HUMAN FERTILITY DATABASE DOCUMENTATION: CANADA

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Warning: HFD data users should be aware that there are some problems in the age distribution of births for Canada in the period 1928-1940. For more details, see section 9.2.

1 Introduction

The aim of this report is to document the fertility and population exposure data for Canada that were collected for the Human Fertility Database (HFD). Data that have been provided by Statistics Canada include the following:

1) Live births by age of mother for the period 1921-2023,
2) Live births by age of mother and birth order for the period 1928-2023,
3) Live births by month for the period 1920-2023, and
4) Female population aged 15 and over by age and number of children ever born alive (parity), Population Censuses of 1971, 1981 and 1991.

Although not all the compiled data are used for HFD calculations, they all can be found in the input files. Data used for producing the HFD output are specified in Appendix 1.

Some parts of this report are taken directly (as extracts) from one specific Internet document posted on the Statistics Canada website[1], which provides an overview of the current Canadian system of birth statistics in terms of data sources, organization of collection, error detection, quality evaluation and data accuracy.

[1] Statistics Canada. 2009. Vital Statistics - Birth Database, Detailed information for 2007 (http://www.statcan.gc.ca).

2 Birth statistics in Canada: history and organization

The Canadian Confederation, which is currently made up of ten provinces and three northern territories, came officially into effect on July 1, 1867. Originally, four provinces joined the new political entity: Ontario, Quebec, Nova Scotia and New Brunswick. The confederation evolved to its current situation until 1999, when the territory of Nunavut was created out of the Northwest Territories (see Table 1).

Table 1: Canadian provinces and territories and the date when they entered the Confederation

Date	Province, territory
July 1, 1867	Ontario (province) Québec (province) Nova Scotia (province) New Brunswick (province)
July 15, 1870	Manitoba (province) Northwest Territories (territory)
July 20, 1871	British Columbia (province)
July 1, 1873	Prince Edward Island (province)
June 13, 1898	Yukon Territory (territory) was created out of Northwest Territories and was renamed Yukon in April 2003.
September 1, 1905	Saskatchewan (province) Alberta (province)
March 31, 1949	Newfoundland (province) was renamed Newfoundland and Labrador in 2001.
April 1, 1999	Nunavut (territory) was created out of Northwest Territories.

The system of birth registration in Canada exists under the name of Canadian Vital Statistics - Birth Database (CVSB). It consists of an administrative survey that collects demographic information annually from all provincial and territorial vital statistics registries on all live births in Canada. Some data also used to be collected on live births to Canadian residents in some states of the United States of America. Starting in 2012, data on births in the United States are no longer collected (Statistics Canada, 2024).

The data are used to calculate basic indicators (such as counts and rates) on births of residents of Canada. Information from this database is also used in the calculation of statistics, such as age-specific fertility rates.

It was impossible to compile a satisfactory series of vital statistics prior to 1921. To join the vital statistics system, the provinces had to demonstrate that at least 90% of the vital events taking place in the province were being registered[2]. Eight provinces initially joined the cooperative Canadian vital statistics system on January 1, 1920, leading to the publication of the first annual detailed report for Canada in 1921, which is considered a remarkable accomplishment[3]. That report included the provinces of Prince Edward Island, Nova Scotia, New Brunswick, Ontario, Manitoba, Saskatchewan, Alberta and British Columbia. Quebec began to participate in 1926 after resolving difficulties connected with its own system of vital registration[4] and Newfoundland in 1949 after joining the Confederation. Their data were included in the tabulations from those years onward. Basic data from the Yukon and Northwest Territories were published as appendices to the national tables from 1924 to 1955; their data

[2] Marshall, J. T. (Ed.), 1949, Chapter VI. – Vital Statistics, The Canada Year Book 1948-49, Ottawa, King's Printer and Controller of Stationery, pages 185-186; Martha Fair, 1994, The Development of National Vital Statistics in Canada: Part 1 – from 1605 to 1945, Health Reports, Vol. 6, No. 3, Catalogue 82-003, p. 368.
[3] A summary report covering the eight provinces entering the system in 1920 was issued for that year. The federal architects of the 1921 report were R. H. Coats, the first Dominion Statistician, and E. S. Macphail, Chief of the Demography Division (Fair, 1994, page 368).
[4] Fair, 1994, page 368.

were first included in the regular tabulations in 1956. Created out of the Northwest Territories, Nunavut came into being officially as a Territory of Canada on April 1, 1999. The name Northwest Territories thus applies to a Territory with different geographic boundaries before and after April 1, 1999.

Prior to 1944 all vital events were classified by place of occurrence. Since 1944, births, stillbirths, and deaths have been classified by area of reported residence, with births and stillbirths according to the residence of the mother.

The conceptual universe of the Birth database comprises births to Canadian resident women anywhere in the world. The target population of the Birth database is births to Canadian resident women in Canada and, before 2012, to Canadian resident women in the USA. The actual (survey) population of the Birth database is births to Canadian resident women and non-resident women in Canada, and (before 2012) births to Canadian resident women in some states of the USA. Births to non-resident women in Canada are registered but are excluded from most tabulations.

Provincial and territorial Vital Statistics Acts (or equivalent legislation) render compulsory the registration of all live births, stillbirths, deaths and marriages within their jurisdictions. These Acts follow, as closely as possible, a Model Vital Statistics Act that was developed and approved by the Cabinet in 1919[5] to promote uniformity of legislation and reporting practices among the provinces and territories.

