cannot be summed in order to obtain a different period (for example, the sum of the quarterly estimates is not equal to the annual estimates). This method has been applied starting with July 2011.

No adjustment were made to the usual estimating method. Estimates calculated with the usual method, as well as other data sources showed similar declines in the intensity of internal migration for the second quarter in most provinces and territories, as expected in the context of COVID-19.

## Related products

### Publications

91-003-X	Canadian Demographics at a Glance
91-209-X	Report on the Demographic Situation in Canada
91-214-X	Annual Demographic Estimates: Subprovincial Areas
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

### Tables

17-10-0005-01	Population estimates on July 1st, by age and sex
17-10-0006-01	Estimates of deaths, by age and sex, annual
17-10-0008-01	Estimates of the components of demographic growth, annual
17-10-0009-01	Population estimates, quarterly
17-10-0014-01	Estimates of the components of international migration, by age and sex, annual
17-10-0015-01	Estimates of the components of interprovincial migration, by age and sex, annual
17-10-0016-01	Estimates of births, by sex, annual
17-10-0020-01	Estimates of the components of interprovincial migration, quarterly
17-10-0021-01	Estimates of the components of interprovincial migration, annual
17-10-0022-01	Estimates of interprovincial migrants by province or territory of origin and destination, annual
17-10-0040-01	Estimates of the components of international migration, quarterly
17-10-0060-01	Estimates of population as of July 1st, by marital status or legal marital status, age and sex
17-10-0045-01	Estimates of interprovincial migrants by province or territory of origin and destination, quarterly
17-10-0061-01	Estimates of the number of census families as of July 1st
17-10-0059-01	Estimates of the components of natural increase, quarterly
13-10-0708-01	Deaths, by month
13-10-0709-01	Deaths, by age group and sex
13-10-0415-01	Live births, by month
13-10-0416-01	Live births, by age of mother
13-10-0417-01	Mean age of mother at time of delivery (live births)
13-10-0418-01	Crude birth rate, age-specific fertility rates and total fertility rate (live births)
13-10-0710-01	Deaths and mortality rates, by age group

### Surveys

3231	Vital Statistics - Birth Database
3233	Vital Statistics - Death Database
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
3606	Estimates of the number of Census Families for Canada, Provinces and Territories