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Quarterly Demographic Estimates

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Notice to readers

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

These estimates are not to be confused with the 2021 Census counts which were released earlier in 2022. Total population estimates based on the 2021 Census counts, adjusted for census net undercoverage and incompletely enumerated reserves, will be available in September 2023.

The analysis in this publication is based on preliminary data. Most of the components, used to produce the preliminary estimates, are calculated using demographic models and less complete data sources, albeit more timely, than those used for updated or final estimates. These data will eventually be revised and trends described in this publication might change as a result of these revisions.

Some of the estimation methods typically used were adjusted to account for the impact of the COVID-19 pandemic. Given that the adjustments are similar to what was done for the second quarter of 2020, (see [Technical Supplement: Production of Demographic Estimates for the Second Quarter of 2020 in the Context of COVID-19](#)), no technical supplement has been produced for this quarter. Some exceptions to be highlighted for the current quarter:

- The usual method was used for the components of emigration to reflect the relaxation of travel restrictions.

Acknowledgements

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

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Quarterly Demographic Estimates

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](#).

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 population growth and how they have changed over time for Canada, the provinces and territories.

Highlights

Second quarter of 2022

- Canada’s population was estimated at 38,929,902 on July 1, 2022, an increase of 284,982 (+0.7%) from April 1, 2022.
- Growth in the second quarter of 2022 was the highest in any quarter (in number) since the addition of Newfoundland to Confederation in 1949 and the highest growth in percent since the third quarter of 1957 (+0.8%). Over 94% of this growth was due to international migration, including the people who came to Canada following to the Russian invasion of Ukraine.
- Population increased in all provinces and territories except for the Northwest Territories (-0.2%).
- Population growth rates in Prince Edward Island (+1.4%), Nova Scotia (+1.2%) and New Brunswick (+1.1%) were the highest in any quarter since quarterly provincial growth rates became available (second quarter of 1951).
- International migration accounted for an increase in population of 269,305 or 94.5% of the growth seen in the second quarter of 2022. This is an increase of 93,000 compared to the next highest quarter (third quarter of 2019, +175,907) since comparable records exist (third quarter of 1971).
- Canada welcomed the largest number of non-permanent residents on record (+157,310). This was due to high numbers of asylum claimants and permit holders (work, study and other), including the arrival of people affected by the Russian invasion of Ukraine.
- The number of emigrants (10,338) was similar to second quarter levels seen before the pandemic, reflecting an increasing number of international flights and the easing of pandemic-related border restrictions.
- Ontario (-21,008), Manitoba (-2,891), and Saskatchewan (-1,948) saw the highest losses to interprovincial migration while losses were also seen in Quebec (-429), the Northwest Territories (-244), Nunavut (-41), and Yukon (-32).
- Ontario had the highest net loss to interprovincial migration in any quarter since at least the third quarter of 1971 and this represents the tenth consecutive quarter of losses for the province. The trend of people moving from Ontario to the Maritime provinces seen during the pandemic continues.
- Nova Scotia (+6,159) and New Brunswick (+4,228) had the highest net gains from interprovincial migration in any quarter since at least the third quarter of 1971. Newfoundland and Labrador (+1,300) saw the second highest net gain from interprovincial migration over the same period, following the third quarter of 1971 (+1,463). Ontario has been the highest supplier of interprovincial migrants to Atlantic Canada in every quarter since the third quarter of 2017.

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)¹ and postcensal estimates. The production of intercensal estimates involves updating the postcensal estimates using the counts from a new census adjusted for CNU.¹

Postcensal estimates are produced using data from the most recent census adjusted for CNU¹ 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,¹ 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 CNU¹ (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) ¹ or most recent estimate);
B	number of births;
D	number of deaths;
I	number of immigrants;
E	number of emigrants;
ΔTE	net temporary emigration;
RE	number of returning emigrants;
ΔNPR	net non-permanent residents;
$\Delta Ninter$	net interprovincial migration;
Resid	residual deviation (for intercensal estimates).

B. Levels of estimates

The difference between preliminary² 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 2016³ 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 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 1st) 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 preliminary² estimates.

