Technical Report

Census Technical Report: Coverage

Census of Population, 2011

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.   not available for any reference period
..   not available for a specific reference period
...   not applicable
0   true zero or a value rounded to zero
0^s value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
p   preliminary
r   revised
x   suppressed to meet the confidentiality requirements of the *Statistics Act*
E   use with caution
F   too unreliable to be published
*   significantly different from reference category (p < 0.05)

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Introduction

The 2011 Census required the participation of the entire population of Canada, some 34.2 million people distributed over a territory of nine million square kilometres. Although data collection and processing have to meet high quality standards, it is impossible to eliminate all errors. To assess the usefulness of census data, users need to be aware of the conceptual framework and definitions used in conducting the census, as well as the data collection and processing procedures, and the main sources of error, including, where possible, the size of the errors and any unusual circumstances that might limit the usefulness or interpretation of census data. With this information, users can assess the risks associated with using census data to draw conclusions or make decisions.

This technical report deals with coverage errors in the 2011 Census. There are two types of coverage errors: population undercoverage and population overcoverage. **Population undercoverage** refers to the error of excluding people who should have been enumerated. **Population overcoverage** refers to the error of either enumerating people more than once or including people who should not have been enumerated. Previous studies have shown that the error due to people who should not have been enumerated is negligible; consequently, that error is ignored here. Undercoverage is generally more common than overcoverage. In this context, the net impact of undercoverage and overcoverage on the size of a population of interest is **population net undercoverage**. Net undercoverage is the number of persons excluded who should have been enumerated (undercoverage) less the number of excess enumerations of persons enumerated more than once (overcoverage). Coverage error is one of the most important types of error since it affects not only the accuracy of the counts for the various census universes, but also the accuracy of all the census data that describe the characteristics of these universes.

Users of census data should be aware that the presence of coverage errors in the 2011 Census means that census products are subject to incomplete enumeration or duplicate enumeration. **For example, undercoverage is higher among young adult males.** For estimates of 2011 Census coverage errors for a variety of demographic and geographic levels and groupings, see Section 1.

Section 2 covers the conceptual framework of the 2011 Census and provides definitions of the population universe, the dwelling universe and usual place of residence. This is precisely what the census is intended to measure. Section 3 describes coverage error, sources of coverage error, census practices that minimize coverage error, and the conceptual framework for measuring coverage error. It is also an introduction to census coverage studies. The methodology used in the 2011 Census, in particular census frames, data collection, editing, coding and imputation, is covered in Section 4 and Section 5.

Census coverage error is measured by three studies. The 2011 Dwelling Classification Survey (DCS) addressed coverage error resulting from dwelling classification error. Census data were adjusted for this type of coverage error. The 2011 Reverse Record Check (RRC) measured population undercoverage. The 2011 Census Overcoverage Study (COS) measured population overcoverage. Census data are not adjusted for the coverage error identified by the RRC and the COS. Rather, Statistics Canada uses estimates of net undercoverage to produce demographic estimates.

The 2011 studies are quite similar to the 2006 studies, although some changes and improvements were made, particularly in the COS (for more information on this subject, see Section 8), including the following:

- Provincial and territorial record matching parameters were used for the COS instead of the national parameters used in 2006.
- Both steps of the COS now involve random sampling with manual verification, whereas in the 2006 COS, cases identified in the first step were all considered to be overcoverage.

The methodology and results of the 2011 Dwelling Classification Survey (DCS) are described in Section 6. This survey, conducted after census non-response follow-up, provides information used in the census to account for persons living in non-response dwellings and in occupied dwellings misclassified as unoccupied. This is done by imputing persons into the census database using the whole household imputation (WHI) procedure. The number of persons added through WHI is a key input for the estimates of population coverage error.

Estimates of coverage error rates are produced only for the population universe. The methodology and results of the 2011 RRC are described in Section 7. The methodology and results of the 2011 COS are described in Section 8. Section 9 shows how the results of the RRC and the COS are combined with census data to produce estimates of population coverage error and the associated standard errors. In view of the extensive use made of estimates of net undercoverage, it is important to undertake critical and detailed evaluations. Section 10 presents the results of evaluations performed for the RRC and the COS as well as an evaluation of the error of closure. The error of closure is the difference between demographic estimates whose base population is the 2006 Census adjusted for net undercoverage and 2011 Census data, also adjusted for net undercoverage.

Statistics Canada has conducted census population coverage studies since the first Reverse Record Check, which dates back to the 1961 Census.[1] Section 11 provides a chronological review of coverage error from the 1971 Census to the 2011 Census.

Section 12 covers additional topics, including the concept of persons not enumerated and census participation by Indian reserves and Indian settlements.

Appendix A contains the 2011 RRC Survey questionnaires, and Appendix B contains a list of all the acronyms used in this report.

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Normand Laniel and David Dolson, of the Social Survey Methods Division, contributed valuable comments on earlier drafts, which improved the content and readability of the final report. We gratefully acknowledge the support of members of the Census Operations Division, the Demography Division and the Social Survey Methods Division.

For additional information on census concepts, variables and geography, please see the *2011 Census Dictionary*. For additional information about the census process, please see the 2011 Census reference materials.

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1. The first RRC was conducted in 1961, but there was no frame of persons missed in the previous census. The 1966 RRC used the results of the 1961 RRC to construct the frame of persons missed in the 1961 Census.

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1. Estimates of population coverage error

1.1 Introduction

The census defines the population to be enumerated as well as the rules by which the population is to be counted (see Section 4). Coverage error occurs when errors are made relative to these definitions and rules. The main sources of coverage error are omission of a dwelling, which results in omission of the dwelling's residents, and failure by the respondent to include all persons who should be included or to exclude persons who should not be included. This section presents estimates of 2011 Census population net undercoverage, undercoverage and overcoverage. Net undercoverage indicates the extent to which the number of enumerations included in census data is higher or lower than complete enumeration. Both undercoverage and overcoverage may produce a bias in official counts and estimates, because the characteristics of persons who are not included may differ from the characteristics of persons who are included, and the characteristics of duplicates may differ from the characteristics of persons who are included only once.

1.2 Net undercoverage

The population net undercoverage rate for the 2011 Census is estimated at 2.22%.[2] In other words, the difference between the number of persons who were not included in the census but were members of the census target population and the number of duplicate enumerations was estimated to be 2.22% of the census target population. The population undercoverage rate is estimated at 4.07% (1,391,971 persons), while the population overcoverage rate is estimated at 1.85% (632,846 persons). An undercoverage rate of 4.07% means that persons who were not included but were members of the target population make up 4.07% of the census target population. An overcoverage rate of 1.85% means that duplicate enumerations make up 1.85% of the census target population.

The estimated undercoverage rate is lower than in the 2006 Census, and the estimated overcoverage rate is higher. Consequently, net undercoverage, which is the difference between undercoverage and overcoverage, is lower.

Table 1.2.1 Estimated rates of population coverage error and standard errors for Canada, 2006 and 2011 censuses

Coverage error	2006 Census		2011 Census	
	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)
Undercoverage	4.26	0.17	4.07	0.16
Overcoverage	1.59	0.01	1.85	0.02
Net undercoverage	2.67	0.17	2.22	0.16

Sources: Statistics Canada, 2006 and 2011 Census Coverage Studies.

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2. This is different from the rate of 2.3% published on September 26, 2013, because incompletely enumerated Indian reserves and settlements are excluded. All estimates of coverage error in this report exclude coverage error for this group.

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This section presents estimates of net undercoverage for a variety of geographic and demographic variables:

- Province or territory of current residence at the time of the census
- Age and Sex
- Legal marital status and Sex
- Marital status and Sex
- Mother tongue
- Census metropolitan area (CMA) of Census Day usual residence

Table 1.2.2 provides the estimated net undercoverage, the standard error associated to the estimate, as well as the corresponding estimated net undercoverage rate and the standard error associated to various characteristics. Negative estimates of net undercoverage indicate that overcoverage was larger than undercoverage. For an explanation of how this can occur, see Section 9.

Table 1.2.2 Estimated population net undercoverage and standard errors for various characteristics, 2011 Census

Characteristics	Population net undercoverage		Population net undercoverage rate	
	estimated number	standard error	estimated rate (%)	standard error (%)
Canada	**759,124**	**57,533**	**2.22**	**0.16**
Provinces and territories				
Newfoundland and Labrador	10,192	2,912	1.94	0.54
Prince Edward Island	3,386	923	2.36	0.63
Nova Scotia	21,911	5,346	2.32	0.55
New Brunswick	3,930	3,335	0.52	0.44
Quebec	73,240	23,660	0.92	0.29
Ontario	369,874	44,121	2.80	0.32
Manitoba	21,698	6,104	1.76	0.49
Saskatchewan	29,580	6,306	2.78	0.58
Alberta	128,584	18,004	3.41	0.46
British Columbia	91,280	19,494	2.03	0.43
Yukon	1,356	303	3.85	0.83
Northwest Territories	1,977	323	4.55	0.71
Nunavut	2,117	608	6.22	1.68
Sex and age group				
Both sexes	**759,124**	**57,533**	**2.22**	**0.16**
0 to 4 years	33,484	12,416	1.75	0.64
5 to 14 years	-6,521	16,509	-0.18	0.44
15 to 17 years	10,957	11,855	0.84	0.90
18 to 19 years	26,634	9,408	2.91	1.00
20 to 24 years	151,804	18,061	6.49	0.72
25 to 34 years	339,569	25,033	7.27	0.50
35 to 44 years	159,934	22,003	3.43	0.46
45 to 54 years	86,500	23,768	1.60	0.43
55 to 64 years	-21,067	18,441	-0.48	0.42
65 years and over	-22,172	22,945	-0.45	0.47

Table 1.2.2 Estimated population net undercoverage and standard errors for various characteristics, 2011 Census (continued)

Characteristics	Population net undercoverage		Population net undercoverage rate	
	estimated number	standard error	estimated rate (%)	standard error (%)
Males	**543,973**	**42,811**	**3.21**	**0.24**
0 to 4 years	14,597	8,406	1.50	0.85
5 to 14 years	4,499	12,412	0.24	0.65
15 to 17 years	8,564	8,119	1.28	1.19
18 to 19 years	10,947	6,021	2.36	1.27
20 to 24 years	75,094	11,750	6.34	0.93
25 to 34 years	205,930	19,346	8.79	0.75
35 to 44 years	118,085	16,928	5.08	0.69
45 to 54 years	91,520	18,854	3.37	0.67
55 to 64 years	22,514	15,625	1.04	0.71
65 years and over	-7,776	13,586	-0.35	0.62
Females	**215,151**	**39,684**	**1.25**	**0.23**
0 to 4 years	18,888	9,318	2.02	0.98
5 to 14 years	-11,021	10,956	-0.61	0.61
15 to 17 years	2,393	8,650	0.38	1.37
18 to 19 years	15,687	7,242	3.49	1.55
20 to 24 years	76,711	13,795	6.64	1.11
25 to 34 years	133,639	16,054	5.74	0.65
35 to 44 years	41,849	14,136	1.79	0.59
45 to 54 years	-5,019	14,521	-0.19	0.54
55 to 64 years	-43,581	9,820	-1.98	0.46
65 years and over	-14,395	18,516	-0.53	0.68
Marital status and sex for persons 15 years and over				
Both sexes	**732,161**	**54,115**	**2.56**	**0.18**
Married (and not separated)	15,516	27,331	0.12	0.21
Living common-law	38,099	16,406	1.20	0.51
Single (never legally married)	502,399	33,851	6.04	0.38
Separated	85,798	15,552	10.94	1.77
Divorced	73,578	21,639	4.18	1.18
Widowed	10,408	13,471	0.65	0.84
Unknown	6,363	2,776	0.00	0.00

Table 1.2.2 Estimated population net undercoverage and standard errors for various characteristics, 2011 Census (continued)

Characteristics	Population net undercoverage		Population net undercoverage rate	
	estimated number	standard error	estimated rate (%)	standard error (%)
Males	**524,877**	**40,270**	**3.73**	**0.28**
Married (and not separated)	26,886	19,698	0.41	0.30
Living common-law	51,073	13,553	3.14	0.81
Single (never legally married)	323,382	25,621	7.14	0.53
Separated	49,551	12,126	14.19	2.98
Divorced	67,816	15,996	9.06	1.94
Widowed	1,406	5,647	0.45	1.80
Unknown	4,763	2,555	0.00	0.00
Females	**207,284**	**37,139**	**1.43**	**0.25**
Married (and not separated)	-11,370	19,126	-0.18	0.30
Living common-law	-12,975	9,267	-0.83	0.60
Single (never legally married)	179,018	22,467	4.72	0.56
Separated	36,247	9,749	8.34	2.06
Divorced	5,762	14,602	0.57	1.44
Widowed	9,002	12,233	0.70	0.95
Unknown	1,601	1,087	0.00	0.00
Legal marital status and sex for persons 15 years and over				
Both sexes	**732,161**	**54,115**	**2.56**	**0.18**
Never married	532,065	36,525	5.02	0.33
Married	15,516	27,331	0.12	0.21
Separated	91,866	16,114	10.00	1.58
Divorced	78,017	22,727	3.19	0.90
Widowed	8,313	13,529	0.50	0.81
Unknown	6,383	2,776	…	…
Males	**524,877**	**40,270**	**3.73**	**0.28**
Never married	356,667	27,960	6.26	0.46
Married	26,886	19,698	0.41	0.30
Separated	57,683	12,823	13.59	2.61
Divorced	77,769	17,055	7.05	1.44
Widowed	1,091	5,714	0.32	1.65
Unknown	4,782	2,555	…	…

Table 1.2.2 Estimated population net undercoverage and standard errors for various characteristics, 2011 Census (continued)

Characteristics	Population net undercoverage		Population net undercoverage rate	
	estimated number	standard error	estimated rate (%)	standard error (%)
Females	**207,284**	**37,139**	**1.43**	**0.25**
Never married	175,398	23,915	3.57	0.47
Married	-11,370	19,126	-0.18	0.30
Separated	34,183	9,770	6.92	1.84
Divorced	248	15,057	0.02	1.12
Widowed	7,223	12,266	0.54	0.92
Unknown	1,602	1,087	…	…
Common-law status and sex for persons 15 years and over				
Both sexes	**732,161**	**54,115**	**2.56**	**0.18**
Not in a common-law relationship	694,062	51,863	2.73	0.20
In a common-law relationship	38,099	16,406	1.20	0.51
Males	**524,877**	**40,270**	**3.73**	**0.28**
Not in a common-law relationship	473,804	38,095	3.81	0.29
In a common-law relationship	51,073	13,553	3.14	0.81
Females	**207,284**	**37,139**	**1.43**	**0.25**
Not in a common-law relationship	220,259	36,069	1.70	0.27
In a common-law relationship	-12,975	9,267	-0.83	0.60
Mother tongue				
Total	**759,124**	**57,533**	**2.22**	**0.16**
English	380,116	43,353	1.95	0.22
French	-3,017	20,845	-0.04	0.29
Other	279,420	30,629	4.06	0.43
English and French	18,345	6,223	11.20	3.37
English and Other	61,116	10,045	13.30	1.90
French and Other	3,489	2,424	4.45	2.96
English, French and Other	3,493	3,043	12.63	9.61
Unknown	16,162	4,484	…	…

Table 1.2.2 Estimated population net undercoverage and standard errors for various characteristics, 2011 Census (continued)

Characteristics	Population net undercoverage		Population net undercoverage rate	
	estimated number	standard error	estimated rate (%)	standard error (%)
Census metropolitan area (CMA)				
St. John's	2,233	1,459	1.12	0.72
Halifax	4,975	2,775	1.26	0.69
Moncton	-1,714	1,030	-1.25	0.76
Saint John	1,574	1,645	1.22	1.26
Saguenay	1,712	3,541	1.07	2.20
Québec	-232	7,160	-0.03	0.94
Sherbrooke	3,331	3,872	1.62	1.86
Trois-Rivières	40	2,729	0.03	1.80
Montréal	42,657	16,516	1.10	0.42
Ottawa - Gatineau	14,359	10,296	1.15	0.81
Kingston	-912	3,613	-0.57	2.29
Peterborough	-774	2,987	-0.66	2.54
Oshawa	18,317	7,855	4.89	1.99
Toronto	215,570	32,048	3.72	0.53
Hamilton	9,730	9,221	1.33	1.25
St. Catharines - Niagara	13,980	7,767	3.44	1.85
Kitchener - Cambridge - Waterloo	8,488	7,853	1.75	1.59
Brantford	1,283	3,547	0.94	2.57
Guelph	2,401	6,121	1.67	4.19
London	1,553	6,397	0.33	1.34
Windsor	5,248	6,061	1.62	1.84
Barrie	12,944	8,594	6.47	4.02
Greater Sudbury / Grand Sudbury	5,007	5,452	3.02	3.19
Thunder Bay	220	3,184	0.18	2.61
Winnipeg	9,064	4,037	1.23	0.54
Regina	2,430	2,134	1.14	0.99
Saskatoon	6,806	2,948	2.55	1.07
Calgary	34,215	9,947	2.74	0.77
Edmonton	26,138	9,714	2.20	0.80
Kelowna	3,365	3,230	1.84	1.73
Abbotsford - Mission	479	2,878	0.28	1.68
Vancouver	46,497	14,946	1.97	0.62
Victoria	2,760	4,747	0.79	1.36
All CMAs	493,743	49,331	2.09	0.20
Outside a CMA	265,382	31,176	2.50	0.29

… not applicable

Sources : Statistics Canada, 2011 Census, 2011 Reverse Record Check and 2011 Census Overcoverage Study.

The standard error provides a measure of the accuracy of estimates based on sampling. The estimates are considered accurate to within plus or minus two standard errors 19 times out of 20. In other words, there are approximately 19 chances in 20 (95%) that the actual population net undercoverage rate for the 2011 Census was between 1.91% and 2.53% (i.e., 2.22% ± two standard errors), or about two chances in three (68%) that the actual rate was between 2.06% and 2.38% (i.e., 2.22% ± one standard error).

Since net undercoverage is a reflection of both undercoverage and overcoverage, the reader should also consult the estimates of undercoverage and overcoverage presented in Table 1.3. A low rate of net undercoverage may indicate low undercoverage or a combination of high undercoverage and high overcoverage.

Population net undercoverage was highest in the territories. The three territories had the three highest net undercoverage rates in Canada, with Nunavut at 6.22%, the Northwest Territories at 4.55% and Yukon at 3.85%. Among the provinces, Alberta had the highest net undercoverage rate, at 3.41%, followed by Ontario at 2.80% and Saskatchewan at 2.78%. New Brunswick had the lowest rate of population net undercoverage, at 0.52%, followed by Quebec at 0.92%. In 2006, Ontario and Alberta also had high rates, while Quebec had the lowest rate. The rates for the territories were also the highest in the country.

Population net undercoverage is generally higher for men, and highest for young adults (Table 1.2.2). The net undercoverage rate for males was slightly more than two and a half times the rate for females, 3.21% compared with 1.25%. In the general population, net undercoverage is highest in the 20-to-34 age group for both males and females. It is 6.49% in the 20-to-24 age group and 7.27% in the 25-to-34 age group. Men aged 25 to 34 had the highest net undercoverage rate, at 8.79%, compared with 6.34% for the 20-to-24 group. For women, the rate reaches 6.64% for the 20-to-24 age group and 5.74% for the 25-to-34 group. Net undercoverage was negative for women aged 15 to 17, as well as, for women aged 45 and over and for men aged 65 and over, indicating that there were more excess enumerations than persons not enumerated. This may also be due to excessive imputation of persons in these age groups when whole household imputation was carried out to compensate for occupied dwellings misclassified as unoccupied and non-response dwellings on the basis of the results of the Dwelling Classification Survey (see Section 6.2.4).

The net undercoverage rate for the population aged 15 and over was higher for never-married persons. If we consider marital status, more than two-thirds of net undercoverage in the 15-and-over population consisted of persons who had never been legally married and were not in a common-law relationship. The net undercoverage rate for this group was 6.04%. Net undercoverage for persons who were separated and not in a common-law relationship is even higher (10.94%), especially for men (14.19%).

The net undercoverage rate was higher for persons whose mother tongue is English than for persons whose mother tongue is French (1.95% compared with -0.04%), which partly explains the lower net undercoverage rate in Quebec. The net undercoverage rate for allophones, persons whose mother tongue is neither English nor French, was higher (4.06%).

Population net undercoverage was slightly more common outside census metropolitan areas. At the Canada level, the net undercoverage rate was 2.50% for persons who should have been enumerated outside of census metropolitan areas (CMAs). This is slightly higher than the net undercoverage rate of 2.09% for persons not living in CMAs. The only jurisdiction where the non-CMA rate was higher than the CMA rate was Ontario. In Quebec, there is little difference between the two rates.