The Canadian Vital Statistics system operates under an agreement between the Government of Canada and governments of the provinces and territories. The Vital Statistics Council for Canada, an advisory committee set up by an Order-in-Council, oversees policy and operational matters. All provincial and territorial jurisdictions and Statistics Canada are represented on the Vital Statistics Council. Under the agreement, all registrars collect a specified set of data elements, although any of them may decide to collect additional information.

The following statistical data items are reported for each birth by all provinces and territories for inclusion in the Canadian Vital Statistics system:

- Date and place of birth
- Child's sex, birth weight and gestational age
- Parents' age, marital status and birthplace
- Mother's place of residence
- Type of birth (single or multiple)
- Parity

The main form for the registration of a live birth is completed by the parents, who are responsible for filing it with the local registrar. Most provinces also require physicians (or other birth attendants) to report all births.

The central Vital Statistics Registry in each province and territory provides raw data from birth registrations to Statistics Canada. Call for data is sent by Statistics Canada in the spring of each year for data from the previous calendar year. All provinces and territories supply microfilm, paper copies or optical images of registration forms to Statistics Canada at different times of the year. In addition, all provinces supply machine-readable abstracts of registrations, which contain the required standard information. For the territories, the required standard information on paper is converted to machine-readable format at Statistics Canada. Subsequent changes to registrations due to errors, amendments or omissions are transmitted

[5] The approval of the Model Vital Statistics Act followed the Statistics Act of 1918 creating the Dominion Bureau of Statistics and two dominion-provincial conferences on the establishment of a national system of vital statistics held in 1918 (Marshall, J. T. (Ed.), 1949, page 186; Fair, 1994, pages 366-367).

to Statistics Canada as the information becomes available. However, changes received after a cut-off date (two years after the year of the event) are not reflected in published tabulations.

The major processes involved in birth data processing are[6] :

- Preparation of the data for editing
- Editing
- Duplication checks
- Creation of preliminary file – Verification tables
- Review by provinces and territories (3 weeks or more)
- Updates and creation of final master file (2 weeks or more)

Provinces and territories that supply machine-readable data conduct edits (edit validation and data consistency) before transmitting their data, based on standard edit specifications prepared by Statistics Canada. Health Statistics Division has actively promoted the use of a standard data dictionary and standard correlation edits for provincial/territorial data entry. More extensive edit routines are applied to the data by Statistics Canada to ascertain the completeness and quality of the data. For 2007, about 7% of the records were assessed for follow-up action either by referring to the microfilmed registrations or optical images or by consulting with the registries. After the preparation of a preliminary data file, verification tables are prepared for data review by the registries and Statistics Canada (for example, distributions, large changes, percentage and number of unknowns, outliers and changes in the relative composition).

Upon completion of the annual national birth data base, Statistics Canada carries out a series of quality checks that include: 1) producing a set of verification tables which consist of basic tabulations for the majority of variables in the data base by province or territory of occurrence; 2) sending the verification tables to each provincial/territorial registrar of vital statistics for their review and approval that Statistics Canada and the registry obtain the same results; 3) checking for internal consistencies, for example, running frequencies and looking for outliers on certain data elements; and 4) comparing the most recent data year with past data years to detect any unusual or unexpected changes. Comparisons of tabulated data are made with vital statistics data published by the provinces and territories, where available.

3 Data coverage and quality

Since the registration of births is a legal requirement in each Canadian province and territory, reporting is virtually complete. Under-coverage is thought to be minimal, but is being monitored. Under-coverage may occur because of late registration, which, if not completed soon after birth, is needed for school registration. Statistics Canada does receive late registrations. Incomplete registration is also a source of under-coverage. For example, some provinces require that a notarized statement be completed when a mother declines to name the father on the application for birth registration. Until the statement is notarized, the application is not registered.

Out-of-country births are incompletely reported. Before 2012, only births to Canadian resident women occurring in the United States were reported. However, in spite of a reciprocal agreement with the U.S., some states may not have reported births to Canadian resident women occurring in their state.

Non-registration and over-coverage are minimal. For over-coverage, as mentioned before, births to non-resident women in Canada are registered but are excluded from most tabulations. Duplicate birth registrations are identified as part of the regular processing operations on each

[6] Health Statistics Division, 2009, Vital Statistics Data Processing Cycle (Power-Point Presentation), Presentation for the Advisory Committee on Demographic Statistics and Studies, November 12.

provincial and territorial subset, as well as additional inter-provincial checks, and comparisons between the birth and stillbirth databases for multiple births. Possible duplicate registrations are checked against microfilmed registrations or optical images, or by consulting with the provinces and territories.

Overall, the level of coverage and quality of the statistical data are high. For 1997 to 2007, the response rates varied from 98% to 100% for most variables on the Birth database. The father's age and father's birthplace response rates were 95% and 94% respectively. The response rate for marital status was 89%.

4 Disclosure control

Statistics Canada is prohibited by law from releasing any data that would divulge information obtained under the Statistics Act that relates to any identifiable person, business or organization without the prior knowledge or the consent in writing of that person, business or organization. Various confidentiality rules are applied to all data that are released or published to prevent the publication or disclosure of any information deemed confidential. If necessary, data are suppressed to prevent direct or residual disclosure of identifiable data.

“In order to prevent any data disclosure, confidentiality analysis is done using the Statistics Canada Generalized Disclosure Control System (G-Confid). G-Confid is used for primary suppression (direct disclosure) as well as for secondary suppression (residual disclosure). Direct disclosure occurs when the value in a tabulation cell is composed of or dominated by few enterprises while residual disclosure occurs when confidential information can be derived indirectly by piecing together information from different sources or data series” (Statistics Canada, 2025).