Special treatment for preliminary² estimates for Quebec, British Columbia and Yukon

Quebec, British Columbia and Yukon provide their most recent estimates of births and deaths. The figures are used to produce preliminary² estimates. For the final estimates, births and deaths for Quebec and British Columbia are derived from the vital statistics compiled by the Centre for Population Health Data. As of 2017, the total number of births and deaths for Yukon come from their statistical agency.

Levels of estimates

For information on the differences between preliminary² 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 preliminary² 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 preliminary² 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).⁴ 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;⁴
- 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 T1FF⁴ 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 T1FF⁴ file. We calculate a ratio of the number of emigrant adults to the number of emigrant children from the T1FF⁴ 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 preliminary² 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 preliminary² 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 T1FF⁴ 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;⁴
- 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 preliminary² 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.⁴

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 preliminary² estimates are produced, the estimation of preliminary² 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.⁴ 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;⁴
- 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.⁴

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 preliminary² and final estimates. Final annual estimates (T1FF)⁴ are now distributed by quarter on the basis of preliminary² 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 preliminary² 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.¹

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.¹

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 1993⁵, 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 reserves	Adjusted population	Rate
	A	B	C	D=A+B+C	(B+C)/D*100
		number			percent
2016¹					
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
2011¹					
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
2006¹					
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

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

Geography	Census population	Census net undercoverage	Incompletely enumerated reserves	Adjusted population	Rate
	A	B	C	D=A+B+C	(B+C)/D*100
	number				percent
2001¹					
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