1.3 Undercoverage

Persons counted as undercoverage are generally persons who were not included as usual residents in the questionnaire that was completed for their usual residence, or persons for whom no questionnaire were completed for their usual residence. For example, persons who regard their residence as temporary may not have

been included as usual residents elsewhere. Persons who have no usual residence and were therefore not enumerated, e.g., the homeless are also part of undercoverage.

This section presents estimates of undercoverage for a variety of geographic and demographic variables:

- Province or territory of current residence at the time of the census
- Age and Sex
- Legal marital status and Sex
- Marital status and Sex
- Mother tongue
- Census metropolitan area (CMA) of Census Day usual residence

Table 1.3 provides the estimated undercoverage in terms of the number of persons missed, the corresponding estimated undercoverage rate, the standard error associated with the estimate and the related standard errors. In some cases, the estimated undercoverage is negative (e.g., -4,127 for women aged 55 to 64). For an explanation of how this can occur, see Section 9.

Table 1.3 Estimated population undercoverage and overcoverage and standard errors for various characteristics, 2011 Census

Characteristics	Population undercoverage				Population overcoverage			
	estimated number	standard error	estimated rate (%)	standard error (%)	estimated number	standard error	estimated rate (%)	standard error (%)
Canada	**1,391,971**	**57,144**	**4.07**	**0.16**	**632,846**	**6,675**	**1.85**	**0.02**
Provinces and territories								
Newfoundland and Labrador	19,406	2,905	3.70	0.53	9,215	199	1.76	0.04
Prince Edward Island	5,600	921	3.90	0.62	2,214	58	1.54	0.04
Nova Scotia	38,150	5,330	4.04	0.54	16,239	404	1.72	0.04
New Brunswick	19,971	3,317	2.64	0.43	16,041	351	2.12	0.05
Quebec	238,516	23,523	2.99	0.29	165,276	2,550	2.07	0.03
Ontario	591,255	43,782	4.47	0.32	221,380	5,457	1.67	0.04
Manitoba	38,279	6,089	3.11	0.48	16,582	436	1.35	0.04
Saskatchewan	47,080	6,294	4.43	0.57	17,500	392	1.65	0.04
Alberta	192,882	17,927	5.11	0.45	64,298	1,659	1.70	0.04
British Columbia	193,495	19,369	4.31	0.41	102,215	2,202	2.28	0.05
Yukon	2,220	303	6.30	0.81	864	14	2.45	0.04
Northwest Territories	2,601	320	5.99	0.69	624	46	1.44	0.10
Nunavut	2,515	608	7.39	1.65	399	23	1.17	0.07

Table 1.3 Estimated population undercoverage and overcoverage and standard errors for various characteristics, 2011 Census (continued)

Characteristics	Population undercoverage				Population overcoverage			
	estimated number	standard error	estimated rate (%)	standard error (%)	estimated number	standard error	estimated rate (%)	standard error (%)
Sex and age group								
Both sexes	**1,391,971**	**57,144**	**4.07**	**0.16**	**632,846**	**6,675**	**1.85**	**0.02**
0 to 4 years	64,239	12,279	3.36	0.62	30,755	1,838	1.61	0.10
5 to 14 years	97,305	16,113	2.61	0.42	103,826	3,594	2.79	0.09
15 to 17 years	49,778	11,501	3.83	0.85	38,821	2,878	2.98	0.22
18 to 19 years	57,441	9,112	6.28	0.93	30,807	2,345	3.37	0.25
20 to 24 years	224,475	17,833	9.60	0.69	72,670	2,861	3.11	0.12
25 to 34 years	418,543	24,797	8.96	0.48	78,974	3,426	1.69	0.07
35 to 44 years	217,040	21,808	4.66	0.45	57,106	2,924	1.23	0.06
45 to 54 years	160,105	23,535	2.95	0.42	73,605	3,324	1.36	0.06
55 to 64 years	44,627	18,158	1.02	0.41	65,694	3,216	1.50	0.07
65 years and over	58,418	22,611	1.19	0.45	80,589	3,901	1.64	0.08
Males	**859,830**	**42,396**	**5.07**	**0.24**	**315,857**	**5,947**	**1.86**	**0.03**
0 to 4 years	30,655	8,309	3.14	0.82	16,058	1,277	1.65	0.13
5 to 14 years	57,499	12,147	3.00	0.62	53,000	2,548	2.77	0.13
15 to 17 years	28,928	7,935	4.31	1.13	20,364	1,721	3.04	0.25
18 to 19 years	25,166	5,838	5.42	1.19	14,219	1,472	3.06	0.31
20 to 24 years	110,936	11,548	9.37	0.88	35,842	2,167	3.03	0.18
25 to 34 years	246,863	19,181	10.54	0.73	40,933	2,522	1.75	0.11
35 to 44 years	147,279	16,810	6.34	0.68	29,194	1,992	1.26	0.09
45 to 54 years	127,470	18,714	4.69	0.66	35,950	2,287	1.32	0.08
55 to 64 years	56,021	15,443	2.58	0.69	33,507	2,383	1.54	0.11
65 years and over	29,014	13,266	1.32	0.60	36,791	2,932	1.68	0.13
Females	**532,140**	**39,198**	**3.08**	**0.22**	**316,989**	**6,194**	**1.83**	**0.04**
0 to 4 years	33,584	9,222	3.59	0.95	14,696	1,337	1.57	0.14
5 to 14 years	39,805	10,618	2.20	0.57	50,826	2,700	2.81	0.15
15 to 17 years	20,851	8,332	3.31	1.28	18,458	2,323	2.93	0.36
18 to 19 years	32,275	7,003	7.17	1.45	16,588	1,844	3.69	0.40
20 to 24 years	113,539	13,658	9.83	1.07	36,828	1,942	3.19	0.17
25 to 34 years	171,680	15,874	7.37	0.63	38,041	2,398	1.63	0.10
35 to 44 years	69,761	13,963	2.99	0.58	27,912	2,199	1.20	0.09
45 to 54 years	32,635	14,305	1.21	0.52	37,655	2,499	1.39	0.09
55 to 64 years	-11,394	9,569	-0.52	0.44	32,187	2,205	1.46	0.10
65 years and over	29,404	18,327	1.08	0.66	43,799	2,638	1.60	0.10

Table 1.3 Estimated population undercoverage and overcoverage and standard errors for various characteristics, 2011 Census (continued)

Characteristics	Population undercoverage				Population overcoverage			
	estimated number	standard error	estimated rate (%)	standard error (%)	estimated number	standard error	estimated rate (%)	standard error (%)
Marital status and sex for persons 15 years and over								
Both sexes	**1,230,427**	**53,668**	**4.30**	**0.18**	**498,266**	**6,941**	**1.74**	**0.02**
Married (and not separated)	196,404	26,826	1.52	0.20	180,888	5,230	1.40	0.04
Living common-law	89,310	16,227	2.81	0.50	51,212	2,419	1.61	0.08
Single (never legally married)	706,453	33,440	8.49	0.37	204,054	5,260	2.45	0.06
Separated	96,090	15,514	12.26	1.74	10,292	1,086	1.31	0.14
Divorced	100,594	21,520	5.72	1.15	27,017	2,266	1.54	0.13
Widowed	35,212	13,374	2.21	0.82	24,803	1,615	1.56	0.10
Unknown	6,363	2,776	0.00	0.00	0	0	…	…
Males	**771,676**	**39,868**	**5.49**	**0.27**	**246,799**	**5,671**	**1.75**	**0.04**
Married (and not separated)	119,082	19,282	1.83	0.29	92,196	4,026	1.42	0.06
Living common-law	75,521	13,459	4.64	0.79	24,448	1,589	1.50	0.10
Single (never legally married)	431,748	25,331	9.53	0.51	108,367	3,844	2.39	0.08
Separated	54,863	12,101	15.71	2.92	5,312	777	1.52	0.23
Divorced	79,416	15,938	10.61	1.90	11,600	1,360	1.55	0.18
Widowed	6,283	5,604	2.01	1.76	4,877	695	1.56	0.22
Unknown	4,763	2,555	0.00	0.00	0	0	…	…
Females	**458,750**	**36,667**	**3.16**	**0.24**	**251,467**	**5,902**	**1.73**	**0.04**
Married (and not separated)	77,322	18,768	1.20	0.29	88,692	3,684	1.37	0.06
Living common-law	13,789	9,073	0.89	0.58	26,764	1,888	1.72	0.12
Single (never legally married)	274,705	22,121	7.25	0.54	95,687	3,927	2.53	0.10
Separated	41,227	9,719	9.48	2.02	4,981	762	1.15	0.18
Divorced	21,179	14,487	2.09	1.40	15,417	1,826	1.52	0.18
Widowed	28,928	12,145	2.26	0.93	19,926	1,466	1.55	0.11
Unknown	1,601	1,087	0.00	0.00	0	0	…	…

Table 1.3 Estimated population undercoverage and overcoverage and standard errors for various characteristics, 2011 Census (continued)

Characteristics	Population undercoverage				Population overcoverage			
	estimated number	standard error	estimated rate (%)	standard error (%)	estimated number	standard error	estimated rate (%)	standard error (%)
Legal marital status and sex for persons 15 years and over								
Both sexes	**1,230,427**	**53,668**	**4.30**	**0.18**	**498,266**	**6,941**	**1.74**	**0.02**
Never married	775,938	36,084	7.32	0.32	243,872	5,662	2.30	0.05
Married	196,404	26,826	1.52	0.20	180,888	5,230	1.40	0.04
Separated	103,889	16,071	11.31	1.55	12,023	1,177	1.31	0.13
Divorced	112,708	22,599	4.61	0.88	34,691	2,406	1.42	0.10
Widowed	35,105	13,425	2.10	0.79	26,792	1,676	1.60	0.10
Unknown	6,383	2,776	0.00	0.00	0	0	…	…
Males	**771,676**	**39,868**	**5.49**	**0.27**	**246,799**	**5,671**	**1.75**	**0.04**
Never married	483,368	27,657	8.49	0.44	126,701	4,103	2.23	0.07
Married	119,082	19,282	1.83	0.29	92,196	4,026	1.42	0.06
Separated	63,905	12,796	15.05	2.56	6,222	838	1.47	0.20
Divorced	93,745	16,989	8.50	1.41	15,976	1,497	1.45	0.14
Widowed	6,795	5,665	1.97	1.61	5,704	752	1.66	0.22
Unknown	4,782	2,555	0.00	0.00	0	0	…	…
Females	**458,750**	**36,667**	**3.16**	**0.24**	**251,467**	**5,902**	**1.73**	**0.04**
Never married	292,570	23,511	5.96	0.45	117,172	4,380	2.39	0.09
Married	77,322	18,768	1.20	0.29	88,692	3,684	1.37	0.06
Separated	39,984	9,734	8.10	1.81	5,800	831	1.17	0.17
Divorced	18,963	14,936	1.41	1.10	18,715	1,903	1.40	0.14
Widowed	28,310	12,173	2.13	0.90	21,087	1,508	1.59	0.11
Unknown	1,602	1,087	0.00	0.00	0	0	…	…

Table 1.3 Estimated population undercoverage and overcoverage and standard errors for various characteristics, 2011 Census (continued)

Characteristics	Population undercoverage				Population overcoverage			
	estimated number	standard error	estimated rate (%)	standard error (%)	estimated number	standard error	estimated rate (%)	standard error (%)
Common-law status and sex for persons 15 years and over								
Both sexes	**1,230,427**	**53,668**	**4.30**	**0.18**	**498,266**	**6,941**	**1.74**	**0.02**
In a common-law relationship	1,141,116	51,415	4.49	0.19	447,054	6,795	1.76	0.03
Not in a common-law relationship	89,310	16,227	2.81	0.50	51,212	2,419	1.61	0.08
Males	**771,676**	**39,868**	**5.49**	**0.27**	**246,799**	**5,671**	**1.75**	**0.04**
In a common-law relationship	696,155	37,696	5.60	0.29	222,351	5,498	1.79	0.04
Not in a common-law relationship	75,521	13,459	4.64	0.79	24,448	1,589	1.50	0.10
Females	**458,750**	**36,667**	**3.16**	**0.24**	**251,467**	**5,902**	**1.73**	**0.04**
In a common-law relationship	444,961	35,632	3.43	0.27	224,703	5,599	1.73	0.04
Not in a common-law relationship	13,789	9,073	0.89	0.58	26,764	1,888	1.72	0.12
Mother tongue								
Total	**1,391,971**	**57,144**	**4.07**	**0.16**	**632,846**	**6,675**	**1.85**	**0.02**
English	721,206	42,937	3.71	0.21	341,090	5,990	1.75	0.03
French	151,789	20,619	2.13	0.28	154,806	3,061	2.17	0.04
Other	402,840	30,328	5.85	0.41	123,420	4,286	1.79	0.06
English and French	21,616	6,205	13.20	3.29	3,271	475	2.00	0.29
English and Other	69,875	9,997	15.21	1.85	8,759	978	1.91	0.21
French and Other	4,081	2,418	5.21	2.93	592	177	0.76	0.23
English, French and Other	4,402	3,013	15.91	9.16	908	425	3.28	1.53
Unknown	16,162	4,484	0.00	0.00	0	0	…	…

Table 1.3 Estimated population undercoverage and overcoverage and standard errors for various characteristics, 2011 Census (continued)

Characteristics	Population undercoverage				Population overcoverage			
	estimated number	standard error	estimated rate (%)	standard error (%)	estimated number	standard error	estimated rate (%)	standard error (%)
Census metropolitan area (CMA)								
St. John's	6,749	1,449	3.39	0.70	4,516	171	2.27	0.09
Halifax	11,437	2,759	2.89	0.68	6,462	297	1.63	0.07
Moncton	612	1,018	0.45	0.74	2,326	160	1.70	0.12
Saint John	4,232	1,629	3.27	1.22	2,658	230	2.06	0.18
Saguenay	5,372	3,495	3.37	2.12	3,660	568	2.29	0.35
Québec	13,732	7,053	1.79	0.90	13,964	1,231	1.82	0.16
Sherbrooke	7,450	3,825	3.63	1.80	4,119	598	2.01	0.29
Trois-Rivières	3,057	2,636	2.01	1.70	3,017	706	1.99	0.46
Montréal	118,129	16,316	3.05	0.41	75,472	2,564	1.95	0.07
Ottawa–Gatineau	35,037	10,151	2.80	0.79	20,677	1,723	1.65	0.14
Kingston	2,191	3,552	1.38	2.21	3,103	658	1.96	0.41
Peterborough	1,606	2,926	1.36	2.44	2,381	601	2.01	0.50
Oshawa	24,791	7,792	6.62	1.94	6,474	993	1.73	0.26
Toronto	318,944	31,738	5.50	0.52	103,375	4,447	1.78	0.08
Hamilton	21,743	9,086	2.98	1.21	12,013	1,571	1.64	0.21
St. Catharines–Niagara	19,831	7,709	4.88	1.81	5,851	949	1.44	0.23
Kitchener	15,283	7,754	3.15	1.55	6,795	1,240	1.40	0.25
Brantford	4,138	3,378	3.02	2.40	2,855	1,080	2.09	0.77
Guelph	6,468	5,792	4.51	3.85	4,067	1,980	2.83	1.35
London	8,555	6,306	1.80	1.30	7,003	1,074	1.47	0.22
Windsor	10,579	5,943	3.26	1.77	5,331	1,191	1.64	0.36
Barrie	15,556	8,570	7.78	3.95	2,612	644	1.31	0.32
Greater Sudbury / Grand Sudbury	8,264	5,404	4.98	3.10	3,257	721	1.96	0.43
Thunder Bay	1,361	3,159	1.12	2.56	1,141	398	0.94	0.32
Winnipeg	17,847	4,020	2.41	0.53	8,782	366	1.19	0.05
Regina	5,635	2,123	2.65	0.97	3,205	215	1.50	0.10
Saskatoon	11,539	2,935	4.32	1.05	4,733	277	1.77	0.10
Calgary	55,462	9,883	4.44	0.76	21,247	1,130	1.70	0.09
Edmonton	47,220	9,646	3.98	0.78	21,082	1,143	1.78	0.10
Kelowna	6,218	3,202	3.39	1.69	2,853	426	1.56	0.23
Abbotsford	5,327	2,807	3.12	1.59	4,848	633	2.84	0.36
Vancouver	106,028	14,800	4.49	0.60	59,531	2,085	2.52	0.09
Victoria	10,721	4,691	3.09	1.31	7,960	729	2.29	0.21
All CMAs	931,112	48,920	3.94	0.20	437,370	6,352	1.85	0.03
Outside a CMA	460,858	30,789	4.34	0.28	195,477	4,896	1.84	0.05

… not applicable

Sources: Statistics Canada, 2011 Census, 2011 Reverse Record Check and 2011 Census Overcoverage Study.

There are some demographic trends in undercoverage:

- The undercoverage rate for males is more than one and a half times the rate for females, 5.07% compared with 3.08%.
- For both males and females, undercoverage is highest in the 20-to-34 age group.
- Among young adult males, undercoverage is 9.37% for the 20-to-24 age group and 10.54% for the 25-to-34 age group.
- If we consider marital status, undercoverage is higher for people aged 15 and over who never married and are not in a common-law relationship. The rate for this group is 8.49%. Undercoverage is also higher for separated persons who are not in common-law relationships. The rate for this group is 12.26%. In both cases, the rates are higher for men than for women.

As shown in Table 1.3, the persons most likely to have been missed in the 2011 Census have the following profiles: men aged 20 to 34 who have never married and are not in a common-law relationship, and separated persons. Mother tongue is also important, as undercoverage is lower for persons whose mother tongue is French (2.13%), followed by persons whose mother tongue is English (3.71%). For persons whose mother tongue is neither English nor French, the rate is even higher, at 5.85%.

1.4 Overcoverage

Population overcoverage is the number of excess enumerations in the census counts for persons enumerated more than once (usually twice) or persons who should not have been enumerated. This error produces a bias because these persons should have been enumerated only once. Examples of overcoverage include children whose parents do not live together and who are included in each parent's census questionnaire, persons who live apart from their family for work reasons and are listed in both their family's questionnaire and the questionnaire for the dwelling where they live while working, students who are away at school and are included in both their roommates' census questionnaire and their parents' questionnaire, and foreign visitors who are enumerated.

This section presents estimates of overcoverage for a variety of geographic, demographic and other variables:

- Province or territory of current residence at the time of the census
- Age and Sex
- Legal marital status and Sex
- Marital status and Sex
- Mother tongue
- Census metropolitan area (CMA) of Census Day usual residence

Table 1.3 also contains estimates of the number of excess enumerations and the associated standard error.

The overcoverage estimates in Table 1.3 have lower standard errors than the undercoverage estimates. There are some demographic trends in overcoverage:

- The estimated overcoverage rate varies less than the undercoverage rate for all provinces and territories except Nunavut, which has a lower overcoverage rate (1.17%) than any other territory or province.
- Males and females have similar overcoverage rates, at 1.86% and 1.83% respectively.
- Overcoverage is higher for the 5-to-24 age range. The highest rate is in the 18-to-19 age group (3.37%). In this age group, the rate is higher for women (3.69%) than for men (3.06%). It is the highest rate for any age group.
- If we look at marital status, overcoverage, like undercoverage, is higher for persons who had never married and are not in a common-law relationship (2.45%). This is true for both men and women.

In summary, as shown in Table 1.3, persons who are most likely to be enumerated more than once are just as likely to be male as female and just as likely to be children as young adults, and for persons aged 15 and over, they are more likely to have never married.

2. Census universes

2.1 Introduction

The 2011 Census involved the enumeration of the following five universes:

- the population universe
- the dwelling universe
- the household universe
- the family universe
- the geography universe

The 2011 Census Coverage Error Measurement Program estimates coverage error for the population universe only. This section provides a description of the population universe and the dwelling universe. Since coverage error can be due to misinterpretation of the concept of usual place of residence as defined in census questionnaires, this section provides the information presented in the census questionnaire itself, and the 2011 Census definition of usual place of residence. Information on the variables associated with each universe can be found in the *2011 Census Dictionary*.

2.2 Population universe

The population universe of the 2011 Census includes the following groups:

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

The population universe of the 2011 Census does not include foreign residents, but since 1991, it includes non-permanent residents.

The definition of the population universe indicates which persons should be included in the census, but not where these persons should be enumerated. The Canadian census uses the modified *de jure* method of enumeration, under which persons are to be enumerated at their usual place of residence, even if they are temporarily away on Census Day. Persons away from their usual place of residence and residing elsewhere in Canada are to be enumerated at their usual place of residence and are considered 'temporary residents' at the other location ('temporary residents' should not be confused with 'non-permanent residents,' which refers to the person's legal status while in Canada). Persons who have no usual place of residence are to be enumerated wherever they happen to be on Census Day. Some countries use the *de facto* method, under which all persons are to be enumerated wherever they are on Census Day, regardless of their usual place of residence.