5 Availability of fertility data for Canada

Table 2 summarizes the availability of data on births by age of the mother and on births by month of birth for Canada. The data user should be aware that historical data on fertility, prior to 1991, that are not yet in Statistics Canada's Database CANSIM (Canadian Socio-Economic Information Management System) are still subject to revision before they are officially released on CANSIM. Therefore, for certain cases, the numbers shown in tables of births by age of the mother (and birth order, where available) and in tables of births by month may not match.

Discrepancies between the total numbers of monthly and age-specific births were found for the years 1927 and 1982-1985 (see Table 3 below). The difference in data for 1927 is most likely due to a mistake in the age-specific data (see a relevant discussion in section 6). As for the period 1982-1985, the differences could not be explained but they are very small, ranging from 1 to 10 births.

Small differences between the total numbers of monthly and age-specific births happen also in data for the recent years. They can be explained by the different time of data processing: data on age- and birth order-specific births were received directly from Statistics Canada, whereas monthly births were retrieved from the official online database of Statistics Canada. Furthermore, following confidentiality requirements of the Canadian Statistics Act, Statistics Canada applies random rounding of small actual numbers to an adjacent multiple of 5 in data on age-specific births. This can also add to the differences between the annual totals in monthly and age-specific birth data.

Table 2: Area codes used in the HFD input data files for Canada

Country code	Area code	Territorial definition/ included provinces	Births by age of mother*	Births by month
CAN	1	Prince Edward Island, Nova Scotia, New Brunswick, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia	1921-1925	1920-1925
CAN	2	Prince Edward Island, Nova Scotia, New Brunswick, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia, Quebec	1926-1955	1926-1955
CAN	3	Prince Edward Island, Nova Scotia, New Brunswick, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia, Quebec, Yukon, Northwest Territories	1956-1990	1956-1990
CAN	4	Prince Edward Island, Nova Scotia, New Brunswick, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia, Quebec, Yukon, Northwest Territories (incl. Nunavut), Newfoundland and Labrador	1991-2016	1991-2016
CAN	5	Prince Edward Island, Nova Scotia, New Brunswick, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia, Quebec, Northwest Territories (incl. Nunavut), Newfoundland and Labrador	2017-2022	2017-2022
CAN	4	Prince Edward Island, Nova Scotia, New Brunswick, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia, Quebec, Yukon, Northwest Territories (incl. Nunavut), Newfoundland and Labrador	2023	2023
CAN	10	Newfoundland and Labrador		1949-1990
CAN	11	Prince Edward Island		1920-1990
CAN	12	Nova Scotia		1920-1990
CAN	13	New Brunswick		1920-1990
CAN	24	Quebec		1926-1990
CAN	35	Ontario		1920-1990
CAN	46	Manitoba		1920-1990
CAN	47	Saskatchewan		1920-1990
CAN	48	Alberta		1920-1990
CAN	59	British Columbia		1920-1990
CAN	60	Yukon		1924-1990
CAN	61	Northwest Territories		1924-1990
CAN	62	Nunavut		2000-1990
CAN	63	unknown province		1991-1990

* Birth order-specific data on live births are available for Canada starting in 1928 (see Table 4).

Table 3: Differences found between the total numbers of age specific and monthly births

Year	Area code*	Age-specific birth data	Monthly birth data	Differences
1927	2	234227	234188	-39
1982	3	363899	363909	10
1983	3	364750	364760	10
1984	3	368468	368471	3
1985	3	367226	367227	1

* Area coding is described in Table 2.

Prior to 1944 births were classified by place of occurrence. Since 1944, births have been classified by area of reported residence of the mother.

Birth data for Yukon are not available for the years 2017-2022. However, the number of births occurring in Yukon constitutes only about 0.11 percent of the total national births (e.g., 440 out of 384,023 in 2016 and 395 out of 351,878 in 2023) and therefore it has only a negligible impact on the national level fertility estimates (Statistics Canada, 2025a).

6 Live births by age of the mother and birth order

Data on births by age of the mother are available starting from 1921 and data on births by age of the mother and birth order starting from 1928 (see Table 4). For the period 1928-1978, birth order-specific data on live births are available by five-year age groups of the mother, while live births for all birth orders combined are available by single years of the mother's age.

However, some differences either between the total numbers of non-order and order-specific births or between the number of order-specific births in an aggregated age group and the sum of appropriate non-order specific births pertaining to the same year were found in the tabulations supplied by Statistics Canada for the period 1928-1943, the year 1946 and for the period 1952-1959. Statistics Canada could not explain the causes of these differences and suggested to use the series where the sums of births correspond to the totals provided in the following publication: *Statistics Canada. 1993. Selected Birth and Fertility Statistics, Canada, 1921-1990, Catalogue no. 82-553, Ottawa: Minister of Industry, Science and Technology*. Namely for this reason, the series of order-specific births used for the HFD calculations start in 1944 only, while for the year 1946 and the period 1952-1959 only data by aggregated age groups of the mother (i.e. including for all birth orders combined) and not by single years of age are employed (see Appendix 1).

A discrepancy was also found in data for 1927: the sum of births by age groups of the mother (234447 births) does not correspond to the total number of births provided in the same data source (234188 births). The difference is 39 births. The total number seems to be correct because the same figure appears in other official statistical publications, and it also matches the sum of birth counts by month for this year. The mistake in the age-specific birth data could not be identified, however.