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 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 CNU¹ 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)¹ 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,¹ 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 preliminary² 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, preliminary² 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, preliminary² 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 2022001](#) (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													
Births														
2020Q01	0.12	0.13	0.32	0.21	0.18	-0.01	0.19	0.09	0.28	0.17	-0.01	0.96	0.80	-0.26
2020Q02	0.08	0.00	0.10	0.11	0.02	0.00	0.12	0.09	-0.04	0.22	-0.02	0.57	-0.20	-0.49
2020Q03	0.11	0.14	0.33	0.28	0.02	0.00	0.17	0.05	0.18	0.23	-0.01	-0.05	-0.57	-1.02
2020Q04	0.09	0.01	0.02	0.12	0.02	-0.01	0.16	0.11	0.16	0.15	-0.01	0.12	0.46	-1.17
Deaths														
2020Q01	0.07	0.20	0.19	0.14	0.33	-0.03	0.14	0.09	0.16	0.05	-0.02	0.10	0.35	-0.21
2020Q02	0.01	-0.05	0.09	-0.14	0.24	0.01	0.01	0.07	0.03	0.00	-0.02	-0.31	-0.11	-0.10
2020Q03	-0.04	0.00	-0.15	-0.02	0.24	-0.01	-0.09	-0.06	-0.04	0.00	-0.02	-0.31	0.02	-0.15
2020Q04	0.01	0.00	0.11	0.05	0.17	-0.02	0.03	0.05	-0.08	0.01	-0.02	0.17	-0.22	0.08
Immigration														
2021Q01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2021Q02	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2021Q03	0.00	-0.03	-0.01	-0.07	0.00	0.00	-0.03	0.01	0.03	0.10	-0.02	-0.02	0.00	0.00
2021Q04	0.00	0.05	0.12	-0.04	0.02	0.01	-0.02	0.00	-0.02	0.05	-0.01	0.02	0.00	0.00
Emigration														
2019Q03	0.21	0.21	0.18	0.22	0.04	0.19	0.25	0.10	-0.02	0.22	0.26	0.19	0.13	0.08
2019Q04	0.15	0.05	0.05	0.03	0.00	0.14	0.15	0.10	-0.03	0.16	0.25	0.10	0.20	0.13
2020Q01	0.09	0.03	0.02	0.02	-0.01	0.08	0.09	0.07	-0.01	0.11	0.17	0.14	0.09	0.03
2020Q02	-0.09	-0.02	-0.02	-0.04	-0.03	-0.06	-0.10	-0.06	-0.05	-0.10	-0.11	-0.02	0.00	0.00
Returning emigration														
2019Q03	0.07	0.02	0.13	0.07	-0.01	0.04	0.12	0.16	0.07	0.04	-0.02	0.00	0.00	0.08
2019Q04	0.01	0.00	0.04	0.02	-0.01	0.01	0.03	0.05	0.02	0.01	-0.02	0.02	-0.02	0.08
2020Q01	-0.03	-0.01	0.01	-0.01	-0.02	-0.02	-0.02	0.01	-0.01	-0.04	-0.07	0.00	-0.04	0.08
2020Q02	-0.08	-0.02	-0.02	-0.05	-0.03	-0.05	-0.09	-0.05	-0.04	-0.08	-0.11	-0.02	-0.02	0.00
Net temporary emigration														
2019Q03	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01	-0.01	-0.01	-0.03	0.00	0.00	0.00
2019Q04	-0.01	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00	0.00	-0.01	-0.01	0.00	-0.02	-0.03
2020Q01	-0.04	-0.01	-0.01	-0.01	-0.01	-0.03	-0.05	-0.01	-0.02	-0.03	-0.05	-0.02	-0.04	-0.03
2020Q02	-0.05	-0.02	-0.02	-0.02	-0.02	-0.04	-0.06	-0.02	-0.03	-0.03	-0.07	-0.07	-0.07	-0.05
Net non-permanent residents														
2019Q03	0.06	0.01	0.25	0.09	0.13	-0.25	0.28	0.22	0.02	0.02	-0.04	-0.41	-0.29	-0.18
2019Q04	0.02	0.01	0.37	-0.05	0.01	-0.22	0.22	0.11	0.04	-0.01	-0.17	-0.38	-0.07	0.03
2020Q01	0.00	-0.03	-0.24	-0.10	-0.05	-0.08	0.16	-0.06	-0.01	-0.08	-0.20	-0.50	-0.09	-0.05
2020Q02	-0.01	0.04	-0.20	-0.14	-0.09	-0.08	0.03	-0.16	-0.02	-0.01	0.04	-0.07	-0.09	0.03
In-migrants														
2020Q03	0.21	0.21	0.03	0.09	0.32	0.16	0.15	-0.54	0.28	0.55	0.41	-0.40	0.68	0.69
2020Q04	0.15	0.07	0.10	0.02	0.20	0.09	0.10	-0.32	0.28	0.39	0.33	-0.47	0.11	1.43
2021Q01	0.09	0.03	-1.16	-0.68	0.06	0.20	0.08	-1.12	0.16	0.24	0.36	-0.14	-5.60	-1.47
2021Q02	0.40	0.75	1.03	0.65	0.78	0.17	0.24	-0.90	0.56	0.87	0.98	-0.44	1.66	4.68
Out-migrants														
2020Q03	0.21	0.37	0.69	0.16	0.78	0.07	0.12	0.54	0.85	0.46	0.13	1.07	1.30	4.09
2020Q04	0.15	0.22	0.63	0.12	0.44	0.04	0.10	0.38	0.61	0.36	0.09	0.47	0.55	1.07
2021Q01	0.09	0.09	1.32	-0.17	0.17	-0.01	0.04	0.23	0.79	0.33	-0.03	-1.18	4.15	-0.79
2021Q02	0.40	0.42	1.51	0.18	0.98	0.10	0.24	0.97	1.26	1.11	0.24	2.29	2.83	7.24
Net interprovincial migration														
2020Q03	...	-0.16	-0.66	-0.07	-0.46	0.10	0.02	-1.08	-0.57	0.09	0.28	-1.47	-0.62	-3.40
2020Q04	...	-0.14	-0.53	-0.10	-0.24	0.05	0.00	-0.70	-0.33	0.03	0.24	-0.95	-0.44	0.36
2021Q01	...	-0.06	-2.47	-0.51	-0.12	0.21	0.04	-1.36	-0.63	-0.08	0.39	1.04	-9.75	-0.69
2021Q02	...	0.33	-0.48	0.47	-0.20	0.07	-0.01	-1.87	-0.70	-0.24	0.74	-2.74	-1.16	-2.56

... 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 (CNU¹). 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.¹ 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 CNU¹ 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 ¹	Error of closure		CNU standard error ²	t value ³
	A	B	C=A-B	D=C/B*100	E	F=C/E
	number			%	number	
2016						
Canada	36,139,555	36,029,245	110,310	0.31	43,844	2.52
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
2011						
Canada	34,417,759	34,273,205	144,554	0.42	57,546	2.51
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
2006						
Canada	32,553,799	32,521,670	32,129	0.10	53,926	0.60
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 ¹	Error of closure		CNU standard error ²	t value ³
	A	B	C=A-B	D=C/B*100	E	F=C/E
	number		%		number	
2001						
Canada	31,016,011	30,966,063	49,948	0.16	44,749	1.12
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 reserves.