2.3 Dwelling universe

A dwelling is a set of living quarters in which a person or group of persons resides or could reside. Only dwellings in Canada are included. There are two types of dwellings:

- A private dwelling is a separate set of living quarters with a private entrance either from outside or from a common hall, lobby, vestibule or stairway inside the building. The entrance to the dwelling must be one which can be used without passing through the living quarters of someone else. In addition, a private dwelling must have a source of heat or power and must be an enclosed space that provides shelter from the elements, as evidenced by complete and enclosed walls and roof and by doors and windows that provide protection from wind, rain and snow.
- A collective dwelling is a dwelling of a commercial, institutional or communal nature. It may be identified by a sign on the premises or by an enumerator (EN) speaking with the person in charge, a resident, a neighbour, etc. Examples of collective dwellings are lodging or rooming houses, hotels, motels, tourist homes, nursing homes, hospitals, staff residences, communal quarters (military bases), work camps, jails, missions, and group homes. Collective dwellings may be occupied by usual residents or solely by foreign or temporary residents.

These two types of dwellings can be subject to more detailed classifications:

- Private dwellings can be regular private dwellings or occupied marginal dwellings. Regular private dwellings are further classified into three major groups: occupied dwellings (occupied by usual residents), dwellings occupied solely by foreign or temporary residents, and unoccupied dwellings. An occupied marginal dwelling is an occupied private dwelling which, because it was not built, maintained or converted for year-round use, does not meet the two conditions for year-round occupancy (a source of heat or power and shelter from the elements). To be included in the census, a marginal dwelling must be permanently occupied by a person or a group of persons who have no other usual place of residence. Examples of marginal dwellings are non-winterized cottages or cabins and unconverted barns or garages. Occupied marginal dwellings are classified as either occupied by usual residents or occupied solely by foreign or temporary residents. Marginal dwellings that were unoccupied on Census Day are excluded.
- Collective dwellings are classified as either occupied dwellings or unoccupied dwellings. Occupied dwellings are either occupied by usual residents or occupied solely by foreign or temporary residents. In the case of unoccupied collective dwellings, data were collected but are not included in census products.

In summary, the dwelling universe includes the following:

- private dwellings occupied by usual residents
- private dwellings occupied solely by foreign or temporary residents
- private dwellings that are unoccupied
- marginal dwellings occupied on Census Day
- collective dwellings occupied by usual residents
- collective dwellings occupied solely by foreign or temporary residents.

The dwelling universe does not include the following:

- marginal dwellings that were unoccupied on Census Day
- collective dwellings that were unoccupied on Census Day,
- dwellings outside Canada

2.4   Usual place of residence

Under the *de jure* enumeration method used in the Canadian population census, the population is enumerated on a 'usual place of residence' basis, that is, at the location where a person lives most of the time. Most people have only one residence, and it is easy to enumerate them at their usual place of residence. Enumeration involves listing all usual residents of a dwelling on Census Day by following the step-by-step instructions at the beginning of the census questionnaire: 'How many persons usually live at this address on May 10, 2011, including yourself? Include all persons who have their main residence at this address, even if they are temporarily away. **See the instructions on page 3 of the Census questionnaire** (joint custody, students, permanent residents, secondary residence, etc.).'

The instructions on page 3 were as follows:

1. WHOM TO INCLUDE IN STEP B

- All persons who have their **main residence** at this address on May 10, 2011, including newborn babies, room-mates and persons who are temporarily away.

- **Canadian citizens**, **permanent residents** (landed immigrants), persons asking for **refugee status** (refugee claimants), persons from **another country** with a **work** or **study permit** and family members living here with them.

- Persons staying at this address temporarily on May 10, 2011 who have **no main residence elsewhere**.

2. WHERE TO INCLUDE PERSONS WITH MORE THAN ONE RESIDENCE

- **CHILDREN IN JOINT CUSTODY** should be included in the home of the parent where they live most of the time. Children who spend equal time with each parent should be included in the home of the parent with whom they are staying on May 10, 2011.

- **STUDENTS** who return to live with their parents during the year should be included at their parents' address, even if they live elsewhere while attending school or working at a summer job.

- **SPOUSES OR COMMON-LAW PARTNERS TEMPORARILY AWAY** who stay elsewhere while working or studying should be listed at the main residence of their family, if they return periodically.

- **PERSONS IN AN INSTITUTION** for **less than six months** (for example, in a home for the aged, a hospital or a prison) should be listed at their usual residence.

In some cases, it is difficult to determine an individual's usual place of residence, and special rules have been developed to define the usual place of residence:

1. Persons with more than one residence.

   This category includes all persons who have more than one dwelling in Canada that could be considered their usual place of residence. In this situation, the usual place of residence is the place where a person spends the majority of the year. If the person spends the same amount of time at both residences or is not sure which one to choose, he or she should choose the residence where he or she stayed overnight on Census Day (between May 9 and 10, 2011). There are two exceptions to this rule:

   (a)   Children who live somewhere else while attending school but return to live with their parents for part of the year should consider the residence they share with their parents to be their usual place of residence, even if they spend most of the year elsewhere.

(b) Husbands, wives or common-law partners who live away from their families while working but return to their families regularly (for example, on weekends) should consider the residence they share with their spouse or partner to be their usual place of residence, even if they spend most of the year elsewhere.

2. Persons in institutions such as a hospital, a home for the aged, a prison or a correctional centre.

   Persons with no other usual place of residence elsewhere in Canada, or persons who have been in one or more institutions for a continuous period of six months or longer, are to be considered usual residents of the institution.

3. Persons with no usual place of residence.

   Persons who do not have a usual place of residence should be enumerated in the dwelling where they stayed overnight between May 9 and 10, 2011.

4. Persons residing outside Canada.

   Canadian citizens and landed immigrants residing outside Canada on Census Day, including:

   - persons aboard Canadian vessels or merchant vessels
   - Canadian federal and provincial/territorial government employees and family members
   - members of the Canadian Armed Forces and family members who do not have a permanent place of residence in Canada occupied by one or more family members.

   These persons were asked to indicate in the census questionnaire the address they use for election purposes or their last permanent address in Canada. This information is used to determine their usual place of residence.

3. Population coverage error

3.1 Sources

Although census data collection and processing have to meet high quality standards, it is impossible to eliminate all errors. There are two kinds of population coverage error. Population undercoverage refers to the exclusion of persons who should have been enumerated, and population overcoverage refers to the inclusion of persons who were enumerated more than once (generally twice).

Undercoverage can occur in the first stage of the census if the list of dwellings used for the dwelling universe is incomplete. This risk is higher, for example, if a dwelling is under construction. Conversely, overcoverage can occur if a dwelling is listed twice or if a dwelling under construction that is not yet habitable is included.

Coverage error can also occur during the field data collection stage. Respondent error is responsible for coverage error when the person completing the census form either excludes or omits someone whose usual place of residence, according to census rules, is the dwelling concerned; this is undercoverage. The person may also include someone whose usual place of residence is not the dwelling concerned; there is overcoverage if this person has already been enumerated at his/her usual place of residence or somewhere else. In most cases, it is easy to determine a person's usual place of residence. However, as stated in the previous section, the process is sometimes more complex, and special rules have been developed for determining an individual's usual place of residence. The rules are spelled out in the census questionnaire, but the list is long, and there can be comprehension difficulties. Coverage error may result when the rules are not consulted or are incorrectly applied. The idea of using Census Day as the reference date for determining usual residence may also be misunderstood, which can lead to coverage error.

Coverage errors may also be committed during the processing stage at any point where records for persons or households are added to or removed from the census database. Records can be deleted by mistake. Questionnaires may be linked to the wrong record or returned too late to be included.

Even though efforts are made to enumerate the homeless population, the risk of undercoverage is high. Some other living arrangements are also susceptible to coverage error. For example, young adults newly away from home may be either undercovered, because neither their roommates nor their parents include them in the census questionnaire, or overcovered, because they are included in both census questionnaires. Persons who maintain a second residence because of their employment can also cause coverage error.

Users should also be aware of the extent to which Indian reserves and Indian settlements participated in the 2011 Census. In some cases, enumeration was not permitted by the community or was interrupted before it could be completed. In other cases, the quality of the enumeration was considered inadequate. In addition, natural disasters prevented enumeration in other communities at the time of the census (for northern Ontario communities hit by natural disasters, however, enumeration was carried out later, and the results were made available to the communities concerned). These geographic areas (31 in all) are considered incompletely enumerated Indian reserves and settlements. There are no 2011 data for incompletely enumerated Indian reserves and settlements, and those areas are not included in the totals. Similar problems have occurred in previous censuses. For example, 30 Indian reserves and settlements were declared incompletely enumerated in the 2001 Census, and 22 in the 2006 Census. Nine of those reserves and settlements participated in the 2011 Census. For more information, see Section 12.2.

The population estimates for the 31 incompletely enumerated Indian reserves and settlements are based on a model. However, since no reliable source is available to verify the assumptions in the model, the estimates must be used with caution. For more information, see Section 12.2.

3.2 Control

Potential sources of coverage error were recognized during the planning stage of the 2011 Census, and the following measures were taken to minimize the associated risks:

- Collection unit (CU) boundaries were carefully defined and mapped to ensure that no geographic areas were left out or included twice.
- List/leave areas: The enumerator's manual contained instructions on how to canvass a CU so as to minimize the risk of missing dwellings. The total number of dwellings from the 2006 Census was provided to the field operations manager to help him/her identify significant changes. In addition, when the listing operation resulted in a substantial difference in the number of dwellings relative to the 2006 Census, the listing was checked. Lastly, specific quality control procedures were applied to the CU to evaluate and correct any changes made in the listing. Section 4.2 provides a definition of list/leave and mail-out areas.
- Mail-out areas: Mail-out was based on a list of addresses from Statistics Canada's Address Register. This list was updated regularly and listing activities were carried out mainly in the fastest-growing areas. These listing activities were carried out continuously, but more intensively in the two years preceding the census. The work of enumerators was closely monitored. Some collective dwellings had to be checked by field staff to verify their occupancy status before the collection stage; if they were occupied then they were identified and included in the census.
- Special procedures were developed for the enumeration of persons who have difficulty responding (e.g., people who are fluent in neither English nor French or are illiterate) and persons located in specific parts of large cities where response or coverage was poor in the past.
- Special procedures were developed for enumerating the population on Indian reserves.
- Advertisements informed Canadians about the census and indicated what to do if they did not receive a questionnaire.
- The Census Help Line (CHL) was available to answer any questions about the census, including questions about coverage.
- There was a 'Whom to include' section in the questionnaire to tell respondents which persons should be included.
- The questionnaire had a question on whether there was anyone the respondent was not sure should be listed. A telephone follow-up was subsequently carried out with the respondent to determine if the person in question should or should not be listed in the questionnaire.
- Telephone follow-up was carried out after questionnaires were reviewed for coverage inconsistencies or to verify household status, including questionnaires containing only foreign or temporary residents.
- Non-response follow-up included a dwelling coverage check.

These procedures, along with appropriate training, supervisory checks and quality control systems during the collection and processing stages, helped to reduce the number of coverage errors.

3.3 Definitions

Algebraic definitions of coverage errors are presented in this section. Let T denote the total or the 'actual' number of persons in the target population. Let C denote the published census count of persons in the target population. The error associated with using C instead of T is as follows:

$$N = T - C$$

This error, denoted as N, is the **net population coverage error**.

Let U denote **population undercoverage**, the number of persons not included in C who should have been.

Let O denote **population overcoverage**, the number of excess enumerations included in C that should not have been. O has two components. One is the excess enumerations of persons enumerated more than once. Coverage studies focus on these excess enumerations that should not have been included in C. The other component of O is persons included in C who are not members of the census target population. For example, foreign residents visiting Canada who are listed on a census questionnaire as usual residents of a dwelling should not be included in C. Fictitious persons are another example. According to previous studies, the number of persons who are enumerated but are not in the census target population is generally very small and can be ignored. Consequently, the 2011 Census coverage studies did not measure this component of coverage error.

Since U refers to persons who were not enumerated but should be included in C and since O denotes enumerations that should not be included in C, the difference between T and C is U less O. That is,

$$N = U - O$$

The actual number of persons in the census target population is therefore

$$T = C + N = C + U - O$$

An estimate of T is given by $\hat{T}$, where

$$\hat{T} = C + \hat{N} = C + \hat{U} - \hat{O}$$

$\hat{U}$ is an estimate of the number of persons not included in C who should have been, and $\hat{O}$ is an estimate of the number of persons included in C who should not have been. We can assume that overcoverage from persons included in C who are not in the census target population is zero, since it is negligible. Consequently, $\hat{O}$ is simply an estimate of the number of duplicate enumerations. The purpose of census coverage studies is to determine the values of $\hat{U}$ and $\hat{O}$.

Census population coverage errors can generally be expressed as rates relative to the actual population. The undercoverage rate R_U is U as a percentage of T. The overcoverage rate R_O is O as a percentage of T. The net undercoverage rate R_N is the difference between U and O as a percentage of the census target population. These three rates can be estimated by $\hat{R}_U$, $\hat{R}_O$ and $\hat{R}_N$, as follows:

$$\hat{R}_U = 100 * \frac{\hat{U}}{\hat{T}} = 100 * \frac{\hat{U}}{C + \hat{N}}$$

$$\hat{R}_O = 100 * \frac{\hat{O}}{\hat{T}} = 100 * \frac{\hat{O}}{C + \hat{N}}$$

$$\hat{R}_N = 100 * \frac{\hat{N}}{\hat{T}} = 100 * \left(\frac{\hat{U} - \hat{O}}{C + \hat{N}} \right)$$

A positive net undercoverage rate indicates that the undercoverage rate is higher than the overcoverage rate. That is, there are more people not included in the published census count C than excess enumerations. That is generally the case for all Canadian censuses. For some domains of interest, however, negative net undercoverage has recently been observed.

As indicated above, U denotes the number of persons not included in C who should have been. The census count C is composed of two elements:

$C = E + I$

where

$E =$ the number of enumerations. This is the number of people who were listed on a census questionnaire.

$I =$ the number of imputed persons. This is an estimate of the number of persons missed in non-response dwellings and in occupied dwellings misclassified as unoccupied. For more information on whole household imputation (WHI), see Section 5.7.

Hence, undercoverage is a subset of all persons who were not listed on a census questionnaire but should have been. It does not include persons who were not enumerated either because no completed census questionnaire was returned for the dwelling (non-response dwelling) or because the dwelling was misclassified as unoccupied (classification error) and did not receive a questionnaire.

In summary, the actual population T is composed of the census count C and the net undercoverage N. C consists of E plus the number of persons added in WHI I, and imputation is done for persons living in non-response dwellings or in occupied dwellings misclassified as unoccupied. N is undercoverage U less overcoverage O.

3.4 Measurement

Two postcensal studies were carried out to estimate the 2011 Census population coverage error. The Reverse Record Check (RRC) provided estimates for population undercoverage, while the Census Overcoverage Study (COS) estimated population overcoverage.

The RRC and the COS were conducted after field collection and processing were complete. Preliminary estimates of 2011 Census population coverage error were released on March 28, 2013. Following a lengthy and detailed validation exercise with the Demography Division and the provincial and territorial statistical focal points, final estimates were released on September 26, 2013. The data were released at the same time as the new official population estimates reflecting the update of the base population to the 2011 Census. Census population counts adjusted for net population undercoverage constituted the updated estimates of the base population.

A brief description of the methodology used in the two census coverage studies is presented below:

Reverse Record Check (RRC)

In the RRC, a random sample of individuals representing the 2011 Census target population was selected from frames independent of the census, such as the list of persons enumerated in the 2006 Census and a list of intercensal births according to provincial birth registries. The 2011 RRC sample consisted of 67,840 persons in the provinces and 1,926 persons in the territories. The 2011 Census database was searched to determine whether the persons selected in the sample had indeed been enumerated.

Where necessary, interviews were conducted, mostly via computer-assisted telephone interviewing (CATI) from the regional offices (ROs), to collect further information for use in additional searches of the 2011 Census database. An interview was completed for 79.5% of the 16,955 cases sent to the ROs. The sampling weight was adjusted for non-response. The total sampling weight of non-respondents was divided among a group of respondents most like the non-respondents in their tendency to respond.

The estimate of population undercoverage is based on the number of persons in the RRC sample who were classified as 'missed.' These persons were in scope for the 2011 Census, but no evidence of enumeration could be found in the 2011 Census Response Database. Nationally, 4,745 persons in the RRC sample were classified as missed in the provinces and 901 in the territories.

Census Overcoverage Study (COS)

Overcoverage was measured by matching the final 2011 Census database to a partial list of persons who should have been enumerated according to administrative data sources, and then matching the persons not matched in the 2011 Census database to the database itself. In other words, the COS carried out one probabilistic linkage with administrative sources and another with the census database. Probabilistic linkage identifies matches that are close but not exact. A sample of pairs of potential duplicates was selected for each linkage, and demographic characteristics and names were examined to identify cases of overcoverage.

4. Census data collection

4.1 General

The data collection stage of the 2011 Census process ensured that each dwelling in Canada received a census questionnaire. The Census enumerated the entire population of Canada, which consists of Canadian citizens (by birth and by naturalization), landed immigrants and non-permanent residents, as well as family members living with them. Non-permanent residents are persons living in Canada on Census Day who have a work or study permit, or are claiming refugee status, as well as family members living with them here.

The census also counted Canadian citizens and landed immigrants who were temporarily outside the country on Census Day. This included federal and provincial/territorial government employees working outside Canada, Canadian embassy staff posted to other countries, members of the Canadian Forces stationed abroad and Canadians aboard merchant vessels.

In most urban areas, an Address Register is used to identify dwellings. This register is constructed before the census and covers about 80% of the dwellings included in the census. In the rest of the country, the list is prepared by interviewers using a Visitation Record in which they list private and collective dwellings, occupied or unoccupied, and agricultural operators and agricultural operations in their collection unit. These two registers serve as address listings for field operations and control purposes for data collection.

In the Census of Canada, various questionnaires are used to collect data, either online or in paper format:

- The 2A questionnaire is the basic questionnaire used to enumerate all private dwellings. Every household that receives a 2A census questionnaire is asked to list all household members who belong to the census population and answer questions for them.
- The 2C questionnaire is used to enumerate Canadians posted in other countries, including government employees (federal and provincial/territorial) and their families, and members of the Canadian Forces and their families.
- The 3A questionnaire is an individual census questionnaire used to enumerate persons in collective dwellings (each person in a collective dwelling must complete a separate questionnaire 3). It can also be used to enumerate usual residents in a private household who prefer to complete their own census questionnaire rather than be included in a 2A questionnaire with the other household members.

Wave methodology is an approach to data collection first used in the 2011 Census. Households are contacted at critical times to remind them to participate in the census and persuade them to complete the questionnaire. In each wave, households are provided with the information they need to respond. Based on the fact that every Canadian household is required by law to answer the census questions, the method is designed to encourage people to respond online, while mitigating the risk of a decline in overall response.

This new methodology varies with the collection method used to distribute the census materials in each region. These collection methods are described in the next section.

4.2 Delivery methods and response modes

The three delivery methods used in the Canadian census are mail-out, list/leave and enumeration by interview. To make census collection as efficient as possible, Canada is divided into small geographic units known as collection units (CUs). In the 2011 Census, there were some 46,000 CUs in Canada.

Mail-out

For mail-out CUs, the postal system is used to deliver the census materials. This method requires an accurate address register and ensures effective, coordinated distribution, without the need to recruit and train a large

contingent of enumerators. Mail-out CUs are typically in urban areas. While mail-out CUs now include about 80% of Canadian dwellings, they cover only a tiny fraction of the country's land area.

List/leave

List/leave CUs are typically in rural areas. In those areas, enumerators prepare a list of dwellings and deliver the census materials. About 18% of Canadian dwellings are in list/leave CUs, which cover a large portion of the country's land area.

Enumeration by interview

Enumeration by interview CUs are usually in remote or inaccessible places and in Aboriginal communities. To limit the number of trips that are often expensive and logistically complicated, that enumerators have to make to those places for follow-ups, they do more than prepare dwelling lists and deliver census materials, they also complete the questionnaires with the respondents on the spot. Interview CUs cover just over half of Canada's land area, but only about 2% of its dwellings.

Response modes

The Internet response mode was introduced in the 2006 Census. In 2011, some 53.9% of Canadians used this method of responding, while 31.2% completed a paper questionnaire and mailed it back. In other words, 85.1% of respondents completed the questionnaire themselves. By comparison, in 2006, 17.8% of responses were submitted via the Internet and 60.6% by mail, for a total of 78.5% of questionnaires completed by respondents.