Live births by *single years* of age and birth order are available only since 1979 for Canada and can be obtained only through special tabulation requests. Due to disclosure control and the nature of agreements with provinces and territories, Statistics Canada is not allowed to release data for provinces and territories without their formal consent. Also for disclosure control considerations, higher birth orders were grouped together into a 5+ category for most of the years from 1979 onwards.

In the year 1921, there is a very high proportion of births (11.6%) for which age of the mother is unknown. The source publication (Statistics Canada 1993) does not provide any explanation for that. Comparison of birth numbers for different provinces and territories of Canada suggests that it is mostly likely Alberta, for which data on births by age of the mother are not available for this year.

Births by age of the mother (i.e., all birth orders combined) for the years 1991 onwards were calculated by summing births for respective age categories over all available birth orders. These estimates, rather than the given age-specific totals, were used for producing the HFD output data. The reason for that are frequent discrepancies between the given totals and the calculated sums. These discrepancies are due to random rounding applied by Statistics Canada to small numbers in order to prevent inappropriate disclosure of private information. Statistics Canada rounds small actual numbers to a lower or higher multiple of 5. By design, differences between the rounded and actual counts should never exceed 4. Due to this practice, columns and rows do not always sum to totals.

During the production of each year's birth/death/stillbirth statistics, data from previous years may be revised by Statistics Canada to reflect the updates or changes that have been received from the provincial and territorial vital statistics registrars. Previously in the HFD published births data for 1991-2019 were revised by Statistics Canada on September 28, 2022 (Statistics Canada 2022). Old data for these years were removed and are no longer available in the HFD, as of May 2025.

Table 4: Availability of live births by age of the mother and birth order, Canada[1]

Period	Age of mother	Birth order	Data sources[2]
1921-1927	≤14, 15-19…45-49, 50+, UNK	-	9
1928-1970	≤14, 15…49, 50+, UNK	-	1
1971-1978	≤14, 15…49, 50+, UNK	-	2
1979-1990	≤14, 15…49, 50+, UNK	-	3
1991-2023[3]	≤14, 15…49, 50+	-	26
1928-1970	≤14, 15-19…40-44, 45+, UNK	1, 2, 3, 4, 5+, UNK	1
1971-1978	≤14, 15-19…40-44, 45+, UNK	1, 2, 3, 4, 5+, UNK	2
1979-1990	≤14, 15-19…40-44, 45+, UNK	1, 2, 3, 4, 5+, UNK	3
1991-2023[3]	≤14, 15…49, 50+	1, 2, 3, 4, 5+, UNK	26

Notes: UNK stands for “unknown”

[1] Excluded provinces and territories: Newfoundland and Labrador for the years 1921-1990, Yukon and Northwest Territories for the years 1921-1955, Quebec for 1921-1925, and Yukon for 2017-2022.

[2] For the list of data sources, see the references file (CANref.pdf) in the Input data section on the HFD webpage for Canada.

[3] Previously in the HFD published data on births for 1991-2019 were revised by Statistics Canada on September 28, 2022. Old data for these years were removed from the HFD.

7 Births by month

Data on live births by month have been collected for Canada as a whole for 1920-2023 and for its provinces and territories for the period 1920-1990. Information about the availability of monthly birth data by provinces and territories of Canada are provided in Table 5.

In case of Canada as a whole, for the period 1924-1990 monthly birth data by provinces and territories were combined to cover the territory of Canada covered by the age-specific (as well as the age- and order-specific where available) data on births for the same years. As a result, monthly data for the following areas were not included: Newfoundland and Labrador for the years 1920 to 1990, Quebec for the years 1920 to 1925 and Yukon and Northwest Territories for the years 1920 to 1955. (The territorial coverage of the age- and order-specific data is documented in Table 2 above).

Table 5: Monthly data on births by provinces and territories of Canada available in the HFD

Area code	Province data available	1920-1923	1924-1925	1926-1948	1949-1990
10	Newfoundland and Labrador (NFL)				x
11	Prince Edward Island (PEI)	x	x	x	x
12	Nova Scotia (NS)	x	x	x	x
13	New Brunswick (NB)	x	x	x	x
24	Quebec (QC)			x	x
35	Ontario (ON)	x	x	x	x
46	Manitoba (MB)	x	x	x	x
47	Saskatchewan (SK)	x	x	x	x
48	Alberta (AL)	x	x	x	x
59	British Columbia (BC)	x	x	x	x
60	Yukon Territory (YK)		x	x	x
61	Northwest Territories (NWT)		x	x	x
62	Nunavut (NV)				

Note: “X” indicates that monthly data on births are available for the respective province.

8 Census parity data

No census parity data are available after the 1991 Census of Canada. Census parity data were collected from 1941 to 1991 censuses. However, only the 1991 census data are used for the HFD purpose because only at this census all women, irrespective of their marital status, were asked about the number of children ever born. Prior to 1991 census, the question on parity was restricted to ever-married women. Parity data in the census 1991 were obtained for all women aged 15 years and over from a 20% sample of non-institutional households (long-form questionnaire). Therefore, they are subject to sampling variability. Moreover, the sample data are weighted so that to represent the entire female population in the relevant categories (age and parity)[7].