2. Census net undercoverage excludes the incompletely enumerated 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	D	D	D
Q4 2018	PD	D	D	D	D	D
Q1 2019	PD	D	D	D	D	D
Q2 2019	PD	D	D	D	D	D
Q3 2019	PD	D	D	D	D	D
Q4 2019	PD	D	D	D	D	D
Q1 2020	PD	D	D	D	D	D
Q2 2020	PD	D	D	D	D	D
Q3 2020	PD	D	D	R	R	R
Q4 2020	PR	D	D	R	R	R
Q1 2021	PR	R	D	R	R	R
Q2 2021	PR	R	D	R	R	R
Q3 2021	PR	R	R	R	R	R
Q4 2021	PR	R	R	R	R	R
Q1 2022	PR	R	R	R	R	R
Q2 2022	PR	P	P	P	P	P
Q3 2022	PP
Modified since ¹	Q4 2019	Q1 2020	Q3 2020	Q3 2019	Q3 2019	Q3 2019

... 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	D	D	D	D
Q4 2018	D	D	D	D	D	D	D	D	D
Q1 2019	D	D	D	D	D	D	D	D	D
Q2 2019	D	D	D	D	D	D	D	D	D
Q3 2019	D	D	D	D	D	D	D	D	D
Q4 2019	D	D	D	D	D	D	D	D	D
Q1 2020	D	D	D	D	D	D	D	D	D
Q2 2020	D	D	D	D	D	D	D	D	D
Q3 2020	D	D	D	D	D	R	R	R	R
Q4 2020	D	D	D	D	D	R	R	R	R
Q1 2021	R	R	D	D	D	R	R	R	R
Q2 2021	R	R	D	D	D	R	R	R	R
Q3 2021	R	R	R	R	D	R	R	R	R
Q4 2021	R	R	R	R	D	R	R	R	R
Q1 2022	R	R	R	R	R	R	R	R	R
Q2 2022	P	P	P	P	P	P	P	P	P
Modified since ¹	Q1 2020	Q1 2020	Q3 2020	Q3 2020	Q1 2021	Q3 2019	Q3 2019	Q3 2019	Q3 2019

... 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. 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 reserves (IER).
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 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 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 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 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 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 2021 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, British Columbia and Yukon were provided by their respective agencies.

Note: Births for 2021 provided by the Centre for Population Health Data were incomplete for Nova Scotia for November and December 2021 and for Manitoba for all of 2021. For these two places, birth counts were replaced by estimates based on the fertility rates from 2020. The distribution of births by sex for Manitoba for 2021 were based on the sex ratio in Manitoba in 2020.

Deaths Mortality rates for 2019 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, British Columbia and Yukon were provided by their respective agencies.

Note: For the provinces and territories where the usual method was adjusted (data from Quebec, British Columbia and Yukon were not adjusted), the number of deaths was estimated from two sources: the provisional death counts from the Centre for Population Health Data (CPHD) when available, and the usual method with the addition of the number of COVID-19 deaths as published by the Public Health Agency of Canada (PHAC) when CPHD data were not available.

Immigration

Estimates are based on the immigrant files provided by Immigration, Refugees and Citizenship Canada (IRCC) according to information made available on August 16, 2022.

For methodological reasons, the total numbers of immigrants by province and territory released by the Demographic Estimates Program may differ from those released by IRCC. In the event of a discrepancy between the two sources, the official numbers of immigrants remain those released by IRCC.

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 2019/2020
- 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 2019/2020
- data provided by the U.S. Department of Homeland Security, Office of Immigration Statistics. The last year of data used was 2019/2020
- 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 2019/2020.