4.3 Census wave methodology

Wave methodology was designed to encourage online response while offering an alternative for households that do not wish to complete their questionnaire online. This approach has many advantages for item response rates, questionnaire registration, question flow and data capture.

Figure 4.3.1 Overview of the wave methodology used in the 2011 Census
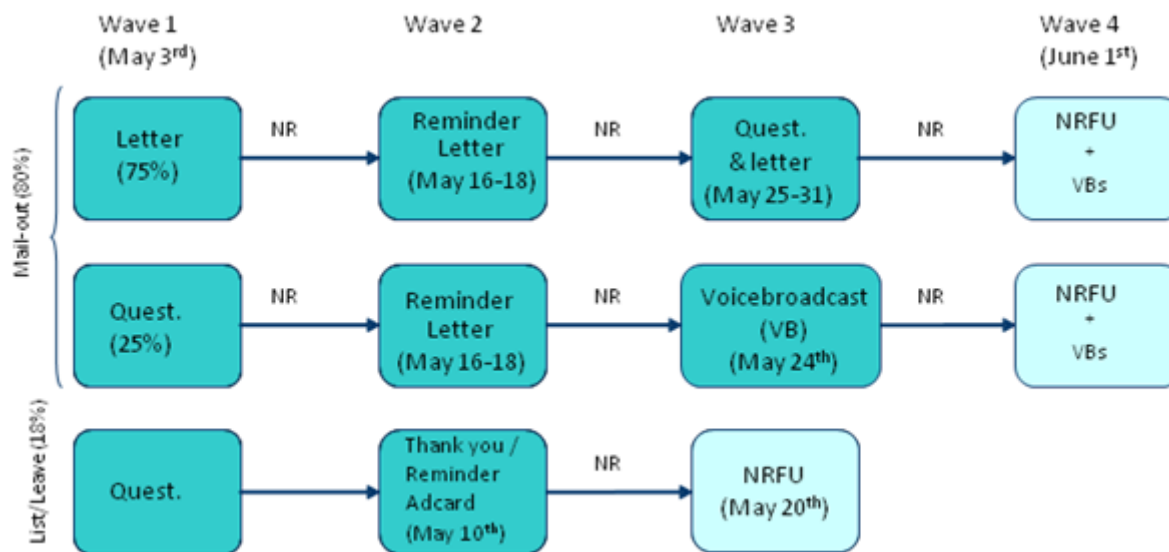
Note: NR = Non-respondents; NRFU = Non-response follow-up.

Source: Statistics Canada, 2011 Census

Wave methodology is applied differently in different CUs. Three main groups of CUs were defined, and a different wave methodology was developed for each one. Because of the nature of enumeration by interview CUs,

however, no wave methodology was developed for them. The sections below and Figure 4.3.1 provide an overview of the wave methodology used in the 2011 Census.

Mail-out collection units – Wave 1 letter

First, a set of mail-out collection units was identified so that the households most likely to respond online could be targeted and those least likely to respond to the census, on the basis of results from the previous census, could be screened out. This set of CUs covers about 75% of the dwellings in mail-out areas. For this group of CUs, Wave 1 involved sending out a letter asking households to complete the questionnaire online using the secure access code (SAC) provided or call an automated system on a toll-free line to have a paper questionnaire mailed to them. The Wave 1 letters were delivered by the postal system one week before Census Day (i.e., on May 3, 2011).

Wave 2 was a reminder letter sent to all non-respondent households. The letter reminded the households that they were required by law to complete the census. Like the Wave 1 letter, it also provided the SAC and the toll-free telephone number. It was delivered to households between May 16 and 18, i.e., as early as six days after Census Day.

In Wave 3, a paper questionnaire was sent to non-respondent households. It was delivered to them between May 25 and May 31, i.e., as early as 15 days after Census Day. The households could still respond online using a SAC printed on the front cover of the questionnaire. The questionnaire was accompanied by a letter indicating that if the questionnaire was not completed by May 31, 2011, an enumerator would contact the household by telephone or in person to complete the questionnaire. It was also noted in the letter that if the household refused to answer the census questions, the case could be referred to the Public Prosecution Service of Canada, which would take appropriate action under the *Statistics Act*.

Wave 4, which began on June 1, 2011, consisted of field non-response follow-up (NRFU) and an automated reminder call. NRFU is described in Section 4.4 of this document.

Mail-out collection units – Wave 1 questionnaire

The second group of collection units on which a variant of wave methodology was used is the set of other mail-out CUs. This set of CUs covers about 25% of the dwellings in mail-out areas. Households in these CUs are considered, on the basis of 2006 Census data and administrative data, less likely to respond after receiving only a letter. Wave 1 for these CUs was the mailing of a paper questionnaire. The questionnaire provided an SAC, so that the household had the option of responding online. As in the case of the first group, Wave 1 took place one week before Census Day (May 3). Wave 2 for the second group was the same as for the first group. In Wave 3, the group's non-respondent households for which a telephone number was available in the census frame received an automated reminder call on May 24. Wave 4 for the second group was the same as for the first group.

List/leave collection units

The third group of collection units on which a variant of wave methodology was used is the set of all list/leave CUs. In Wave 1, enumerators delivered a paper questionnaire to all dwellings in those CUs on or about May 3. The questionnaire also provided an SAC, so that the household had the option of responding online. In Wave 2, all dwellings in these CUs received a thank-you/reminder card in the mail on May 10, whether they had responded or not, because it was generally impossible in these areas to send mail to specific addresses without the occupant's name. Wave 3, the last wave, involved going directly to field NRFU as of May 20.

4.4 Verification of dwellings' occupancy status

Field operations were also carried out for the dwelling occupancy verification (DOV). The purpose of DOV, which began on May 13, 2011, was to identify a significant number of unoccupied or cancelled dwellings (addresses that

are not private or collective dwellings) before NRFU started. Identifying such dwellings close to Census Day should make dwelling classification more accurate and perhaps easier to perform. DOV also reduces the NRFU workload, since any unoccupied or cancelled dwellings it identifies do not require follow-up.

Nevertheless, errors in classifying a dwelling as occupied or unoccupied do occur during collection. Some dwellings classified as unoccupied are in fact occupied, and some non-response dwellings are unoccupied. As a result, another operation, the Dwelling Classification Survey, is carried out after NRFU. It assesses and determines the occupancy status of dwellings for which no completed questionnaire has been received (unoccupied or cancelled dwellings and unresolved cases), for a sample of these dwellings. The survey's results are used to adjust the Census of Population counts during head office processing (see Section 5.7).

4.5   Non-response follow-up

As mentioned in Section 4.3 above, the final wave in the wave methodology is non-response follow-up (NRFU), which is carried out after dwelling occupancy verification. In that wave, enumerators telephone and visit households that have not responded. Each non-respondent household for which a telephone number was available receives an automated reminder call at the beginning of the NRFU period. The message reminded non-respondents of their legal obligation to respond to the census.

The enumerators had information from the Field Management System (FMS) to help them manage their work. A computerized system accessible over the Internet, the FMS was developed for the 2011 Census to facilitate the management of enumerators' work and the gathering of collection progress information.

5. Census data processing

5.1 Introduction

This chapter discusses the processing of all the completed questionnaires, which encompasses everything from the reception of the questionnaires through the creation of an accurate and complete census database. Described below are the steps of questionnaire registration, questionnaire imaging and data capture, editing, error correction, failed edit follow-up, coding, dwelling classification and non-response adjustments and imputation.

Automated processes, implemented for the 2011 Census, had to be monitored to ensure that all Canadian residences were enumerated once and only once. The Master Control System (MCS) was built to control and monitor the process flow. The MCS held a master listing of all the dwellings in Canada where each dwelling was identified with a unique identifier. This system was updated on a daily basis with information about each dwelling's status in the Census process flow (i.e., delivered, received, processed, etc.). Reports were generated and made accessible online to the managers to ensure that census operations were efficient and effective.

5.2 Receipt and registration

Respondents completing paper questionnaires mailed them back to a data processing centre. Canada Post registered their receipt automatically by scanning the barcode on the front of the questionnaire through the transparent portion of the return envelope. The envelopes were then delivered to the Data Operations Centre. Each day, Canada Post would send a file listing the census questionnaires received at each regional processing plant, by date of receipt.

Responses received through the Internet or Census Help Line telephone interview were received directly by the Data Operations Centre and their receipt registered automatically.

The registration of each returned questionnaire was flagged almost in real time on the MCS at Statistics Canada. A list of all of the dwellings for which a questionnaire had not been received was generated by the MCS and then transmitted to field operations for follow-up. Registration updates were sent to field operations on a daily basis to prevent follow-up on households which had subsequently completed their questionnaire, either by telephone or through the Internet.

5.3 Imaging and keying from images

In 2011, the census questionnaires imaged were the three questionnaires (2A, 2C, 3A). The image quality has improved relative to 2006 with the replacement of black and white scanners with color scanners. The following steps are part of the imaging process:

- **Document preparation:** mailed-back questionnaires were removed from envelopes and foreign objects, such as clips and staples, were detached in preparation for scanning. The questionnaires were batched by questionnaires type. Questionnaires that were in a booklet format were separated into single sheets by cutting off the spine.
- **Scanning:** converted the questionnaires to digital images
- **Automated image quality assessment:** an automated system analyzes the images for errors or anomalies. Images failing this process were sent to be reviewed by a document analysis operator.
- **Document analysis:** presents images containing anomalies to an operator for review. The operator may accept the image as is, send it directly to key entry, or send it to be rescanned.
- **Automated recognition:** attempts to automatically recognize hand-written responses and marks on the questionnaire.
- **Key entry:** operators enter responses that automated recognition could not determine with sufficient confidence.

- **Check-out:** as soon as the questionnaires were processed successfully through all of the above steps, the paper questionnaires were checked out of the system. Check-out is a quality assurance process that ensures the images and captured data are of sufficient quality that the paper questionnaires are no longer required for subsequent processing. Questionnaires that had been flagged as containing errors were pulled at check-out and reprocessed.

5.4 Coverage edits

At this stage, a number of automated edits were performed on respondent data. These edits were designed to detect cases where invalid persons may have been created, either due to respondent error or data capture error. Examples include data erroneously entered in a blank person column, crossed off data that was captured in error, or data provided for the same person more than once, usually due to the receipt of duplicate questionnaires (e.g., a husband or wife completed the Internet version and their spouse filled in the paper questionnaire and mailed it back). The edits were also designed to detect the possible absence of usual residents, when data are not provided for every household member listed at the beginning of the questionnaire.

About 45% of edit failure cases were resolved by the system. The remainder were forwarded to processing clerks for resolution. An interactive system enabled the clerks to examine the captured data and compare them with the image, if available (online questionnaires would not have an image). Edit failures were resolved by deleting invalid or duplicate persons and adding missing ones (i.e., creating blank person records), as necessary, and appropriate or by conducting a follow-up with the respondents.

5.5 Completion edits and failed edit follow-up

Following the coverage edits, another set of automated edits was run on census questionnaires to detect cases where there were either too many missing responses, or there were indications that data may not have been provided for all usual residents in the household. Households failing these edits were sent for follow-up. An interviewer telephoned the respondent to resolve any coverage issues and to fill in the missing information, using a computer-assisted telephone interviewing application (CATI). The data were then sent back to the Data Operations Centre for reintegration into the system for subsequent processing.

5.6 Coding

The census questionnaire contained questions for which answers could be checked off against a list, and there was a space for a write-in if none of the choices in the list applied. These written responses underwent automated coding to assign each one a numerical code, using Statistics Canada reference files, code sets and standard classifications. Reference files for the automated match process were built using actual responses from past censuses, as well as administrative files. Specially-trained coders and subject-matter specialists resolved cases where a code could not be automatically assigned. The following questions required coding: relationship to Person 1, language spoken at home and mother tongue.

Overall 93% of the answers were coded automatically.

5.7 Classification and non-response adjustments for unoccupied and non-response dwellings

The Dwelling Classification Survey (DCS) was used to estimate the error rates in classifying dwellings in the self-enumerated collection areas of the census as occupied or unoccupied in the field. Based on this information, adjustments were made to the census database. The DCS selected a random sample of 1,729 self-enumeration CUs that were revisited in July and August 2011 to reassess the occupancy status as of Census Day for each dwelling for which no response had been received. The DCS estimated that 13.8% of the 1,099,156 dwellings classified as unoccupied were actually occupied and that 30.8% of the 317,976 dwellings with no responses that were classified as occupied or with occupancy status classified as unknown were actually unoccupied. Estimates

based on the DCS sample were used to adjust the occupancy status for individual dwellings. This resulted in an increase of 3.3% in the number of occupied dwellings, and a decrease of 5.0% in the number of unoccupied dwellings at the Canada level.

After this adjustment of the occupancy status by the DCS, occupied dwellings with total non-response had the number of usual residents (if not known) and all the responses to the census questions imputed by borrowing the unimputed responses from another household within the same CU. This process, called whole household imputation (WHI), imputed 99% of the total non-response households. Utilizing a single donor under WHI was more efficient computationally and was less likely to produce implausible results than using several donors as part of the main E & I process. Nevertheless, the other 1% of the total non-response households where no donor household was found under the WHI process was imputed as part of the main edit and imputation process.

More details on the DCS can be found in Section 6.

5.8   Edit and imputation

The data collected in any survey or census contains some omissions or inconsistencies or invalid responses. For example, a respondent might be unwilling to answer a question, fail to remember the right answer, or misunderstand the question. Other possible mistakes such as incorrect coding can also occur.

The final clean-up of data, done in the edit and imputation process, was for the most part fully automated. Two types of imputation were applied. The first type, called 'deterministic imputation,' involved assigning specific values under certain conditions when the resolution of the problem is clear and unambiguous. Detailed edit rules were applied to identify these conditions, and then the variables involved in the rules would be assigned a pre-determined value. The second type of imputation, called 'minimum-change nearest-neighbour donor imputation,' applied a series of detailed edit rules that identified any missing or inconsistent responses. When a record with missing or inconsistent responses is identified, another record with most characteristics in common with the record in error was selected. Data from this donor record were borrowed and used to make the minimum number of changes to the variables in order to resolve all missing or inconsistent responses. The Canadian Census Edit and Imputation System (CANCEIS) was the automated system used for nearly all deterministic and minimum-change nearest-neighbour donor imputation in the 2011 Census.

6. Dwelling Classification Survey

6.1 Introduction

As described in Section 5.7, census data are adjusted for occupied non-respondent dwellings. The number of people living in these dwellings is estimated by the Dwelling Classification Survey (DCS). These estimates are used in census processing to specify how many people should be imputed during whole household imputation (WHI). The second objective of the DCS is to measure three types of dwelling classification error.

One of the potential sources of error in a census is the misclassification of dwellings. When a census questionnaire is not returned from a household, the enumerator has to determine if the dwelling is occupied or not. Two types of classification error can occur. **First, an occupied dwelling can be incorrectly classified as unoccupied**. Census population undercoverage is the result of this classification error because the people living in the dwelling will not be on the census database. **Second, an unoccupied dwelling can be incorrectly classified as occupied**. When this error occurs, no questionnaire will be received for this dwelling and it will be subject to non-response follow-up (NRFU) as described in Section 4.5. If the NRFU fails to correct the dwelling's classification to unoccupied, the dwelling will continue to be considered as a non-respondent dwelling and therefore subject to imputation. This would add persons to the census database when, in fact, no one is living at that dwelling. That is, this classification error results in population overcoverage. Estimates from the DCS are used to adjust census data for both of these coverage errors.

The third component of dwelling classification error measured by the DCS is the error incurred when marginal dwellings or dwellings under construction are classified in error as dwellings. Since the dwelling would be classified as unoccupied, no population overcoverage results as only occupied dwellings can be classified as non-respondent dwellings and therefore be subject to imputation. However, there is dwelling overcoverage. Census data are not adjusted for these dwellings so census estimates of the housing stock include some degree of overcoverage.

6.2 Methodology

6.2.1 Stratification and sample selection

The DCS target population consisted of all dwellings classified as either unoccupied or non-response dwellings, excluding dwellings in collective collection units (CU), canvasser CUs and Indian reserves CUs. These areas were excluded because of cost and operational considerations.

The sample size for the DCS was set at 1,729 CUs. The sampling frame consisted of all self-enumeration CUs. Consequently, Nunavut has no in-scope CUs and hence the DCS is not conducted in Nunavut. The sample design was as follows. First, all in-scope CUs in the Yukon (50 CUs) and in the Northwest Territories (19 CUs) formed one stratum. All of these CUs were selected for the DCS sample with certainty. All of the CUs in Prince Edward Island formed a second stratum from which a simple random sample of 44 CUs was selected.

The remaining CUs were grouped into urban and rural strata. A CU was considered urban if it initially had been part of a census metropolitan area (CMA) or a census agglomeration (CA) that had 40,000 or more occupied dwellings. Further, all of the CUs within a crew leader district (CLD) were considered urban if more than 50% of the CUs in the CLD were urban. All of the remaining CUs formed the rural strata. Urban CUs were stratified by CMA and CA. A simple random sample of at least five CUs was selected within each stratum. From past census data, it was determined that five CUs was an appropriate workload for an interviewer. There were 1,092 urban CUs in the sample. In order to control field costs, the rural sample was chosen to be geographically close. This was done via a two-stage stratified random sampling design. In the first stage, CLDs were selected within each province. In the second stage, five CUs were selected from each of the selected CLDs. There were 637 rural CUs in the sample.

Sub-sampling of dwellings within a sampled CU was invoked when the number of unoccupied and non-response dwellings exceeded a maximum dwelling parameter, which was 100 in mail-out and list/leave CUs and 200 in seasonal CUs. Sub-sampling of in-scope dwellings occurred in 84 CUs. Otherwise, all unoccupied dwellings and non-response dwellings in the sampled CUs formed the DCS sample of dwellings. A total of 37,493 unoccupied and 7,557 non-response dwellings were sampled in 2011. Table 6.2.1 shows the distribution of the sample by province and territory.

Table 6.2.1 Sample size for Canada, provinces and territories

Provinces and territories	Number of collection units	Number of unoccupied dwellings	Number of non-response dwellings
Canada	**1,729**	**37,493**	**7,557**
Newfoundland and Labrador	94	3,656	316
Prince Edward Island	44	1,716	193
Nova Scotia	100	3,244	363
New Brunswick	100	2,070	417
Quebec	303	5,749	1,338
Ontario	352	7,317	1,519
Manitoba	113	1,860	452
Saskatchewan	100	1,489	308
Alberta	196	4,060	989
British Columbia	258	5,519	1,218
Yukon	50	589	319
Northwest Territories	19	224	125
Nunavut	0	0	0

Source: Statistics Canada, 2011 Dwelling Classification Survey.

6.2.2   Field interviews

Sampled dwellings in the sampled CUs that were classified as unoccupied on Census Day or classified as occupied but for which no census form had been returned, were to be checked again in late June or early July 2011 to determine the true occupancy status of the dwellings on Census Day. A DCS questionnaire was used for this purpose.

The timing of this operation was left to the discretion of each regional office (RO). In order to determine occupancy status and collect other information, enumerators were instructed to contact current occupants, neighbours, landlords, or any other person with some knowledge about the dwelling. Up to three contact attempts were made for each dwelling. If the dwelling was found to have been occupied on Census Day, the number of occupants on Census Day was also obtained.

6.2.3   Processing, coding and editing

All completed questionnaires were sent to Ottawa for processing.

Some preliminary edits and general grooming were then performed before the questionnaires were sent for data capture (key entry). Once data capture was completed, the questionnaires were subjected to an extensive set of consistency edits. The questionnaires failing edits were examined manually in order to resolve the inconsistencies.

At this point in processing, the unoccupied dwellings and the non-response dwellings in the sample were separated and the classification of these dwellings was confirmed against final census listing. The questionnaires completed for each sampled CU were matched to the final census listing of unoccupied dwellings. If a match could not be found, the sampled dwelling was discarded and no further processing was required. Dwellings listed as unoccupied on the census list for which no DCS questionnaire was received were considered as total non-response and went on to the next step of processing. Similarly, the final census listing of all dwellings for which a census questionnaire was not received was used to establish which of the DCS dwellings for which a DCS questionnaire was not received would be considered as total non-response.