The census parity data were suppressed due to the confidentiality requirements of the Canadian Statistics Act. They used a procedure known as "random rounding". “This is done to prevent the possibility of associating statistical data with any identifiable individual. Under this method, all figures including totals are randomly rounded either up or down to a multiple of "5", and in some cases "10". While providing strong protection against disclosure, this technique does not add significant error to the census data. However, there are some consequences for the users. Since totals are independently rounded, they do not necessarily equal the sum of individually rounded figures in distributions. Also, minor differences can be expected in corresponding totals and cell values in various census tabulations. Similarly, percentages, which are calculated on rounded figures, do not necessarily add up to 100.” (Statistics Canada 2008: 5).

The 1971 and 1981 Censuses provide information on parity of women aged 15 years and over from 33 1/3% and 20% samples respectively.

Table 6: Availability of census data on women by age and parity, Canada

Census date	Age range	Parity*	Marital status	Data source**
1.6.1971	15-19, 15,16…49, 50+	0-14+, CHL	ever married	5
3.6.1981	15-19, 15,16…49, 50+	0-14+, CHL	ever married	5
4.6.1991	15-19, 15,16…49, 50+	0-14+, CHL	all marital statuses	5

* CHL: Total number of children ever born alive.
** The list of data sources can be found at the end of the document.

[7] On sampling variability, rounding and weighting in 1991 Census, see Appendix 2.

9 Specific details

9.1 Definitions[8]

The current definitions used for the production of statistical tables of Canadian vital statistics data are based on those recommended by the World Health Organization[9] and the United Nations.

Age of the mother. Age the mother attained at her last birthday preceding delivery.

Birth. The complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy.

Live birth. The complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached.

Birth order. The biological live-birth order of children to the mother; that is, the number of live births a woman has had to date (excludes foetal deaths or stillbirths). A woman with zero parity has had no live births; a woman of parity 1 has had one live birth; of parity 2, two live births, and so on. In the case of a first delivery resulting in live twins, the woman has a parity of 1 after the first twin is born and a parity of 2 after the second twin is born.

Parity (1991 Census). Refers to the number of children ever born alive to women aged 15 years and over. Age on June 4, 1991, Census day.

9.2 Data Quality Issues

Age-specific fertility, 1928-1940

HFD users should be aware that data on live births by age of the mother for the period 1928-1940 show some irregular pattern, which is further echoed in the age-specific fertility rates as well as in the cohort fertility data (Figures 1 and 2). This problem is not visible in the birth count data for the earlier years (1921-1927) because the original birth counts were provided by five-year age groups and have been split into single year age groups using the HFD methodology.

The observed irregularities suggest that quality of the birth count data for the period 1928-1940 is not good. Data spikes seen at age 30 in most of the years (and in the respective birth cohorts of women) hint at age heaping, but it does not explain spikes evident at other ages. However, we are not able to provide a sufficient explanation for these data irregularities at present.

[8] Statistics Canada, 2009, Births 2007, Catalogue no. 84F0210X, Ottawa, Minister of Industry, 53 pages.
[9] World Health Organization (WHO). International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Volumes 1 and 2 (ICD–10). Geneva, 1992; and United Nations. Principles and Recommendations for a Vital Statistics System. Statistical Papers, Series M, No. 19, Rev. 1. New York, 1974.

Figure 1: Period live birth counts by age of the mother and age-specific fertility rates, selected years

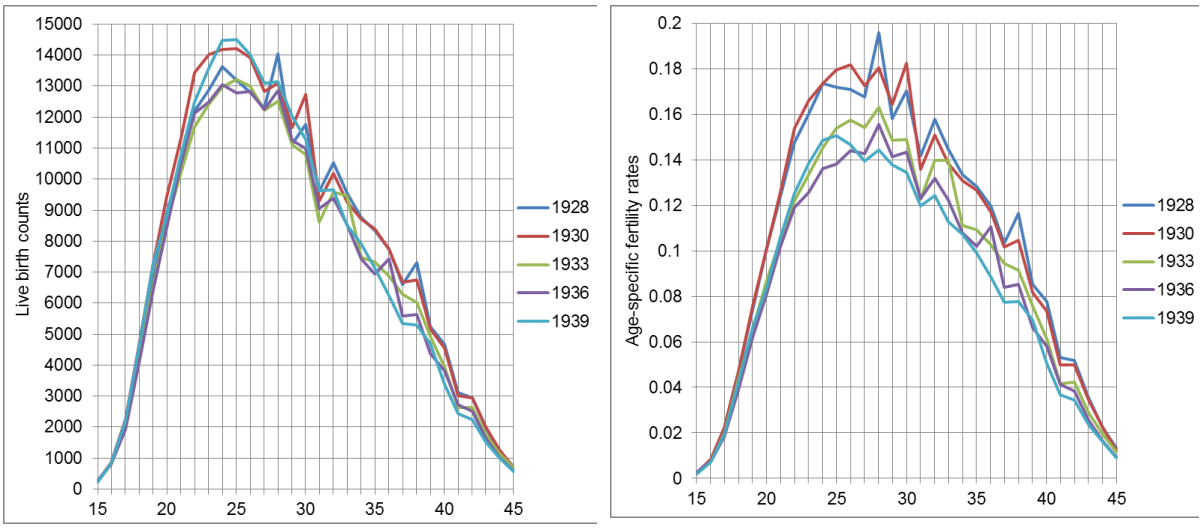
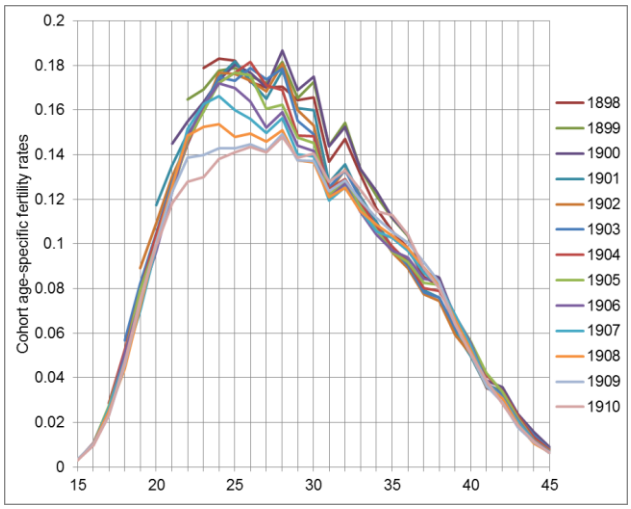