For estimates after 2019/2020, we:

- calculated the 2019/2020 emigration rate for Canada
- applied this rate to Canada's population on July 1st 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 2019/2020
- distributed these data by month according to the provincial or territorial emigration seasonality of 2019/2020.

Note: Adjustments were 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 July 2020 to December 2021.

For 2020, it was calculated using the number of emigrants from T1 Family File (T1FF). The monthly ratios between the number of emigrants from the 2018 T1FF and the 2019 final estimates of emigration were applied to the number of emigrants from 2019 T1FF from July 2020 to December 2020. This adjustment resulted in lower estimates of emigration for this period compared with the usual method.

For 2021, the adjustment was only made on the seasonality of emigration. This adjustment was based on the pre-preliminary 2021 T1 data. Adjusted data show slightly less emigrants compared with the usual method from January to September 2021 and more emigrants from October to December.

In 2022, the travel restrictions put in place have been relaxed or abolished over time and successive waves of COVID-19. These changes could indicate a return to emigration levels similar to those observed before the pandemic. To reflect this situation, the usual method was used since the first quarter of 2022.

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 2019/2020
- 2016 Census – 1 year mobility.

For estimates after 2019/2020, we:

- calculated the 2019/2020 returning emigration rate for Canada
- applied this rate to Canada's population on July 1st 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 2019/2020
- distributed these data by month according to the provincial or territorial returning emigration seasonality of 2019/2020.

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 July 2020 to December 2020. It was calculated using the number of children returning emigrants from the Canada Child Benefit (CCB). The monthly ratios between the number of children returning emigrants from the 2019 CCB and the 2019 final estimates of returning emigration were applied to the number of children returning emigrants from the CCB from July 2020 to December 2020. This adjustment resulted in lower estimates of returning emigration for this period compared with the usual method.

The travel restrictions put in place have been relaxed or abolished over time and successive waves of COVID-19. These changes could indicate a return to levels of returning emigration similar to those observed before the pandemic. To reflect this situation, the usual method was used since January 2021.

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 1st 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: Adjustments were 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 adjustments were applied from April 2020 to December 2021. Temporary departures and returns were adjusted independently. Monthly net temporary emigration was divided into departures and returns based on the 2016 Reverse Record Check (RRC) temporary departures and temporary returns estimated by the 2016 Census and the DEP. Then, monthly ratios between the number of permanent emigrants and temporary departures were calculated from 2017 to 2019. These ratios were applied to the estimated number of permanent emigrants from April 2020 to December 2021 (these numbers of permanent emigrants were adjusted as mentioned above). A similar strategy was used to model the number of temporary returns. The adjustments resulted in lower estimates of net temporary emigration compared with the usual method from April 2020 to August 2021 and an increase from September to December 2021.

The travel restrictions put in place have been relaxed or abolished over time and successive waves of COVID-19. These changes could indicate a return to temporary emigration levels similar to those observed before the pandemic. To reflect this situation, the usual method was used since January 2022.

Non-permanent residents

The estimates are produced by the Centre for Demography using the Global Case Management System (GCMS) from IRCC. These files, received on August 16, 2022, document the number of permit holders and asylum claimants.

Since March 17, 2022, persons with a Canada-Ukraine authorization for emergency travel who are on Canadian soil are included.

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:

- adjusted migration data for children from the Canada child benefit (CCB) program from Canada Revenue Agency (CRA)
- 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 2020/2021 tax file data
- factors (${}_kF$) 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 2018/2019, 2019/2020 and 2020/2021.

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 adjustments related to COVID-19 were made to the usual estimating method.

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 1 st , 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 1 st , 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 1 st
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	Mortality rates, by age group

Surveys

3231	Statistics Canada, Canadian Vital Statistics - Birth database (CVSB)
3233	Statistics Canada, Canadian Vital Statistics - Death database (CVSD)
3601	Quarterly Demographic Estimates (QDE)
3604	Annual Demographic Estimates: Canada, Provinces and Territories
3605	Estimates of population, by marital status or legal marital status, age and sex for July 1, Canada, provinces and territories
3606	Estimates of the number of census families for July 1 st , Canada, provinces and territories