Total non-response was addressed by a weighting adjustment while item imputation was used for item non-response. The procedure was the same for the unoccupied dwellings and non-response dwellings. When there was no information for a dwelling, the design weights of the respondents were adjusted to account for the design weight of the non-respondents. The adjustment was done separately by geographic post-stratum, i.e., for each of the Montréal, Toronto and Vancouver CMAs, for the remaining urban areas in each province and territory, and for the rural areas for each province and territory. Item non-response for occupancy status, number of usual residents, and dwelling type was addressed by imputation. Occupancy status was imputed first and then used in the imputation of the other variables. Design weights were then adjusted so that the sum of the adjusted weights for each geographic post-stratum equaled the number of unoccupied/non-response dwellings.

6.2.4 Census whole household imputation

Once the DCS estimates were produced, census data were adjusted for non-respondent dwellings and for occupied dwellings classified in error as unoccupied. This was done in the whole household imputation (WHI) step of census processing as follows for the non-respondent dwellings; unoccupied dwellings were handled in a similar but simpler fashion. First, all the non-respondent dwellings within a DCS geographic post-stratum were identified. Second, any non-respondent dwelling for which field collection had obtained the number of usual residents was deemed to be occupied and assigned the recorded household size. Finally, an additional number of non-respondent dwellings was randomly selected and imputed as occupied. The selection was done so that the final number of non-respondent dwellings converted to occupied dwellings in the post-strata equaled the DCS estimate of occupied dwellings in the non-respondent dwelling universe. This process resulted in all private dwellings on the census database being classified as either occupied or unoccupied.

A procedure, constrained on the DCS estimates by post-stratum and household dwelling size was used to impute the household dwelling size and other variables for the selected non-respondent dwelling. Household size was determined by randomly selecting a dwelling from all dwellings that had completed a census questionnaire in the same CU. The complete record from this donor household was then assigned to the non-respondent dwelling. If no donor was found, then only a household size was assigned.

More information on WHI can be found in Dick (2013).

6.3 Estimates

Census data are adjusted for non-respondent dwellings and for occupied dwellings that are classified in error as unoccupied using DCS estimates. The estimates are given in Sections 6.3.1.1 and 6.3.2. Census data are not adjusted for marginal dwellings or dwellings under construction that are classified in error as dwellings. Section 6.3.1.2 presents estimates of the number of marginal dwellings and dwellings under construction that are classified in error as dwellings and therefore erroneously included in the housing stock.

6.3.1 Unoccupied dwellings

6.3.1.1 Occupied dwellings misclassified as unoccupied

Table 6.3.1.1.1 gives the estimated number of dwellings classified as unoccupied that should have been classified as occupied, and the corresponding error rate for unoccupied dwellings by urban and rural,[3] and by province and territory. For comparison, Table 6.3.1.1.2 gives the same estimates for the 2006 Census. Table 6.3.1.1.3 gives the estimated number of persons living in occupied dwellings misclassified as unoccupied. Table 6.3.1.1.4 shows the number of households and persons added to the initial 2011 Census counts to adjust for these misclassifications.

Table 6.3.1.1.1 shows that 13.8% of all dwellings classified as unoccupied were actually occupied. This is a decrease from 17.4% found in 2006. The misclassification of dwellings was more prevalent in urban areas (19.3%) than in rural areas (6.5%). Both areas show decreases from 2006. Decreases in the misclassification rates occurred for all provinces except New Brunswick where it increased.

Among the provinces and territories, British Columbia had the highest misclassification rate, 15.9%, followed by Alberta, 15.2%, Quebec, 14.9%, Ontario, 14.8% and the Yukon, 13.1%. The rates for the other provinces and territories ranged from 11.2% for New Brunswick to 5.7% for Newfoundland and Labrador and Prince Edward Island.

Because of error in the initial classification of dwellings, approximately 151,152 households were not enumerated in the 2011 Census. This is the number of households added to the census during WHI. Table 6.3.1.1.4 shows the number of households and persons added to adjust for occupied dwellings misclassified as unoccupied.

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3. Urban refers to urban areas with a population of over 50,000 persons. The remaining geographies constitute the rural areas.

Table 6.3.1.1.1 Number of occupied dwellings misclassified as unoccupied dwellings, for various geographic areas, 2011 Census

Geographic areas	Number of unoccupied dwellings	Occupied dwellings misclassified as unoccupied			
		estimated number	standard error	estimated rate (%)	standard error (%)
Canada	**1,099,156**	**151,152**	**8,153**	**13.8**	**0.7**
Urban > 50,000	622,309	120,322	7,375	19.3	1.2
Rural	476,847	30,830	3,690	6.5	0.8
Atlantic provinces	**126,074**	**9,611**	**1,007**	**7.6**	**0.8**
Newfoundland and Labrador	39,016	2,240	391	5.7	1.0
Prince Edward Island	9,493	537	132	5.7	1.4
Nova Scotia	46,338	3,350	664	7.2	1.4
New Brunswick	31,227	3,484	635	11.2	2.0
Quebec	248,311	36,952	4,374	14.9	1.8
Ontario	374,639	55,366	6,564	14.8	1.8
Prairies	**180,821**	**22,422**	**1,602**	**12.4**	**0.9**
Manitoba	36,357	3,047	432	8.4	1.2
Saskatchewan	40,901	3,632	535	8.9	1.3
Alberta	103,563	15,743	1,447	15.2	1.4
British Columbia	168,421	26,695	1,487	15.9	0.9
Territories	**890**	**107**	**0**	**12.0**	**0.0**
Yukon	654	85	0	13.1	0.0
Northwest Territories	236	21	0	8.9	0.0

Source: Statistics Canada, 2011 Dwelling Classification Survey.

Table 6.3.1.1.2 Number of occupied dwellings misclassified as unoccupied dwellings for various geographic areas, 2006 Census

Geographic areas	Number of unoccupied dwellings	Occupied dwellings misclassified as unoccupied			
		estimated number	standard error	estimated rate (%)	standard error (%)
Canada	**934,565**	**162,897**	**10,915**	**17.4**	**1.2**
Urban > 50,000	495,781	127,404	10,052	25.7	2.0
Rural	438,784	35,493	3,900	8.1	0.9
Atlantic provinces	**119,899**	**12,937**	**983**	**10.8**	**0.8**
Newfoundland and Labrador	34,267	2,510	344	7.3	1.0
Prince Edward Island	9,077	711	160	7.8	1.8
Nova Scotia	45,298	6,765	825	14.9	1.8
New Brunswick	31,257	2,953	379	9.4	1.2
Quebec	192,297	40,479	3,796	21.1	2.0
Ontario	363,808	58,111	8,837	16.0	2.4
Prairies	**139,653**	**21,078**	**2,308**	**15.1**	**1.7**
Manitoba	35,126	3,755	838	10.7	2.4
Saskatchewan	43,899	4,377	696	10.0	1.6
Alberta	60,628	12,946	2,035	21.4	3.4
British Columbia	118,087	30,154	4,511	25.5	3.8
Territories	**821**	**137**	**24**	**16.7**	**2.9**
Yukon	307	72	9	23.5	2.9
Northwest Territories	514	65	22	12.6	4.3

Source: Statistics Canada, 2006 Dwelling Classification Survey.

Table 6.3.1.1.3 Estimated number of persons living in misclassified occupied dwellings and standard errors, for various geographic areas, 2011 Census

Geographic areas	Estimated number	Standard error
Canada	**293,160**	**15,700**
Urban > 50,000	235,510	14,551
Rural	57,651	6,342
Atlantic provinces	**18,533**	**1,941**
Newfoundland and Labrador	4,702	890
Prince Edward Island	977	226
Nova Scotia	6,378	1,299
New Brunswick	6,476	1,111
Quebec	64,180	7,376
Ontario	108,791	13,069
Prairies	**44,508**	**3,356**
Manitoba	5,633	994
Saskatchewan	7,257	1,205
Alberta	31,619	2,971
British Columbia	56,942	3,422
Territories	**206**	**0**
Yukon	167	0
Northwest Territories	39	0

Source: Statistics Canada, 2011 Dwelling Classification Survey.

Table 6.3.1.1.4 Imputed households and persons, for various geographic areas, 2011 Census

Geographic areas	Number of imputed households	Number of imputed persons
Canada	**151,152**	**293,160**
Urban > 50,000	120,322	235,510
Rural	30,830	57,651
Atlantic provinces	**9,611**	**18,533**
Newfoundland and Labrador	2,240	4,702
Prince Edward Island	537	977
Nova Scotia	3,350	6,378
New Brunswick	3,484	6,476
Quebec	36,952	64,180
Ontario	55,366	108,791
Prairies	**22,422**	**44,508**
Manitoba	3,047	5,633
Saskatchewan	3,632	7,257
Alberta	15,743	31,619
British Columbia	26,695	56,942
Territories	**107**	**206**
Yukon	85	167
Northwest Territories	21	39

Source: Statistics Canada, 2011 Dwelling Classification Survey.

6.3.1.2   Housing stock overcoverage

Table 6.3.1.2 shows the estimated number of unoccupied dwellings not in the housing stock and the corresponding error rate for unoccupied dwellings for various geographic areas. No adjustments were made to the census database to account for dwellings not in the housing stock that were erroneously classified as unoccupied.

The enumeration of unoccupied dwellings that fall outside the housing universe results in overcoverage of dwellings. Dwellings are considered to be outside the housing universe if they are used for commercial purposes, if they are not habitable year round, or if they are double counted in the census. This last situation can happen when the dwelling appears to have two addresses associated with it, or when two questionnaires are mistakenly returned for a dwelling which no longer contains a separate apartment within it.

The Dwelling Classification Survey estimates of the number of unoccupied dwellings misclassified as dwellings are not used to adjust the census database because of the degree of subjectivity associated with classifying a dwelling as suitable for year-round occupancy. A dwelling must have a source of heat or power and provide complete shelter from the elements to be considered as suitable. It is sometimes difficult to tell whether or not a dwelling is habitable for example, when the dwelling is a cottage; when the dwelling is under construction and almost complete; or when the dwelling has deteriorated.

Dwellings outside the housing stock account for 8.4% of all dwellings classified as unoccupied. Among the provinces and territories, the incidence of dwellings outside the housing stock having been classified as unoccupied ranges from 3.1% in Prince Edward Island to 24.8% in the Yukon. The problem is more prevalent in urban areas (10.3%) than rural areas (5.8%).

Dwellings actually outside the housing stock represent 0.6% of all private dwellings in the 2011 Census. This is a decrease from the 2006 error rate of 2.5%. Among the provinces and territories, the error ranges from a rounded low of 0.0% in the Northwest Territories to a high of 1.1% in British Columbia.

Table 6.3.1.2 Dwellings not in housing stock misclassified as unoccupied dwelling, for various geographic areas, 2011 Census

Geographic areas	Number of unoccupied dwellings	Dwellings not in housing stock misclassified as unoccupied dwellings			
		estimated number	standard error	estimated rate[1] (%)	standard error (%)
Canada	**1,099,156**	**91,928**	**4,934**	**8.4**	**0.4**
Urban > 50,000	622,309	64,066	4,175	10.3	0.7
Rural	476,847	27,863	2,706	5.8	0.6
Atlantic provinces	**126,074**	**6,506**	**562**	**5.2**	**0.4**
Newfoundland and Labrador	39,016	1,828	288	4.7	0.7
Prince Edward Island	9,493	295	72	3.1	0.8
Nova Scotia	46,338	1,602	337	3.5	0.7
New Brunswick	31,227	2,781	337	8.9	1.1
Quebec	248,311	20,096	2,217	8.1	0.9
Ontario	374,639	26,022	2,842	6.9	0.8
Prairies	**180,821**	**18,550**	**2,706**	**10.3**	**1.5**
Manitoba	36,357	3,471	859	9.5	2.4
Saskatchewan	40,901	2,790	599	6.8	1.5
Alberta	103,563	12,289	2,495	11.9	2.4
British Columbia	168,421	20,588	2,030	12.2	1.2
Territories	**890**	**166**	**0**	**18.7**	**0.0**
Yukon	654	162	0	24.8	0.0
Northwest Territories	236	4	0	1.8	0.0

1. The rate is the estimated number of occupied non-response dwellings as a percent of all non-response dwellings.

Source: Statistics Canada, 2011 Dwelling Classification Survey.

6.3.2   Non-response dwellings

6.3.2.1   Persons added in non-response dwellings

Table 6.3.2.1.1 gives the estimated number and rate of occupied non-response dwellings in the census by urban (> 50,000) and rural and by province and territory. Table 6.3.2.1.2 gives the number of persons estimated by the DCS to be living in these non-response dwellings while Table 6.3.2.1.3 gives the same information for the 2006 DCS.

Table 6.3.2.1.1 shows that 69.2% of all dwellings classified as non-response were actually occupied. The census did a slightly better job of classifying non-response dwellings in urban areas (71.7%) than it did in rural areas (59.8%). At the province and territory level in 2011, the Northwest Territories had the highest rate of correctly classified non-response dwellings at 87.4%, while Prince Edward Island had the lowest rate at 56.1%.

Table 6.3.2.1.2 shows the number of non-response dwellings in the 2011 Census, and gives the number of persons added in those dwellings through the DCS. Table 6.3.2.1.3 shows the same data from the 2006 DCS. In 2011, a total of 443,098 persons were added to the census in 220,181 dwellings. The comparable 2006 numbers are 571,521 persons in 259,894 dwellings.

Table 6.3.2.1.1 Occupied non-response dwellings, for various geographic areas, 2011 Census

Geographic areas	Number of non-response dwellings	Occupied non-response dwellings			
		estimated number	standard error	estimated rate[1] (%)	standard error (%)
Canada	**317,976**	**220,181**	**3,160**	**69.2**	**1.0**
Urban > 50,000	252,675	181,105	2,506	71.7	1.0
Rural	65,301	39,076	1,980	59.8	3.0
Atlantic provinces	**24,699**	**16,582**	**465**	**67.1**	**1.9**
Newfoundland and Labrador	4,133	2,720	186	65.8	4.5
Prince Edward Island	1,343	753	50	56.1	3.7
Nova Scotia	10,082	7,162	332	71.0	3.3
New Brunswick	9,141	5,946	263	65.0	2.9
Quebec	74,957	54,110	1,481	72.2	2.0
Ontario	108,101	76,310	2,199	70.6	2.0
Prairies	**60,619**	**39,587**	**1,125**	**65.3**	**1.9**
Manitoba	11,706	7,657	497	65.4	4.2
Saskatchewan	10,487	6,595	563	62.9	5.4
Alberta	38,426	25,335	838	65.9	2.2
British Columbia	48,965	33,063	1,301	67.5	2.7
Territories	**635**	**530**	**0**	**83.4**	**0.0**
Yukon	455	373	0	81.9	0.0
Northwest Territories	180	157	0	87.4	0.0

1. The rate is the estimated number of occupied non-response dwellings as a percent of all non-response dwellings.

Source: Statistics Canada, 2011 Dwelling Classification Survey.

Table 6.3.2.1.2 Persons living in occupied non-response dwellings, for various geographic areas, 2011 Census

Geographic Areas	Occupied non-response dwellings		Persons living in occupied non-response dwellings	
	estimated number	standard error	estimated number	standard error
Canada	**220,181**	**3,160**	**443,098**	**8,924**
Urban > 50,000	181,105	2,506	361,319	7,604
Rural	39,076	1,980	81,778	4,841
Atlantic provinces	**16,582**	**465**	**33,240**	**1,221**
Newfoundland and Labrador	2,720	186	5,478	463
Prince Edward Island	753	50	1,476	129
Nova Scotia	7,162	332	14,496	804
New Brunswick	5,946	263	11,790	783
Quebec	54,110	1,481	101,503	4,021
Ontario	76,310	2,199	159,370	6,382
Prairies	**39,587**	**1,125**	**81,567**	**3,289**
Manitoba	7,657	497	16,260	1,542
Saskatchewan	6,595	563	13,892	1,571
Alberta	25,335	838	51,415	2,444
British Columbia	33,063	1,301	66,433	3,471
Territories	**530**	**0**	**985**	**0**
Yukon	373	0	696	0
Northwest Territories	157	0	289	0

Source: Statistics Canada, 2011 Dwelling Classification Survey.

Table 6.3.2.1.3 Persons living in occupied non-response dwellings, for various geographic areas, 2006 Census

Geographic areas	Occupied non-response dwellings		Persons living in occupied non-response dwellings	
	estimated number	standard error	estimated number	standard error
Canada	**259,894**	**3,030**	**571,521**	**3,918**
Urban > 50,000	223,821	2,750	489,840	3,477
Rural	36,074	1,265	81,681	1,774
Atlantic provinces	**15,578**	**647**	**31,059**	**823**
Newfoundland and Labrador	2,722	284	5,783	360
Prince Edward Island	762	69	1,458	90
Nova Scotia	7,991	472	15,215	593
New Brunswick	4,103	333	8,603	434
Quebec	82,877	1,552	171,274	1,927
Ontario	72,111	1,594	163,184	2,083
Prairies	**43,457**	**1,200**	**97,102**	**1,677**
Manitoba	8,104	273	16,952	373
Saskatchewan	6,296	381	13,587	474
Alberta	29,057	1,105	66,563	1,564
British Columbia	45,627	1,540	108,296	1,952
Territories	**245**	**9**	**607**	**10**
Yukon	83	7	131	7
Northwest Territories	161	6	476	7

Source: Statistics Canada, 2006 Dwelling Classification Survey.

6.3.2.2   Dwellings not in the housing stock misclassified as non-response

Table 6.3.2.2 shows the 2011 Census dwelling classification error from dwellings erroneously classified as non-response because they should not have been included in the housing stock. Section 6.3.1.2 provides the definition of dwellings outside of the housing universe and comments on the difficulty in determining whether a dwelling should be included in the housing stock. At the national level, dwellings outside the housing stock account for 4.5% of all non-response dwellings. The error rate is similar in rural areas (4.3%) and urban areas (4.6%). For provinces and territories, the incidence of dwellings outside the housing stock having been classified as non-response ranges from 2.1% in Saskatchewan to 5.7% in British Columbia. At the national level, non-response dwellings outside the housing stock account for 0.1% of all private dwellings. This error is 0% in the Northwest Territories, rounded to 0% in Saskatchewan and rounded to 0.1% in all other provinces and territories.

Table 6.3.2.2 Dwellings not in housing stock misclassified as non-response dwellings, for various geographic areas, 2011 Census

Geographic areas	Number of non-response dwellings	Dwellings not in housing stock misclassified as non-response dwellings			
		estimated number	standard error	estimated rate[1] (%)	standard error (%)
Canada	**317,976**	**14,370**	**1,094**	**4.5**	**0.3**
Urban > 50,000	252,675	11,544	940	4.6	0.4
Rural	65,301	2,825	578	4.3	0.9
Atlantic provinces	**24,699**	**1,039**	**208**	**4.2**	**0.8**
Newfoundland and Labrador	4,133	154	50	3.7	1.2
Prince Edward Island	1,343	73	17	5.5	1.3
Nova Scotia	10,082	339	106	3.4	1.1
New Brunswick	9,141	473	171	5.2	1.9
Quebec	74,957	3,934	668	5.2	0.9
Ontario	108,101	4,332	657	4.0	0.6
Prairies	**60,619**	**2,273**	**381**	**3.7**	**0.6**
Manitoba	11,706	582	132	5.0	1.1
Saskatchewan	10,487	218	87	2.1	0.8
Alberta	38,426	1,472	347	3.8	0.9
British Columbia	48,965	2,777	391	5.7	0.8
Territories	**635**	**15**	**0**	**2.3**	**0.0**
Yukon	455	15	0	3.2	0.0
Northwest Territories	180	0	0	0.0	0.0

1. The rate is the estimated number of occupied non-response dwellings as a percent of all non-response dwellings.

Source: Statistics Canada, 2011 Dwelling Classification Survey

7.   Reverse Record Check

The primary purpose of the Reverse Record Check is to estimate the number of persons in the 2011 Census target population who were not enumerated by the census at the national, provincial and territorial levels. A sample of approximately 70,000 persons was selected from six sampling frames independent of the 2011 Census. The data for the selected persons (SPs) was matched with tax data and other administrative sources to obtain recent information about their usual residence, contact addresses and household members or associated groups of persons.

A series of complex automated matches and manual searches were performed to find each SP in the 2011 Census Response Database (RRC RDB). The RRC RDB is an early version of the final 2011 Census Response Database that was available before the end of census processing. There are some minor differences between the RRC RDB and later versions of the census databases. In particular, the RRC RDB, which is a database of persons, contains all census records for persons with three exceptions. The first exception involves census records imputed through whole household imputation (WHI). The second group consists of census records with invalid or incomplete names, or invalid or incomplete birth dates. This group is also known as the 'incompletely enumerated.' The third group consists of all census records that were added late, after the start of RRC processing.