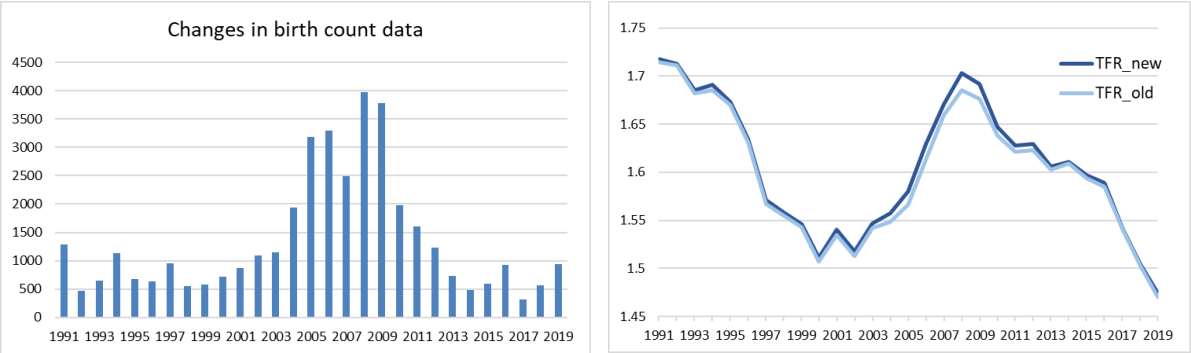
Figure 2: Cohort age-specific fertility rates, selected birth cohorts of women



Birth data revisions, 1991-2019

Birth statistics released by Statistics Canada on September 28, 2022 comprised revisions covering the years 1991-2020 (Statistics Canada 2022). For this reason, HFD birth data for the years 1991-2019 (HFD data release of October 2021) were replaced with the revised figures. Figure 3 below shows differences between the old and the revised data on births for these years as well as changes in the calculated total fertility rates.

Figure 3: Changes in birth count data after the 2022 revision by Statistics Canada (left panel) and comparison of the old and new TFR estimates (right panel)



9.3 Revision History

Changes with the March 2016 revision:

Due to the revision of HMD population estimates (see Andreev and Bourbeau 2024 for details), the current update includes some small changes in the birth estimates for 1995-2009, as compared to the data release of October 1, 2013.

Changes with the June 2019 revision:

Data for 2012-2016 were added.

Changes with the January 2021 revision:

Data for 2017-2018 were added. There are some changes both in the birth estimates and fertility indicators for the years 2012-2016 as compared to the data release as of June 26, 2019. The differences are caused by revised HMD population estimates (see Andreev and Bourbeau 2024 for details).

Following data confidentiality requirements, some cells in the latest delivery of population count data by Statistics Canada to the HMD were suppressed. For this reason, the revised HMD population estimates are not available for some age categories, mostly for very young and very old ages. As regards the HFD, the revised population estimates are not available only for the age category 12 in the year 2016 (the 2003 and 2004 birth cohorts). The population estimates from the previous HFD update (June 26, 2016) were therefore used for this specific age category.

Changes with the October 2021 revision:

Data for 2019 were added. Due to revised HMD population estimates, there are some insignificant shifts in 2000-2018 birth estimates by Lexis triangles. The HMD revisions include the following data modifications: population estimates were updated with final 2001-2015 intercensal estimates and with preliminary 2016-2019 post-censal estimates.

Changes with the May 2025 revision:

New data were added for 2020-2023. Birth count data for 1991-2019 were revised by Statistics Canada, which resulted in some changes both in the period fertility estimates and indicators for these years and in the cohort fertility estimates and indicators that were affected by data for this period of time.

Acknowledgements

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APPENDIX 1
INPUT DATA USED FOR HFD CALCULATIONS

BIRTHS

Period	Type of data	Age scale	Birth order	RefCode(s)
1921-1927	Annual number of live births by age groups of mother (Lexis squares)	≤14, 15-19…45-49, 50+, unknown	–	9
1928-1945	Annual number of live births by age of mother (Lexis squares)	≤14, 15…49, 50+, unknown	–	1
1946	Annual number of live births by age groups of mother (Lexis squares)	≤14, 15-19…40-44, 45+, unknown	–	1
1947-1951	Annual number of live births by age of mother (Lexis squares)	≤14, 15…49, 50+, unknown	–	1
1952-1959	Annual number of live births by age groups of mother (Lexis squares)	≤14, 15-19…40-44, 45+, unknown	–	1
1960-1970	Annual number of live births by age of mother (Lexis squares)	≤14, 15…49, 50+, unknown	–	1
1944-1970	Annual number of live births by age groups of mother and birth order (Lexis squares)	≤14, 15-19…40-44, 45+, unknown	1, 2, 3, 4, 5+, unknown	1
1971-1978	Annual number of live births by age of mother (Lexis squares)	≤14, 15…49, 50+, unknown	–	2
1971-1978	Annual number of live births by age groups of mother and birth order (Lexis squares)	≤14, 15-19…40-44, 45+, unknown	1, 2, 3, 4, 5+, unknown	2
1979-1997	Annual number of live births by age of mother and birth order (Lexis squares)	≤14, 15…49, 50+, unknown	–	3
1979-1990	Annual number of live births by age of mother and birth order (Lexis squares)	≤14,15-19, 20, 21…43, 44, 45-49, 50+, unknown	1, 2, 3, 4, 5+, unknown	3
1991-2023	Annual number of live births by age of mother and birth order (Lexis squares)	≤14, 15…49, 50+	1, 2… 4, 5+, unknown	26
1920-2023	Annual number of live births by month	–	–	1, 2, 4, 6, 7, 8, 10, 11, 12, 18, 19, 20, 22, 23, 25