When the search produced no matches, a multimode collection process was initiated to determine whether the SP was a member of the target population and to obtain additional information (including addresses) to help find the SP in the RDB. At the end of the search, each SP was classified as out of scope (deceased, emigrated, temporarily outside Canada), enumerated or missed. A small number of non-response cases, consisting mostly of persons who could not be traced during collection, had to be processed and were used to adjust respondent weights with a non-response adjustment model.

7.1   Sampling

The sampling frame for the RRC's target population, which includes all persons who should have been enumerated in the 2011 Census, was constructed from six sources independent of the census. The first five frames were used to select a sample for estimating undercoverage in the ten provinces, while estimates for the three territories were calculated using samples from the last frame only.

At the provincial level, we began with the persons who were in the 2006 Census target population. They represented all persons enumerated in the 2006 Census along with the persons missed by the census, represented by the portion of the sample of SPs from the 2006 RRC who were classified as missed. To represent persons added to the target population since the previous census, we added intercensal births and immigrants (i.e., people who were born and immigrated between the 2006 and 2011 censuses) and non-permanent residents on Census Day. The data sources for these frames are as follows:

*   Census frame: Persons who were enumerated in the 2006 Census and appear in the 2006 RDB.
*   Missed frame: There is no comprehensive list of missed persons. However, there is a representative sample of these persons; the 2006 RRC sample of SPs classified as missed. They were included in the 2011 sample with their 2006 weights.
*   Birth frame: Vital statistics data on intercensal births. Since the final vital statistics file on births was late in becoming available, the RRC sample of births was selected from a mix of vital statistics preliminary, final and raw data files. In addition, to have all samples within the prescribed timeframe, the 2011 sample of births for Newfoundland and Labrador was selected from the Canada Revenue Agency's Canada Child Tax Benefit file.
*   Immigrant frame: Administrative data from Citizenship and Immigration Canada on immigrants who arrived in Canada during the intercensal period.

- Non-permanent resident (NPRs) frame: Administrative data from Citizenship and Immigration Canada on persons claiming refugee status on Census Day and persons holding a work or study permit valid on Census Day.

For each territory, the only frame was the health insurance files for persons eligible for health care on Census Day.

Table 7.1.1 provides a description of each frame and the size of the sample selected from each one.

Table 7.1.1 Sample size, sampling frames for Canada

Sampling frames	Definition	Number of persons
Canada	…	**69,766**
Provinces	…	**67,840**
2006 Census	All persons enumerated in the 2006 Census.	54,772
Missed	All persons from the 2006 Reverse Record Check (RRC) sample who were classified as missed or as incompletely enumerated. Their weight is their 2006 RRC weight.	5,431
Births	All children born between May 16, 2006 and May 9, 2011.	3,619
Immigrants	All landed immigrants who arrived in Canada between May 16, 2006 and May 9, 2011.	2,548
Non-permanent residents	All persons from another country, who held employement or student permits covering May 10, 2011 and persons claiming refugee status on May 10, 2011. Family members living with them in Canada are also in this frame.	1,470
Territories	…	**1,926**
Health care files	All persons listed in the health care files of the Yukon, the Northwest Territories and Nunavut who were living in these territories on May 10, 2011.	1,926

... not applicable

Source: Statistics Canada, 2011 Reverse Record Check.

None of the first five frames for the provinces covered persons who had emigrated or were out of the country at the time of the 2006 Census, did not complete a census questionnaire and returned during the intercensal period ('returning Canadians within a province'). According to population estimates, there were 234,673 persons in this group. In addition, there were 12,169 persons returning from a territory to a province, and 13,228 persons from Indian reserves or Indian settlements who were partially enumerated in 2006 and enumerated in 2011. Because of these gaps, coverage error estimates do not include these populations, which total an estimated 260,070 persons.

One problem with the use of multiple sampling frames is the possibility that someone will be included in more than one frame. For example, a person in the immigrants frame may have been in Canada on a work permit in May 2006 and thus have been enumerable in the 2006 Census. The person would then be in both the immigrants frame and the census frame if he or she was enumerated, or in the immigrants frame and the missed frame if not enumerated. Consequently, it is important to identify all cases of frame overlap. If this is not done, estimates may be too high because some people are included twice in the frames. Though such overlap was identified wherever possible when the sampling frames were constructed, some overlap was also identified later using information provided by respondents.

It was decided that the total size of the 2011 sample would be similar to that of the 2006 RRC. Sample allocation was done in two stages. First, the national sample was allocated to the provinces using a combination of equal-variance allocation, to obtain the same variance for all provincial undercoverage rate estimates, and optimal allocation, to find the national undercoverage rate estimate with the smallest variance. Second, the provincial samples were allocated to the provincial strata. This was done by optimal allocation based on historical undercoverage rates, historical non-response rates, and stratum size. The only exception was the missed frame: everyone who was classified as missed in the 2006 RRC was selected. It should be noted that incomplete enumerations and late enumerations in 2006 were considered missed (or not enumerated) and were included in this frame. This expanded frame covered a larger proportion of the population than the frame used in the 2006 RRC (since the frame used in the 2006 and previous censuses did not cover incomplete enumerations), thus reducing the census frame's coverage. Note that the resulting allocation was only approximately optimal, since assumptions were made about the size of certain populations, including the expected number of intercensal births and immigrants at the time of the allocation. The actual sample size for the provincial sample of births, immigrants and non-permanent residents was unknown until all the samples had been selected. The final total allocated sample was 69,766 persons distributed across the frames (67,840 in the provinces, and 1,926 in the territories). Table 7.1.2 shows the final sample allocation by stratum for all provinces.

Table 7.1.2 Sample allocation, sampling frames, strata for all provinces

Sampling frames	Strata within each province[1]	Number of persons
All	…	**67,840**
2006 Census	Females, 0 to 12 years	3,922
	Females, 13 to 24 years	5,303
	Females, 25 to 34 years, married	1,875
	Females, 25 to 44 years, not married	2,956
	Females, 35 years and over, married	7,715
	Females, 45 years and over, not married	3,984
	Males, 0 to 12 years	3,945
	Males, 13 to 24 years	6,144
	Males, 25 to 34 years, married	1,713
	Males, 25 to 44 years, not married	3,879
	Males, 35 years and over, married	8,426
	Males, 45 years and over, not married	2,844
	On reserve	2,066
Missed	No further stratification	5,431
Births	No further stratification	3,619
Immigrants	No further stratification	2,548
Non-permanent residents	No further stratification	1,470

… not applicable

1. In Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario and British Columbia persons in common-law relationships are included in the married strata.

Source: Statistics Canada, 2011 Reverse Record Check.

Table 7.1.3 shows the allocation by stratum for all territories.

Table 7.1.3 Sample allocation, strata for territories

Strata	Number of persons
Total	**76,711**
Matched	**74,785**
Unmatched	**1,926**
Females, 0 to 19 years	270
Females, 20 to 24 years	101
Females, 25 to 34 years	165
Females, 35 to 44 years	135
Females, 45 years and over	190
Males, 0 to 19 years	283
Males, 20 to 24 years	110
Males, 25 to 34 years	206
Males, 35 to 44 years	184
Males, 45 years and over	282

Source: Statistics Canada, 2011 Reverse Record Check.

Table 7.1.4 shows the sample allocation for Canada, provinces and territories.

Table 7.1.4 Sample allocation for Canada, provinces and territories.

Provinces and territories	Number of persons
Canada	**144,551**
All provinces	**67,840**
Newfoundland and Labrador	3,846
Prince Edward Island	4,003
Nova Scotia	5,428
New Brunswick	5,037
Quebec	8,601
Ontario	12,044
Manitoba	6,022
Saskatchewan	5,429
Alberta	6,877
British Columbia	10,553
All territories	**76,711**
Matched	74,785
Unmatched	1,926
Yukon	**28,035**
Matched	27,467
Unmatched	568
Northwest Territories	**30,482**
Matched	29,629
Unmatched	853
Nunavut	**18,194**
Matched	17,689
Unmatched	505

Source: Statistics Canada, 2011 Reverse Record Check.

The sample design varied by frame depending on the nature of the list used. In the 2006 Census frame, the sample design was a one-stage stratified design. The population was stratified by province of residence, sex, age and marital status. People enumerated on Indian reserves in the 2006 Census were placed in separate strata. In the territories frame, the sample design was also a one-stage stratified design. The population was stratified by territory of residence, sex and age. As mentioned previously, we used optimal allocation to select the sample in each stratum. The sample was allocated to strata in order to minimize the standard error of the estimate of missed persons.

Sampling fractions were not the same in all strata. To make the sample design more efficient, higher sampling rates were applied in subgroups for which high undercoverage or a lower tracing rate was expected. For example, as in the 2006 RRC, never-married males aged 20 to 24 in 2011 had a greater probability of being selected, since it had been observed in previous RRCs that undercoverage was consistently higher in that stratum. As a result of increased interest in studies of Aboriginal populations, the samples in the provincial strata for persons enumerated on Indian reserves in the 2006 Census were larger than called for by optimal allocation.

The missed frame is a sample-based frame since there is no list of all persons missed in the 2006 Census. The sample for this frame consisted of all cases classified as 'missed' in the 2006 RRC. This frame now covers late enumerations and incomplete enumerations, i.e., cases for which names and/or birth dates are incomplete in the 2006 Census database. Strictly speaking, the sample was not stratified, but there was an implicit stratification since the 2006 missed cases were from different frames and strata.

For the births frame, copies of intercensal birth registrations were obtained from vital statistics or, for some provinces, through the National Routing System, which provides faster access to such data. The frame was then stratified by mother's province of residence. Provincial samples were selected systematically, after sorting by the child's date of birth. In the past, data on births in the census year were usually not available in time to be sent to collection. For the 2011 RRC, however, we were able to select the births earlier and proceed with collection for the SPs that required this step. To do this for Newfoundland and Labrador, we had to rely on sampling using Canada Child Tax Benefit files.

The immigrants frame was constructed with immigration records obtained from Citizenship and Immigration Canada. This frame was stratified by province. Provincial samples were selected systematically, after sorting by year of immigration.

The non-permanent residents frame (permit holders and refugee claimants) was constructed with records from Citizenship and Immigration Canada. The records were sorted by province. Provincial samples were selected systematically after sorting by type of permit and refugee status to ensure that each of these groups was adequately represented.

The sampling methodology for the territories was similar to the one used in 2006. The sampling frames for the three territories were constructed from their respective health insurance files. The people listed in the sampling frame for each territory were then matched with the 2011 Census Response Database (RDB) using systems developed for information processing (see Section 7.2.1). This frame excludes incomplete enumerations and late enumerations, which were not available at processing time. A manual verification was also performed to ensure that the matched cases were actually the same people. Matched persons were classified as enumerated and assigned a weight of 1. Persons not classified as enumerated were then stratified by age and sex (see Table 7.1.3). After sorting by geography, a one-stage systematic sample was selected in each stratum.

Following selection of the provincial and territorial samples, the next step was to prepare the samples, which included checking the quality of the information for the geographic and demographic variables of interest. For example, we checked the accuracy of names and the validity of birth dates. Addresses were standardized to facilitate subsequent processing. To update the geographic information, especially for the census sample and the missed sample, for which the information was from 2006, we performed a match with Canada Revenue Agency (CRA) files, including personal income tax files for 2005 to 2010 and 2011-2012 Canada Child Tax Benefit files. We also checked whether any selected persons had died, using CRA files and vital statistics data. This preparation stage was very important, because it helped to identify enumerated persons in the census frames and contact persons not classified as enumerated so that they could be interviewed.

7.2 Processing and classification

7.2.1 Processing

The purpose of processing is to provide information for the classification of selected persons (SPs) for purposes of estimation and non-response adjustment. Specifically, processing is carried out to:

1. determine whether the SPs are enumerated in the Census Response Database
2. determine whether the SPs are in the census target population
3. provide further information for non-response adjustment.

The results of processing were recorded in a classification assigned to each SP for estimation and tabulation purposes (see Section 7.4 and Section 9).

Most of the work in processing involved automated and computer-assisted searching of the RRC version of the 2011 Census Response Database (RRC RDB) to determine whether the SP was enumerated or not.

Various elements of information were used for searching, including surnames, given names and birth dates. Telephone numbers and addresses associated with the SP or members of his/her household were also used. Questionnaires in which the SP could have been listed were identified from a variety of sources, including the following:

- matches with the RRC RDB using the birth date and sex of the SP and members of his/her household, or the SP's name, postal code or telephone number
- selection addresses from the sampling frame
- address updates from tax records
- information from the computer-assisted telephone interview (CATI) (see Section 7.3).

The first step after sample preparation was to process all SPs with questionnaires identified using sampling frame data and tax data to search the RRC RDB for each SP. There were two outcomes. When the SP was found, the 'enumerated' classification was assigned in most cases, and no further processing was required. When the SP was not found, the case was sent to collection. SPs identified as deceased were not sent to collection. While collection was taking place, searching of the RRC RDB continued; in a few cases, the SP was found and collection was halted. When CATI data were available, we were able to determine whether the SP was part of the census target population. If so, the CATI data were used as input for further searching.

Searching for SPs in the RRC RDB based on identified questionnaires was done both automatically and manually by the clerical staff. Automated searching was performed first as follows: for SPs matched with the RRC RDB, there was a corresponding 2011 Census questionnaire. First, we calculated a measure of similarity between the census questionnaire and the RRC data. When this measure was above a specified threshold, it was automatically concluded that the SP was listed in that questionnaire. If so, neither that questionnaire nor the other questionnaires associated with that SP needed to be processed by the Bureau staff. Computer programs also determined when one address was a duplicate of another address being used for searching. Such duplicate addresses were not processed.

The clerical staff used a number of tools for manual searching, and coding was done with DocLink's Interactive Verification Application (DIVA). Some census questionnaires were identified as not having a strong enough match for the SP to be automatically classified as enumerated. In addition, some census collection units associated with the address were identified. Staff members were also able to search the RRC RDB based on flexible parameters. Electronic telephone directories were searched as well. To ensure coding uniformity, coding staff were provided with a highly detailed procedures manual that spelled out the specific steps for coding the search results. In addition, the results of the manual search were automatically edited to minimize errors. A file containing the search results was then produced. The data in this file were used to classify the SPs.

7.2.2   Classification

Processing provides the information required to determine which SPs were:

- 'listed' or 'not listed'
- 'mobile' or 'not mobile'
- included in the 'census target population' or 'out of scope' (not included)
- 'enumerated'
- 'missed'
- 'classified' or 'not classified.'

Some SPs were in three or four of these categories. Other SPs did not belong to any of these groups. This is explained in more detail later in this section.

7.2.2.1   'Target population' or 'out of scope' classification

The 'census target population' includes the group of persons listed in Section 2.2. An SP is considered 'out of scope' if he/she is not in the census target population. Each SP classified 'out of scope' is assigned a reason for the classification, such as death, emigration, or representation by another sampling frame. For a person to be classified as deceased, he/she must appear in the vital statistics death files or have been reported deceased in income tax files or the collection interview. SPs classified in the census target population are either 'enumerated,' 'missed' or 'not classified' (see Section 7.2.2.2). An SP is considered 'enumerated' if he/she is in the RRC RDB. The 'missed' classification is assigned to SPs in the census target population who were not enumerated.

7.2.2.2   Classification for non-response and non-response adjustment

The definitions of 'listed,' 'mobile' and 'not classified' depend on how useful the addresses and the CATI information were in determining the classification. In many cases, collection provided information as well as one or more addresses that were not available from other sources. In other cases, all the information and all the addresses obtained during collection were also available from other sources.

An SP was 'listed' if he/she was classified without using CATI data; even if data were collected, the information and address(es) collected in the interview were not required.

An SP was considered 'mobile' if his or her usual place of residence, as defined in Section 2.4, was available only from collection data. Furthermore, SPs that were not in the census target population and were therefore classified as out of scope were, by definition, mobile.

A person was considered 'not classified' if it was possible to determine whether he/she was in the target population but not whether he/she was missed. A person whose address on Census Day is unknown or too vague (for example, the address on Census Day is only the name of a large city) or a homeless person could fall into this category. These persons were mobile because it was possible to determine that they were not enumerated at the addresses known before collection.

Selected persons (SPs) for whom one or more of the characteristics in the list above could not be determined were considered non-respondents. There were three types of non-respondents:

- An SP was 'not identified' when it could not be determined whether he/she was listed. In other words, since the information about the SP was incomplete, he/she could not be matched with the RRC RDB or interview data.
- An SP was 'not traced' when it could not be determined whether he/she was included in the census target population.
- A 'not classified' SP was deemed to be partial non-response. It was known that the person was in the target population but not whether he/she was missed or enumerated.

7.2.2.3   Distribution of the sample by classification

Table 7.2 shows the distribution of the sample by classification and sampling frame. The classification was determined from specific combinations of the characteristics listed above. Initially, a total sample of 67,840 SPs was selected in the provinces. Of that number, 57,434 SPs were classified as 'enumerated,' 4,745 as 'missed,' and 2,619 as non-respondents, 311 of whom were classified as 'not classified.' The other 3,042 SPs were classified as 'out of scope.' A non-response adjustment was made during estimation (see Section 7.4). It is important to note that the definition of a non-respondent for classification, and therefore for estimation, was not the same as the usual definition of a non-respondent for whom data collection was attempted but not completed. This is because classification was based on data from many sources, one of which might be collection. To prevent confusion, Section 7.3 on collection refers to 'completed collection' rather than 'response.'

Persons in the territory sampling frames were assigned to the matched stratum or the unmatched strata. The matched stratum corresponds to the initial processing of records from the territorial sampling frames. These cases were processed in the same way as our sample was processed: in DIVA and using processing procedures specific to the territories. Of the 113,211 persons in the territorial sampling frame, 74,377 SPs were classified as 'enumerated,' 151 as 'missed' (because they were incompletely enumerated) and 257 as 'out of scope.' A total sample of 1,926 SPs was selected from the unmatched persons. Of that number, 512 SPs were classified as 'enumerated,' 750 as 'missed' and 330 as non-respondents, of whom 130 were classified as 'not classified.'

7.2.2.4   Implications of the classification

'Traced' SPs are SPs for whom it was possible to determine whether they were included in the census target population. For purposes of estimation and tabulation, traced SPs that were also classified were respondents. Since names, including those of household members, and addresses were available in the RRC RDB, and since the tools for consulting the database were sufficiently powerful, it was possible to verify whether an SP was enumerated at an address even though the address was vague. This ensured that SPs were classified as traced only when it was known whether they were mobile and whether they were enumerated.

The usefulness of knowing whether an SP was enumerated is self-evident. SPs who were in the census target population but were not enumerated and therefore classified as missed formed the basis for the undercoverage estimate. We also wanted to classify SPs according to the above-mentioned characteristics so that we could choose the most appropriate respondents to represent non-respondents. The above definitions imply the following:

- SPs who were not identified were also not traced
- identified SPs who were not traced were not listed
- enumerated SPs who were not mobile were listed
- enumerated SPs who were mobile were not listed
- SPs who were not classified were mobile.

We also determined the Census Day address (usual place of residence) of each SP in the census target population, except for SPs who were not classified. This is the address where, according to census instructions, the SP should have been enumerated. If the SP was enumerated, the enumeration address was considered to be the Census Day address even if other information might have raised doubts about the proper interpretation of census instructions.

For more information on processing and classification, see Parenteau (2012).

Table 7.2 Classification of selected persons, sampling frames for Canada

| Classification | Provincial strata | | | | | | | | | | Territorial strata | | | | Total | |
| | 2006 Census | | Missed | | Births | | Immigrants | | Non-permanent residents | | Matched | | Unmatched | | | |
	number	%	number	%	number	%	number	%	number	%	number	%	number	%	number	%
Total	54,772	100.0	5,431	100.0	3,619	100.0	2,548	100.0	1,470	100.0	74,785	100.0	1,926	100.0	144,551	100.0
Enumerated	47,854	87.3	3,787	69.8	3,223	89.1	1,900	74.6	670	45.6	74,377	99.5	512	26.6	132,323	91.5
Listed	47,510	86.7	3,737	68.9	3,217	88.9	1,890	74.2	660	44.9	74,377	99.5	470	24.4	131,861	91.2
Unlisted	344	0.6	50	0.9	6	0.2	10	0.4	10	0.7	0	0.0	42	2.2	462	0.3
Missed	3,152	5.7	737	13.7	226	6.3	332	13.1	298	20.2	151	0.2	750	39.0	5,646	3.9
Listed	564	1.0	74	1.4	65	1.8	27	1.1	21	1.4	151	0.2	220	11.4	1,122	0.8
Not mobile unlisted	1,583	2.9	427	7.9	105	2.9	208	8.2	162	11.0	0	0.0	317	16.5	2,802	1.9
Mobile unlisted	1,005	1.8	236	4.4	56	1.6	97	3.8	115	7.8	0	0.0	213	11.1	1,722	1.2
Out of scope	2,343	4.3	452	8.3	55	1.6	110	4.3	82	5.5	257	0.3	334	17.4	3,633	2.5
Listed	1,989	3.6	170	3.1	31	0.9	10	0.4	2	0.1	257	0.3	269	14.0	2,728	1.9
Unlisted	354	0.7	282	5.2	24	0.7	100	3.9	80	5.4	0	0.0	65	3.4	905	0.6
Non-response	1,423	2.6	455	8.4	115	3.2	206	8.0	420	28.6	0	0.0	330	17.2	2,949	2.0
Traced not classified	222	0.4	57	1.1	17	0.5	6	0.2	9	0.6	0	0.0	130	6.8	441	0.3
Identified not traced	1,192	2.2	396	7.3	98	2.7	199	7.8	411	28.0	0	0.0	200	10.4	2,496	1.7
Not identified	9	0.0	2	0.0	0	0.0	1	0.0	0	0.0	0	0.0	0	0.0	12	0.0

Source: Statistics Canada, 2011 Reverse Record Check.