special processing method applied in production of the Lexis Database for some of the years.
2017-2022 data do not include births occurred in Yukon.

FEMALE POPULATION: Distribution by age and parity

Period	Type of data	Age scale	Year of birth, range	Parity	RefCode(s)
04.06.1991	Women by age and parity	15-19, 15,16…49, 50+	–	1,2…..13, 14+, CHL*	5

*CHL stands for the total number of children ever born to women of a certain age.

FEMALE POPULATION: Exposure by age and year of birth

For the period starting in 1991 onwards, female exposure population by calendar year, age and year of birth (Lexis triangles) is estimated using data on population size and deaths from the Human Mortality Database, which is available at http://www.mortality.org or http://www.humanmortality.de.

For the period before 1991, however, the territorial coverage of HMD and HFD data differ. Table 2 and Table A1 describe the territorial coverage of HFD and HMD data respectively, and Table A2 compares the territorial coverage of the both databases. Due to the reported differences, HFD female exposure population for the period 1921-1990 was calculated using population and death counts by provinces and territories of Canada provided by the Canadian HMD (http://www.bdlc.umontreal.ca/chmd/index.htm), i.e. combining them to form the territory covered by HFD fertility data. Territorial adjustment factors were used to account for territorial changes in the following years: 1926 (Quebec was added), 1956 (Yukon and Northwest Territories were added), and 1991 (Newfoundland and Labrador were added).

Table A1: Territorial coverage of population count data in the HMD

1921-1948	1949+
Prince Edward Island, Nova Scotia, New Brunswick, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia, Quebec, Yukon, Northwest Territories*	Prince Edward Island, Nova Scotia, New Brunswick, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia, Quebec, Yukon[2], Northwest Territories[1]
	Newfoundland and Labrador

[1]Death and birth count data are available from 1950, but in national population estimates these territories are included since 1921 (for details, see Andreev and Bourbeau, 2024).
[2]Since vital statistics is not available for Yukon for 2017-2022, the population estimates for Yukon were excluded also from the HMD input data (Andreev and Bourbeau, 2024:10).

Table A2: Comparison of the territorial coverage of data used in the HFD and the HMD

Period	Difference
1921-1925	HFD excludes Quebec
1926-1948	Identical
1949-1955	HFD excludes Newfoundland and Labrador, Yukon and Northwest Territories
1956-1990	HFD excludes Newfoundland and Labrador
1991 onwards	Identical

APPENDIX 2
CENSUS OF POPULATION, 1991[10]

Data Quality

General

The 1991 Census was a large and complex undertaking and, while considerable effort was taken to ensure high standards throughout all collection and processing operations, the resulting estimates are inevitably subject to a certain degree of error. Users of census data should be aware such error exists, and have some appreciation of its main components, so that they can assess the usefulness of census data for their purposes and the risks involved in basing conclusions or decisions on these data.

Errors can arise at virtually every stage of the census process from the preparation of materials, through the listing of dwellings and data collection to processing. Some errors occur more or less at random, and when the individual responses are aggregated for a sufficiently large group, such errors tend to cancel out. For errors of this nature, the larger the group, the more accurate the corresponding estimate. It is for this reason that users are advised to be cautious when using small estimates. There are some errors, however, which might occur more systematically, and which result in "biased" estimates. Because the bias from such errors is persistent no matter how large the group for which responses are aggregated, and because bias is particularly difficult to measure, systematic errors are a more serious problem for most data users than the random errors referred to previously.

For census data in general, the principal types of error are as follows:

coverage errors, which occur when dwellings and/or individuals are missed, incorrectly included or double counted;

non-response errors, which result when responses cannot be obtained from a small number of households and/or individuals, because of extended absence or some other reason; ,

response errors, which occur when the respondent, or sometimes the Census Representative, misunderstands a census question, and records an incorrect response;

processing errors, which can occur at various steps including: coding, when "write-in" responses are transformed into numerical codes; data capture, when responses are transferred from the census questionnaire to computer tapes by key-entry operators; and imputation when a "valid", but not necessarily correct, response is inserted into a record by the computer to replace missing or "invalid" data ("valid" and "invalid" referring to whether or not the response is consistent with other information on the record);

sampling errors, which apply only to the supplementary questions on the "long form" asked of a one-fifth sample of households, and which arise from the fact that the results for these questions, when weighted up to represent the whole population, inevitably differ somewhat from the results which would have been obtained if these questions had been asked of all households.

[10] Reproduced from: Statistics Canada, [not dated], Research Data Centres (RDC), 1991 Census code book, pages 2-6.

The above types of error each have both random and systematic components. Usually, however, the systematic component of sampling error is very small in relation to its random component. For the other non-sampling errors, both random and systematic components may be significant.

Coverage Errors

Coverage errors affect the accuracy of the census counts, that is the sizes of the various census universes: population, families, households and dwellings. While steps have been taken to correct certain identifiable errors, the final counts are still subject to some degree of error resulting from persons or dwellings being missed, incorrectly included in the census or double counted.

[…]

Sampling Errors

Estimates obtained by weighting up responses collected on a sample basis are subject to error due to the fact that the distribution of characteristics within the sample will not usually be identical to the distribution of characteristics within the population from which the sample has been selected.

The potential error introduced by sampling will vary according to the relative scarcity of the characteristics in the population. For large cell values, the potential error due to sampling, as a proportion of the cell value, will be relatively small. For small cell values, this potential error, as a proportion of the cell value, will be relatively large.

The potential error due to sampling is usually expressed in terms of the so-called "standard error". This is the square root of the average, taken over all possible samples of the same size and design, of the squared deviation of the sample estimate from the value for the total population.

The table below provides approximate measures of the standard error due to sampling. These measures are intended as a general guide only.

Appendix table1: Approximate Standard Error Due to Sampling for 1991 Census Sample Data

Cell Value	Approximate Standard Error
50 or less	15
100	20
200	30
500	45
1 000	65
2 000	90
5 000	140
10 000	200
20 000	280
50 000	450
100 000	630
500 000	1 400

Users wishing to determine the approximate error due to sampling for any given cell of data, based upon the 20% sample, should choose the standard error value corresponding to the cell value that is closest to the value of the given cell in the census tabulation. When using the obtained standard error value, in general the user can be reasonably certain that, for the enumerated population, the true value (discounting all forms of error other than sampling) lies

within plus or minus three times the standard error (e.g., for a cell value of 1,000, the range would be 1,000 ± 3 x 65 or 1,000 ± 195).

The standard errors given in the table above will not apply to population or universe (persons, households, dwellings or families) totals or subtotals for the geographic area under consideration (see Sampling and Weighting). The effect of sampling for these cells can be determined by comparison with a corresponding 100% publication.

The effect of the particular sample design and weighting procedure used in the 1991 Census will vary, however, from one characteristic to another and from one geographic area to another. The standard error values in the table may, therefore, understate or overstate the error due to sampling.

[…]

Confidentiality and Random Rounding

The figures shown in the tables have been subjected to a confidentiality procedure known as "random rounding". This is done to prevent the possibility of associating statistical data with any identifiable individual. Under this method, all figures including totals are randomly rounded either up or down to a multiple of "5", and in some cases "10". While providing strong protection against disclosure, this technique does not add significant error to the census data. However, there are some consequences for the users. Since totals are independently rounded, they do not necessarily equal the sum of individually rounded figures in distributions. Also, minor differences can be expected in corresponding totals and cell values in various census tabulations. Similarly, percentages, which are calculated on rounded figures, do not necessarily add up to 100. Percentage distributions and rates for the most part are based on rounded data, while percentage changes and averages are based on unrounded data. It should also be noted that small cell counts may suffer a significant distortion as a result of random rounding. Individual data cells containing small numbers may lose their precision as a result.

Users should be aware of possible data distortions when they are aggregating these rounded data. Imprecisions as a result of rounding tend to cancel each other out when data cells are reaggregated. However, users can minimize these distortions by using, whenever possible, the appropriate subtotals when aggregating. For those requiring maximum precision, the option exists to use custom tabulations. With custom products, aggregation is done using individual census database records. Random rounding occurs only after the data cells have been aggregated, thus minimizing any distortion.

In addition to random rounding, area suppression has been adopted to further protect the confidentiality of individual responses.

Area suppression results in the deletion of all characteristic data for geographic areas with populations below a specified size. The extent to which data are suppressed depends upon the following factors:

- if the data are tabulated from the 100% database, suppression is based upon the total population;

- if the data are tabulated from the 20% sample database, suppression is based upon the non-institutional population;

- if the population is less than 40 persons, then all data are suppressed.

In all cases, suppressed data are included in the appropriate higher aggregate subtotals and totals. […]

Sampling and Weighting

The 1991 Census data were collected either on a 100% basis (i.e. for all households) or on a sample basis (i.e. from only a random sample of households) with data weighted to provide estimates of the entire population. The information [on parity] was collected on a 20% sample basis and weighted up to compensate for sampling. Note that, on most Indian reserves and remote areas, all data were collected on a 100% basis.

[…]

APPENDIX 3
SPECIAL PROCESSING METHOD APPLIED IN PRODUCTION OF LEXIS DATABASE

Problems were detected after splitting births into 1-year age groups using the standard HFD methodology for the years 1944, 1947, 1950 and 1951 relating to the distribution of births between birth orders 1 and 2. In these years, the number of observed 2nd-order births at age 14- is 0, and the replacement of values in the Logit-transformed cumulative fertility function was resulting in a distorted spline curve.

In order to overcome this, for Canada then a single birth is allocated to any lower open age category where no births were observed before the splitting of 5-year and open-interval age groups is performed, minimizing the distortion to the spline. This 'phantom birth' is then removed after splitting by setting the births in the relevant single ages (i.e. 12-, 13 and 14) back to 0, corresponding to the original data.

Although this adjustment will have a minor impact on the allocation of births in higher age categories (e.g. the number of births at age 15 is estimated slightly higher applying the phantom birth method), the overall improvement in the allocation compared with the standard method is sufficient to justify application of this special processing method.