7.3 Data collection

7.3.1 Environment

Head office (HO) staff in Ottawa worked closely with staff in five Statistics Canada regional offices (ROs) to collect data during the survey phase of the RRC. These ROs were located in Halifax, Sherbrooke, Sturgeon Falls, Winnipeg and Edmonton. The suggestions and recommendations made by the ROs as a result of conducting the 2006 RRC were incorporated into the design and operations of the 2011 survey. HO was responsible for providing a computer-assisted telephone interviewing (CATI) application that met the needs of the survey and was interviewer and respondent friendly.

Assignment of the sample to the ROs was based on HO's 'best guess' about where the selected person (SP) was residing during the collection period. Once a case was assigned to an RO, it was never transferred to another RO even if it was determined that the SP moved outside the RO collection area. RO coverage areas and survey counts are shown in Table 7.3.1.

Table 7.3.1 Geographic coverage for regional offices

Regional offices	Coverage	Number of cases
Total	**Canada**	**16,955**
Halifax	Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick	3,732
Sherbrooke	Quebec	1,478
Sturgeon Falls	Ontario, Manitoba	3,934
Winnipeg	Saskatchewan, Alberta, Northwest Territories, Nunavut	4,375
Edmonton	British Columbia, Yukon	3,436

Source: Statistics Canada, 2011 Reverse Record Check.

A total of 16,955 cases were sent for collection. Section 7.1 describes the two sample designs used in the RRC for the provinces and for the territories. The number of cases requiring collection could not be determined until all cases were sent for a first attempt at processing, whereby the RRC Census Response Database (RRC RDB) was searched. When the SP was not found, the file was sent for collection. There were a total of 10,448 such cases, referred to as the 'regular' sample. A sample of 6,507 SPs was selected from among the found SPs. These are referred to as the 'non-response adjustment (NRA)' sample. The collection results for the NRA sample were used to estimate a parameter of the RRC non-response adjustment model described in Section 7.4. RO staff was not made aware if a case was NRA or regular until the case was opened. Consequently, the staff could not select cases based on whether or not they belonged to the NRA.

The 16,955 cases sent to the field represented 24.3% of the RRC sample. Most of the sample not sent for collection consisted of SPs who were found on the RRC RDB during the first search. A classification of enumerated could therefore be assigned to these SPs and no further work was required. The remainder of the

sample not sent for collection included deceased SPs and cases not sent for other reasons (such as frame overlap, insufficient information to determine the SP's identity and SP found on the incomplete enumerations).

There were five versions of the RRC Survey questionnaire; non-proxy (meaning that the SP is responding for him/herself), proxy (meaning that somebody else is responding for the SP), short versions of the proxy and non-proxy (for the NRA sample), and deceased before Census Day. The content of the 2011 RRC Survey questionnaire focused on determining whether the SP was in scope for the census, and collecting addresses where the SP has lived (and thus where they may have been enumerated), especially the addresses where the SP lived on Census Day and during the month of May 2011. Names and demographic data were collected for all Census Day household members. By design, collection was proxy for SPs who were less than 18 years of age or presumed deceased. Proxy respondents were also used when the SP was not available during the collection period or was difficult to reach.

For deceased SPs, it was important to determine if the SP had died before, on, or after Census Day, since different paper questionnaires and CATI flows were used depending on the date of death. In some cases, it was known that the SP was deceased prior to collection; for example, by matching tax records and vital statistics. These cases were not sent for collection. However, when in doubt, the case was sent for collection with a flag indicating that the SP was 'presumed deceased.'

Although the 2011 RRC Survey was a multi-mode survey, the main data collection mode was CATI. The CATI application was developed using many of the standards set for all CATI questionnaires used at Statistics Canada. The application consisted of various interrelated modules and was accessed through the regional offices' generic interface. Interviewers were assigned cases based on language and whether cases required tracing or not.

Paper questionnaires in both official languages were available for those SPs who were contacted by telephone and requested a paper questionnaire. Selected persons who the RO did not succeed in contacting by telephone and who had a good quality mailing address (as determined by the RO) were sent a paper questionnaire package from HO containing the different questionnaire versions, a cover letter explaining the survey, instructions for choosing the right questionnaire, and how to complete it. Finally, field interviewers completed some interviews using the paper questionnaires. Data capture from the paper questionnaires was performed at HO using the CATI system. A great deal of coordination is required to operationalize a sequential multiple-mode collection system such as the 2011 RRC.

Collection and tracing is becoming increasingly challenging, due in large part to the increased use of cellular phones and decreased use of land lines, the unavailability of directories of cell phone numbers, and the increased use of screening devices and unlisted phone numbers. As well, more people are concerned about privacy and identity theft, and are reluctant to provide personal information.

7.3.2   Operations

As a new initiative for the 2011 RRC, introductory letters were sent out on January 30, 2012, to SPs with valid mailing addresses. These letters explained the RRC, advised the SP (or a proxy) that they had been selected for the survey, and that Statistics Canada would be calling them in the near future to complete the survey. A

telephone number was provided if they had any questions or wanted to call to complete the survey at a time of their choosing. Data collection began in the ROs on February 6, 2012, and active collection ended on August 15, 2012. In total, there were 190 days where at least one RO was actively collecting data, and 13,671 questionnaires were completed during that period. Between August 16 and 31, 2012, passive collection took place wherein returned paper questionnaires or SPs calling the RO to do the survey were handled. During this period, 56 questionnaires were completed, and some other completed paper questionnaires were received after. It should also be noted that among these late questionnaires deemed complete by the ROs, a few were later judged in HO to have been conducted with an incorrect SP and thus were removed from processing.

Interviewers were given the survey objectives and background along with a detailed training manual. Mock interviews were incorporated into the training sessions using the CATI application. A call scheduler assigned cases to interviewers in normal operations, but on occasion, an interviewer could be assigned to manage specific cases. For instance, they may take an incoming call or make a call to someone who preferred to speak in a non-official language. International calls were made, especially for SPs in the non-permanent resident (NPR) group who had left Canada.

Quality management of the collection operation included interviewer supervisor training at HO, monitoring the interviewer training at some of the ROs and retraining and discussing specific data quality issues noted in HO relating to completed questionnaires. Regional office managers allocated resources to the survey while balancing the needs of other surveys taking place in their region. Sustained efforts to interview persons who initially refused to participate in the survey improved response rates.

Survey data were sent electronically to HO from the five ROs each night after interviewing was completed. Data quality analysis was performed on the data each morning at HO to verify the completeness and accuracy of each case. Cases with missing or ambiguous data in key fields, or where the data collected was for someone other than the SP, were reactivated and sent back to the ROs for follow-up. Cases passing the data quality analysis were compiled into batches for processing as described in Section 7.2.1.

Table 7.3.2 shows the distribution of cases sent to ROs from HO over time. Interviewing typically began in the RO as soon as new cases arrived. The counts for the second and third wave include a small number of reactivated cases sent back for re-interviewing as a result of HO data quality analysis. The adjusted total reflects cases that were dropped by the ROs as a result of an HO request as well as reactivated cases. The dropped cases were removed if they were found in processing to be enumerated or out of scope.

Table 7.3.2 Regional office workload by date sent

Date sent (2012)	Regional offices					
	Halifax	**Sherbrooke**	**Sturgeon Falls**	**Winnipeg**	**Edmonton**	**Total**
February 6	3,870	1576	4,005	2905	2,711	15,067
March 20	20	10	44	1525	725	2,324
May 11	109	42	150	118	67	486
Reactivated cases sent after May 11[1]	1	4	23	8	3	39
Total cases sent	**4,000**	**1,632**	**4,222**	**4,556**	**3,506**	**17,916**
Cases dropped by head office[2]	265	149	259	173	66	912
Total reactivated cases[1]	3	5	29	9	3	49
Adjusted total	**3,732**	**1,478**	**3,934**	**4,374**	**3,437**	**16,955**

1. Reactivated cases were returned to the ROs for re-interview as the information collected was for someone other than the selected person.
2. Collection was no longer required because the case had been classified in processing as either enumerated or out of scope.

Source: Statistics Canada, 2011 Reverse Record Check.

Detailed management reports were created at HO on a daily and weekly basis to document the progress of the survey collection. The daily reports presented the number of cases collected and response rates by RO and outcome code. The weekly reports included progress by other variables such as sampling frame, sex and age groups and stratum, and compared the progress for some of these variables with the projected targets. Other weekly reports were more specialized, providing details on the interviewing efforts of refusal, tracing, and not contacted cases.

The average duration of the CATI interview was 14 minutes. However, the actual time spent on each case was much greater, given the number of contact attempts required and the amount of tracing that was involved. The average total time by case was 121 minutes.

7.3.3   Tracing

Tracing refers to the work done to find telephone and address information for either a selected person or a proxy for the selected person. Tracing was undertaken by both HO and the ROs, and was critical to the success of the RRC. As part of the sample preparation, cases were linked to tax and other administrative data to provide updated contact data for the SP and their household members. In some cases, initial CATI data were outdated or incomplete and therefore tracing was required.

HO provided tracing leads using several large administrative files containing names and addresses but not necessarily telephone numbers. These files included motor vehicle registration, tax files, Citizenship and Immigration files, and Vital Statistics files. These tracing leads were loaded into the CATI tracing application prior to collection, and additional leads were sent to the ROs as they were found in processing during the collection period.

RO tracing was done on both the SP and the household members, and was extended outside of Canada – calls, emails and faxes could be made internationally. Specialized tracing staff was available to handle specific types of cases, such as immigrants and elderly SPs. RO managers contacted external data suppliers (such as educational facilities and provincial health departments) with the help of the regional directors and provincial/territorial statistical focal points.[4] The information coming from these external data suppliers was used directly by the ROs for tracing, as well as by processing in HO to attempt to locate the SP on the Census Response Database even if the RO was not able to complete the case during collection. Interviewers used a variety of tracing tools, with online electronic directories such as Canada 411, Google and Facebook being the most popular.

As data collection began, 15,039 (88.7%) of the cases sent for collection were placed in the queue for interviewing and the remaining 1,916 (11.3%) in the tracing queue. As required, cases were moved back and forth between interviewing and tracing. For SPs initially in the tracing queue, no telephone number had yet been found for the SP or any family member. As tracing leads were found, cases were moved to interviewing. When all tracing leads were exhausted for interviewing cases, they were moved to tracing.

A minority of cases started in tracing (9.5% of the NRA sample and 12.4% of the regular sample). Looking at the cases that started in interviewing, only 31.7% of the NRA sample required tracing, compared to 70.7% of the regular sample.

Of the 1,916 cases that started in tracing, successful leads that yielded interviews were found for 57% of them. Among the 8,334 cases that started in the interviewing queue and required tracing, the rate of tracing success leading to an interview was 74%. Numerous valuable leads were also found for these cases. Overall, 7,183 (53%) of the 13,477 completed cases required some tracing effort.

7.3.4   Collection statistics

Many statistics were monitored throughout the data collection period. An analysis of the statistics was done after collection was completed.

Table 7.3.4.1 shows provincial and territorial completion rates by type of case as either regular or NRA. The table shows that completion rates are higher for the NRA cases. This is expected because the initial CATI data included the more recent address specified in the 2011 Census, and these people already showed a propensity to answer by completing their census form.

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4. A focal point is a provincial or territorial representative who coordinates activities between Statistics Canada and their provincial or territorial administration.

Table 7.3.4.1 Completion counts and rates, type of sample for Canada, provinces and territories

Provinces and territories	Regular sample			Non-response adjustment sample			Total		
	cases sent	cases completed	completion rate (%)	cases sent	cases completed	completion rate (%)	cases sent	cases completed	completion rate (%)
Canada	**10,448**	**7,523**	**72.0**	**6,507**	**5,954**	**91.5**	**16,955**	**13,477**	**79.5**
Newfoundland and Labrador	370	314	84.9	311	300	96.5	681	614	90.2
Prince Edward Island	447	339	75.8	426	390	91.5	873	729	83.5
Nova Scotia	725	548	75.6	429	382	89.0	1,154	930	80.6
New Brunswick	556	408	73.4	551	505	91.7	1,107	913	82.5
Quebec	941	781	83.0	521	508	97.5	1,462	1,289	88.2
Ontario	1,882	1,291	68.6	695	634	91.2	2,577	1,925	74.7
Manitoba	762	556	73.0	565	525	92.9	1,327	1,081	81.5
Saskatchewan	785	627	79.9	501	465	92.8	1,286	1,092	84.9
Alberta	1032	720	69.8	561	516	92.0	1,593	1,236	77.6
British Columbia	1,946	1,161	59.7	774	706	91.2	2,720	1,867	68.6
Yukon	372	271	72.8	328	296	90.2	700	567	81.0
Northwest Territories	398	339	85.2	460	429	93.3	858	768	89.5
Nunavut	232	168	72.4	385	298	77.4	617	466	75.5

Source: Statistics Canada, 2011 Reverse Record Check.

Table 7.3.4.2 gives completion statistics by frame and case type. The low response rate for the SPs in the NPR frame was in large part due to the permits expiring before the start of survey operations; approximately 33% of the NPRs sent for collection had a permit end date before the start of collection. It was also often very difficult to locate these SPs or a suitable proxy. This was especially true for NPRs with a permit to study in Canada where the completion rate was just 40.9%.

Table 7.3.4.2 Completion counts and rates, sampling frames and type of sample for Canada

Sampling frames	Regular sample			Non-response adjustment sample			Total		
	cases sent	cases completed	completion rate (%)	cases sent	cases completed	completion rate (%)	cases sent	cases completed	completion rate (%)
All	**10,448**	**7,523**	**72.0**	**6,507**	**5,954**	**91.5**	**16,955**	**13,477**	**79.5**
2006 Census	5,977	4,496	75.2	3,580	3,359	93.8	9,557	7,855	82.2
Missed	1,622	1,168	72.0	366	330	90.2	1,988	1,498	75.4
Births	335	234	69.9	656	614	93.6	991	848	85.6
Immigrants	663	449	67.7	419	385	91.9	1,082	834	77.1
NPR	849	398	46.9	313	243	77.6	1,162	641	55.2
Health care files[1]	1,002	778	77.6	1,173	1,023	87.2	2,175	1,801	82.8

1. From the unmatched strata. By definition, no collection is required for samples in the matched strata.

Source: Statistics Canada, 2011 Reverse Record Check.

Table 7.3.4.3 gives completion statistics by stratum and type of case for the sample selected from the demographic strata. As discussed in Section 7.1, demographic strata were used for the 2006 Census frame and the unmatched frames in the territories.

Table 7.3.4.3 Completion counts and rates, strata and type of sample for 2006 Census and territories unmatched sampling frames for Canada

Strata	Regular sample			Non-response adjustment sample			Total		
	cases sent	cases completed	completion rate (%)	cases sent	cases completed	completion rate (%)	cases sent	cases completed	completion rate (%)
All provinces, 2006 Census frame[1]	**5,977**	**4,496**	**75.2**	**3,580**	**3,359**	**93.8**	**9,557**	**7,855**	**82.2**
Females, 0 to 12 years	216	172	79.6	380	359	94.5	596	531	89.1
Females, 13 to 24 years	1,004	809	80.6	291	275	94.5	1,295	1,084	83.7
Females, 25 to 34 years, married	147	103	70.1	216	210	97.2	363	313	86.2
Females, 25 to 44 years, not married	460	309	67.2	134	125	93.3	594	434	73.1
Females, 35 years and over, married	351	279	79.5	257	253	98.4	608	532	87.5
Females, 45 years and over, not married	377	327	86.7	323	306	94.7	700	633	90.4
Males, 0 to 14 years	209	164	78.5	356	350	98.3	565	514	91.0
Males, 15 to 24 years	1,065	799	75.0	327	305	93.3	1,392	1,104	79.3
Males, 25 to 34 years, married	177	127	71.8	225	211	93.8	402	338	84.1
Males, 25 to 44 years, not married	692	456	65.9	169	153	90.5	861	609	70.7
Males, 35 years and over, married	428	331	77.3	296	286	96.6	724	617	85.2
Males, 45 years and over, not married	347	256	73.8	223	206	92.4	570	462	81.1
On reserve	504	364	72.2	383	320	83.6	887	684	77.1
All territories, unmatched frames[2]	**1,002**	**778**	**77.6**	**0**	**0**	**…**	**1,002**	**778**	**77.6**
Females, 0 to 19 years	131	105	80.2	0	0	…	131	105	80.2
Females, 20 to 24 years	52	43	82.7	0	0	…	52	43	82.7
Females, 25 to 34 years	87	67	77.0	0	0	…	87	67	77.0
Females, 35 to 44 years	66	58	87.9	0	0	…	66	58	87.9
Females, 45 years and over	91	72	79.1	0	0	…	91	72	79.1
Males, 0 to 19 years	117	96	82.1	0	0	…	117	96	82.1
Males, 20 to 24 years	60	50	83.3	0	0	…	60	50	83.3
Males, 25 to 34 years	119	90	75.6	0	0	…	119	90	75.6
Males, 35 to 44 years	106	68	64.2	0	0	…	106	68	64.2
Males, 45 years and over	173	129	74.6	0	0	…	173	129	74.6

… not applicable

1. Age five years ago at the time of the 2006 Census. Persons in common-law relationships are included in the married strata, except for in Manitoba, Saskatchewan and Alberta.
2. Age at the time of the 2011 Census.

Source: Statistics Canada, 2011 Reverse Record Check.

Another statistic of interest is the degree to which questionnaires were completed by proxy. Collection was proxy by design for everyone who was less than 18 years of age and for SPs who were presumed deceased. Otherwise, proxy was used when the SP was not available during the survey period or was difficult to reach. Overall, 4,640 (34.4%) of the completed sample were done by interviewing a suitable proxy.

Table 7.3.4.4 gives, for Canada and the provinces and territories, the number of cases sent for collection, the number of these that required tracing, and the percentage of cases sent for collection that required tracing. The tracing rate was highest among the provinces for Nova Scotia, Alberta, Ontario, British Columbia and Quebec, and for Yukon and Nunavut.

Table 7.3.4.4 Cases requiring tracing for Canada, provinces and territories

Provinces and territories	Number of cases sent	Number of cases that required tracing	Percentage of cases that required tracing (%)
Canada	**16,955**	**9,826**	**58.0**
Newfoundland and Labrador	681	337	49.5
Prince Edward Island	873	461	52.8
Nova Scotia	1,154	719	62.3
New Brunswick	1,107	583	52.7
Quebec	1,462	854	58.4
Ontario	2,577	1,522	59.1
Manitoba	1,327	721	54.3
Saskatchewan	1,286	736	57.2
Alberta	1,593	958	60.1
British Columbia	2,720	1,600	58.8
Yukon	700	431	61.6
Northwest Territories	858	423	49.3
Nunavut	617	481	78.0

Source: Statistics Canada, 2011 Reverse Record Check.

There were three modes of collection: CATI, self-enumeration using the paper questionnaire, and personal interview also using the paper questionnaire. Of the 13,477 completed questionnaires, 95.9% were done by CATI, 2.6% were done by self-enumeration, and 0.9% by personal interview. Of the 95.9% cases completed by CATI, 4.2% were as a result of the SP calling the RO. The collection mode varied by province and territory. This may reflect different operational methods in the ROs, differences in the characteristics of the persons requesting a questionnaire, or different demographic distributions.

7.4 Estimation

The estimation of the RRC is divided in two parts. First, there is the weighting of Selected Persons (SPs) which is followed by the calculation of the census undercoverage. Weighting is the process consisting of the determination of the initial sampling weights of SPs and of all other adjustments made to these initial weights leading to the

creation of the final weights of SPs. Weighting is composed of several steps that are described in Sections 7.4.1 to 7.4.4. The methodology related to the calculation of the census undercoverage is described in Section 7.4.6.

7.4.1 Calculation of the initial weights

The initial weight of an SP from the 2006 missed frame was the final weight assigned to that person in the 2006 Reverse Record Check (RRC) when he/she was classified as missed. For SPs from the other sampling frames, the initial weights are generally based on the inverse selection probabilities in the sample.

7.4.2 Initial weights adjustment

For the births frame, the initial weight was adjusted upward to account for the small number of births who were not in the sampling frame when the sample was selected. Final counts of births were not obtained until after the sample was selected. Also, the frame of births from the year 2011 was incomplete in 3 provinces. The SPs' initial weights were adjusted for these counts.

The initial weights of SPs from the 2006 Census frame who were enumerated more than once in 2006 were adjusted downward to account for the fact that these SPs had more than one chance of being selected. This adjustment was new for 2011, since we were able to determine for the first time, using information provided by the 2006 Census Overcoverage Study, whether SPs appeared more than once in the sampling frame.

7.4.3 Non-response adjustment

To reduce bias, the initial weights of respondents had to be adjusted to account for non-response. The weight of persons who could not be classified (referred to as non-respondents) was redistributed among persons who were classified (referred to as respondents). Where possible, this was done by ensuring that the weight of non-respondents with certain characteristics was redistributed among respondents with the same characteristics. The following characteristics (or 'metadata') were used: sampling stratum (and, in addition, for the non-permanent resident stratum,according to the country of origin and the type of permit); indication that the person filed a tax return for the reference year preceding the census year (or in the case of a child, indication that he was on the Canadian Child Tax Benefit (CCTB) file), which suggests that the person is in the target population; and finally, whether the SP is listed, mobile or part of the target population (classified persons).

For the purposes of redistributing the weight of non-respondents, the RRC was treated as a four-phase sample in which each phase corresponded to the selection of a nested sample: selection of SPs from the sampling frames, selection of identified SPs from the set of SPs, selection of traced SPs from the identified SPs and selection of classified SPs from the traced SPs. When a respondent with the same characteristics as a non-respondent could not be identified in a stratum, the stratum was grouped with another stratum that most closely resembled it.

7.4.4 Post-stratification adjustment for the territories

Following adjustment of the initial weights, the estimated number of enumerated persons in the territories has traditionally been lower than the comparable census count. This is probably due to undercoverage of the census target population in health insurance files. To address this undercoverage, the weights of the SPs selected in each territory were adjusted so that the estimated number of enumerated persons equalled the comparable census count for that territory.

7.4.5 Weighted distribution by classification

Table 7.4.5.1 shows the weighted distribution of SPs by classification and sampling frame. For definitions, see Section 7.2. Only SPs found in the RRC RDB were classified as enumerated. Persons who were in the target population but not in the RRC RDB were classified as missed. The remaining SPs were classified as out of scope of the census population (deceased, emigrated, etc.).

Table 7.4.5.1 Weighted classification of selected persons, sampling frames for Canada

	Provincial strata										Territorial strata				Total	
	2006 Census		Missed		Births		Immigrants		Non-permanent residents		Matched stratum		Unmatched stratum		Total	
Classification	number	%	number	%	number	%	number	%	number	%	number	%	number	%	number	%
Total	29,572,766	100.0	2,836,047	100.0	1,853,383	100.0	1,136,544	100.0	541,150	100.0	79,521	100.0	40,811	100.0	36,060,222	100.0
Enumerated	26,318,455	89.0	1,987,314	70.1	1,668,832	90.0	851,371	74.9	262,759	48.6	79,088	99.5	13,153	32.2	31,180,972	86.5
Listed	26,014,733	88.0	1,940,304	68.4	1,663,595	89.8	843,357	74.2	253,129	46.8	79,088	99.5	11,104	27.2	30,805,310	85.4
Not listed	303,722	1.0	47,010	1.7	5,237	0.3	8,014	0.7	9,630	1.8	0	0.0	2,049	5.0	375,662	1.0
Missed	1,765,313	6.0	528,841	18.6	128,771	6.9	184,884	16.3	199,946	36.9	161	0.2	20,313	49.8	2,828,229	7.8
Listed	254,780	0.9	33,971	1.2	21,120	1.1	11,233	1.0	8,140	1.5	161	0.2	4,716	11.6	334,121	0.9
Not mobile not listed	791,643	2.7	276,222	9.7	56,658	3.1	102,279	9.0	75,594	14.0	0	0.0	6,837	16.8	1,309,233	3.6
Mobile not listed	718,890	2.4	218,648	7.7	50,993	2.8	71,372	6.3	116,212	21.5	0	0.0	8,760	21.5	1,184,875	3.3
Out of scope	1,488,998	5.0	319,892	11.3	55,780	3.0	100,289	8.8	78,445	14.5	272	0.3	7,345	18.0	2,051,021	5.7
Listed	1,107,510	3.7	103,223	3.6	19,514	1.1	3,684	0.3	1,466	0.3	272	0.3	5,509	13.5	1,241,178	3.4
Not listed	381,488	1.3	216,669	7.6	36,266	2.0	96,605	8.5	76,979	14.2	0	0.0	1,836	4.5	809,843	2.2

Source: Statistics Canada, 2011 Reverse Record Check.

7.4.6   Calculation of the census undercoverage

Let

C	=	published census count of the number of persons in the target population
$\hat{U}$	=	estimate of undercoverage
	=	estimate of the number of persons not included in C who should have been
$\hat{M}$	=	estimate of the number of persons in the RRC target population who were not enumerated
	=	sum of the final weights of persons classified as missed
X	=	number of persons included in C who could not be identified with certainty in the RRC as enumerated.

Census population undercoverage was estimated by the number (weight) of missed persons less the number of persons excluded from the RRC RDB. We then have

$$. \hat{U} = \hat{M} - X .$$

X has three components: imputations (from whole household imputations of DCS), incomplete enumerations and late enumerations.

The SP's Census Day address refers to a dwelling for which there was an imputed enumeration. This was the case in particular for non-respondent dwellings for which the data of another household was used in whole household imputation (WHI).

Some enumerations in the census database were deemed too incomplete to be used by the RRC to identify an SP as enumerated. Incomplete enumerations in this context usually involves invalid data in the date-of-birth field or the name field (e.g., '?,' 'Mr.,' 'Unknown' or 'Person 1'). An SP that had such an enumeration was classified as missed. This is referred to as an 'RRC incomplete enumeration.'

Some cases of persons enumerated only in the National Household Survey (and not in the census) were transferred directly to the final census database and therefore did not appear in the Census RDB from which data were extracted to create the RRC database. These enumerations were not accessible for RRC purposes, and as a result, the RRC was unable to identify the enumerations in the case of these dwellings.

At the national level, X made up about half of $\hat{M}$. This is similar to the 2006 result. The number of persons imputed in the WHI was lower in 2011 than in 2006, but since the number of persons not enumerated was also lower, the relative sizes of the two components of $\hat{M}$ remained unchanged.

Table 7.4.6.1 shows the numbers (for Canada) for the various components of the estimation of population undercoverage, namely the numbers for the three components of the X term.

Table 7.4.6.1 Components of the estimate of population coverage error for Canada

Components	Number of persons
Estimate of M	**2,828,228**
Total X	**1,436,257**
X for imputed persons	780,737
X for late enumerations	95,757
X for RRC incomplete enumerations	559,763
Estimate of U	**1,391,971**

Source: Statistics Canada, 2011 Census Coverage Studies.

Lastly, for the purpose of calculating the variance of the estimates, we have

$$v(\hat{U}) = v(\hat{M} - X) = v(\hat{M})$$

$v(\hat{M})$ = estimated variance of $\hat{M}$ based on the RRC design

The RRC sample design is approximated by a stratified design with selection probabilities proportional to size. The sizes are selected so as to reproduce the final weights. The variance was calculated with StatMx, a module of Statistics Canada's Generalized Estimation System (GES).

For more details on the estimation methods used in the 2011 RRC, see Théberge (2008).

8.   Census Overcoverage Study (COS)

8.1   Overview and methodology

Following the 2001 Census of Population, the level of overcoverage due to duplication of individuals was measured by three studies, each one covering part of the overcoverage: the Automated Match Study (AMS), the Collective Dwelling Study (CDS) and the Reverse Record Check (RRC). Since the 2006 and 2011 Census Response Databases contain names,[5] overcoverage can be measured with a single study: the Census Overcoverage Study (COS). The 2011 COS was based on a series of probabilistic record linkage operations and manual verification of pairs of potential overcoverage cases. These record linkage operations also entailed the use of certain administrative data files. Consequently, since 2006, the RRC is no longer used to measure overcoverage, and the CDS was discontinued. The AMS is still conducted for evaluation purposes.

For ease of reference, in the rest of this section a pair of potential overcoverage cases is referred to as a **pair**, and a pair that has been confirmed to be the same person is referred to as a **duplicate**.

The 2011 COS was a statistical survey in which overcoverage was estimated with a probabilistic sample selected from a frame of potential overcoverage cases. Like other statistical surveys, the COS involves the following set of steps:

- construction of the sampling frame
- selection of a sample
- data collection
- processing and verification of the data collected
- weighting and estimation
- analysis.

However, the COS differs from a typical survey in the following ways:

- the sampling frame was constructed by means of successive probabilistic record linkage operations
- collection was based on manual verification of sampled pairs of records and did not involve respondents.

The COS methodology for estimating 2011 overcoverage was based on matching persons without geographic restrictions, while the Automated Match Study (AMS)[6] was based on matching private households located in the same geographic area. The 2011 Census Overcoverage Study (COS) took advantage of the fact that the 2011 Census Response Database (RDB) contains respondents' surnames and given names in two separate variables. This made it possible to produce a more precise estimate of overcoverage due to persons enumerated more than once in the census database using automated matching and manual verification methods while including people living in collective dwellings, and without geographic restrictions such as those imposed on the AMS.

In principle, the RDB could have been matched to itself to detect duplicate enumerations. However, on a practical level, and for methodological reasons, the COS was conducted in two steps as outlined below.

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5. In 2006, the full name (surname and given name) was recorded in a single variable; in 2011, the surname and given name were recorded in two separate variables.

6. For a detailed description of the AMS methodology, see the 2001 Technical Report on Coverage Studies.

The census database used for the COS is the same as the database used for the RRC: the RRC RDB. For simplicity, however, it is referred to as the RDB.

Note that in contrast to the 2006 COS, in which both an exact and a probabilistic record linkage were carried out, both main steps leading to the creation of frames of pairs of potentially overcovered persons in the 2011 COS used probabilistic record linkage methods. For this purpose, the COS used G-Link,[7] the probabilistic record linkage system designed at Statistics Canada which uses the Fellegi-Sunter method to largely solve file linkage problems when there are no unique identifiers.

8.2   Construction of the sampling frame

The COS began with the construction of a sampling frame of potential overcoverage cases using probabilistic record linkage. This work consisted of the following four steps:

- Step 1: Probabilistic record linkage between the RDB and an administrative data file.
- Step 2: Probabilistic record linkage between the residual RDB (defined below) and the complete RDB.
- Extension of the sampling frame based on households.
- Processing of frame overlap.

8.2.1   Input files for the construction of the COS sampling frame

As indicated above, the COS included the construction of a sampling frame of potential overcoverage cases, in part through probabilistic record linkage in steps 1 and 2.

In Step 1, a record linkage was performed between the Census Response Database (RDB) and the Cumulative Administrative Frame (referred to as the AF). In Step 2, a record linkage was performed between the complete RDB and the residual RDB, which consisted of the portion of the RDB that was not matched to the AF in Step 1 and records for which the match was not strong enough (below the upper limit).

The 2011 RDB contains more than 32.6 million records, and the AF contains more than 48 million. The AF is based on five administrative data sources:

- T1 personal master tax files (T1PMF) for the period from 2005 to 2009, provided by the Canada Revenue Agency (CRA), which account for 58.2% of the records in the AF.
- Canada Child Tax Benefit (CCTB) files for the period from May 2004 to July 2011, provided by the CRA, which account for 15% of the records in the AF.
- Birth records from vital statistics files for the period from 1974 to 2011, provided by the Health Statistics Division, which account for 12.2% of the records in the AF.
- Immigrant and non-permanent resident files for the period from the beginning of 1898 to September 2011, provided by Citizenship and Immigration Canada (CIC), which account for 14.4% of the records in the AF.
- Territorial health care files covering all residents of the territories for July 2011, which account for 0.2% of the records in the AF.

The 2010 T1PMF were unavailable when the AF was created. All sources except the CCTB were also used in the 2006 COS. The addition of the CCTB in 2011 substantially increased the AF's coverage.

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7. The 2006 COS used the G-Link 2.4 system but there is a new version 3.0 that now uses the SAS statistical analysis system as its information processing environment.

The following matching variables common to the two databases (the RDB and AF) were submitted to G-Link:

- Names: the given name and surname variables.
- Demographic data: the date-of-birth and sex variables.
- Geographic data: the province/territory and postal code variables.

In Step 2, a second probabilistic record linkage was performed, this time between the complete RDB and the residual RDB, as mentioned above.

8.2.2   Construction of the COS initial frame (steps 1 and 2)

The initial COS frame consisted of all pairs forming potential overcoverage cases that were output by G-Link following steps 1 and 2. Construction of the initial frame is illustrated in Figure 8.2.2 below:

Figure 8.2.2: Construction of the COS initial frame
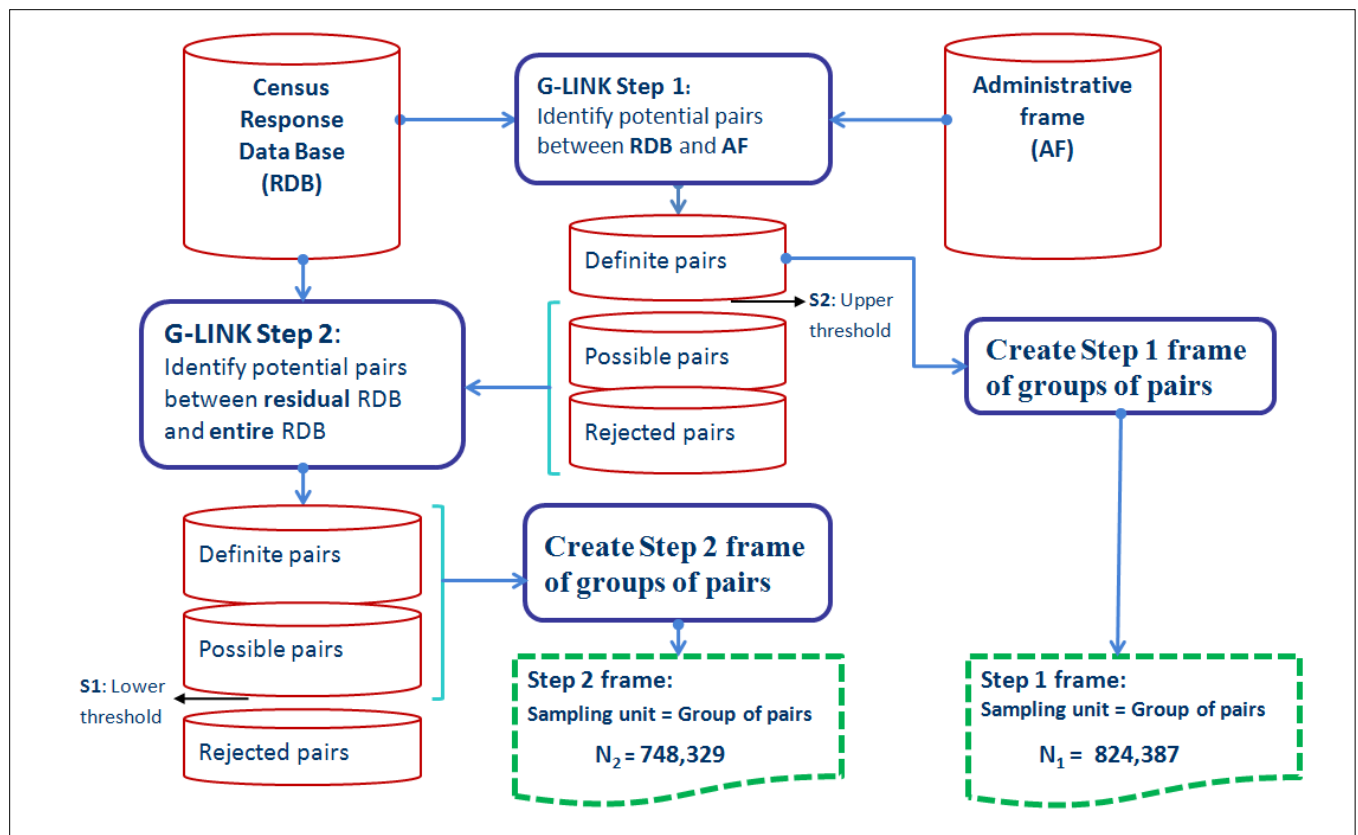
Source: Statistics Canada, 2011 Census Overcoverage Study.

8.2.2.1   Step 1: Probabilistic match between the RDB and the AF

The purpose of Step 1 was to measure the overcoverage of persons in the RDB who were covered by the AF (see Figure 8.2.2). Step 1 involved a probabilistic linkage of RDB records with AF records, where the linkage parameters were estimated with the expectation-maximization (EM) algorithm. This matching process identified most of the potential overcoverage cases, that is, cases where two or more RDB records were matched to the same administrative record. It also picked out pseudo-duplicates, which are RDB and AF records that shared many match variables with a high linkage weight but actually represented different people.

Step 1 was based on the following sequence of operations:

- create potential RDB-AF pairs by applying initial selection criteria
- compare the records for the potential pairs by applying concordance rules
- calculate the weights of the results of the rule application using the EM algorithm
- calculate the provincial and territorial frequency weights of the given names and surnames
- calculate the linkage weights of the pairs
- calculate the provincial/territorial upper weight thresholds S_2
- select the final pairs, that is, pairs for which the total odds ratio is greater than the **upper threshold** S_2
- eliminate redundant pairs whose weight is greater than S_2 when a particular RDB record is matched to many AF records from various administrative sources (duplicates between AF sources)
- create groups of associated RDB records, **the sampling units**, which form the first part of the sampling frame (Step 1 sampling frame).

Potential overcoverage cases were identified using groups of RDB records that were indirectly linked by means of AF records. These mutually exclusive groups formed the Step 1 sampling frame. Each group (or sampling unit) was constructed with RDB-AF record pairs whose linkage weight was greater than an upper threshold S_2, which depended on the province or territory of the RDB record in a given pair. Each group was also associated with the set of RDB-RDB record pairs that was produced by considering all possible ways of selecting two different RDB records from the group.

The Step 1 sampling frame consisted of 824,387 mutually exclusive groups (or sampling units) of RDB person pairs associated in a particular way.

8.2.2.2   Step 2: Probabilistic linkage between the residual RDB and the complete RDB

The purpose of Step 2 was to measure overcoverage in the set of persons not selected for the Step 1 pairs frame, referred to as the residual RDB. These persons were from RDB-AF record pairs whose linkage weight was below the Step 1 upper threshold S_2. This step was a probabilistic linkage of residual RDB records with all RDB records, where the linkage parameters were estimated with the expectation maximization (EM) algorithm. To optimize the record linkage, provincial/territorial frequency weights were applied to compare the given names and surnames.

This matching process was based on the following series of operations:

- create potential RDB-RDB record pairs by applying selection criteria
- compare the records for the potential pairs by applying concordance rules
- calculate the weights of the results of the rule application using the EM algorithm
- calculate the provincial/territorial frequency weights
- calculate the linkage weights of the pairs
- calculate the provincial/territorial lower weight thresholds S_1
- select pairs whose weight is greater than S_1
- create groups of records, **the sampling units,** which form the Step 2 sampling frame.

The potential overcoverage cases consisted in groups of associated RDB records (or sampling units). Each group was composed of residual RDB-complete RDB record pairs whose linkage weight was greater than a lower threshold S_1, which depended on the province or territory of the RDB record in a given pair. These groups were mutually exclusive and collectively formed the Step 2 sampling frame. This frame consisted of 748,329 groups.

Thus, the COS initial sampling frame (known as COS-initial) was composed of groups of RDB records linked by RDB record pairs from Step 1 or Step 2. COS-initial contained a total of 1,572,716 groups.

8.2.3 Extension of the sampling frame based on households

The purpose of extending the sampling frame was to find additional overcoverage in households that contained potential overcoverage cases from Step 1 or Step 2 (see Figure 8.2.3). This phase resulted in the creation of additional RDB-RDB record pairs and new potential overcoverage cases for these pairs. The additional RDB-RDB record pairs were produced in two steps.

Figure 8.2.3: Construction of the COS extended frame
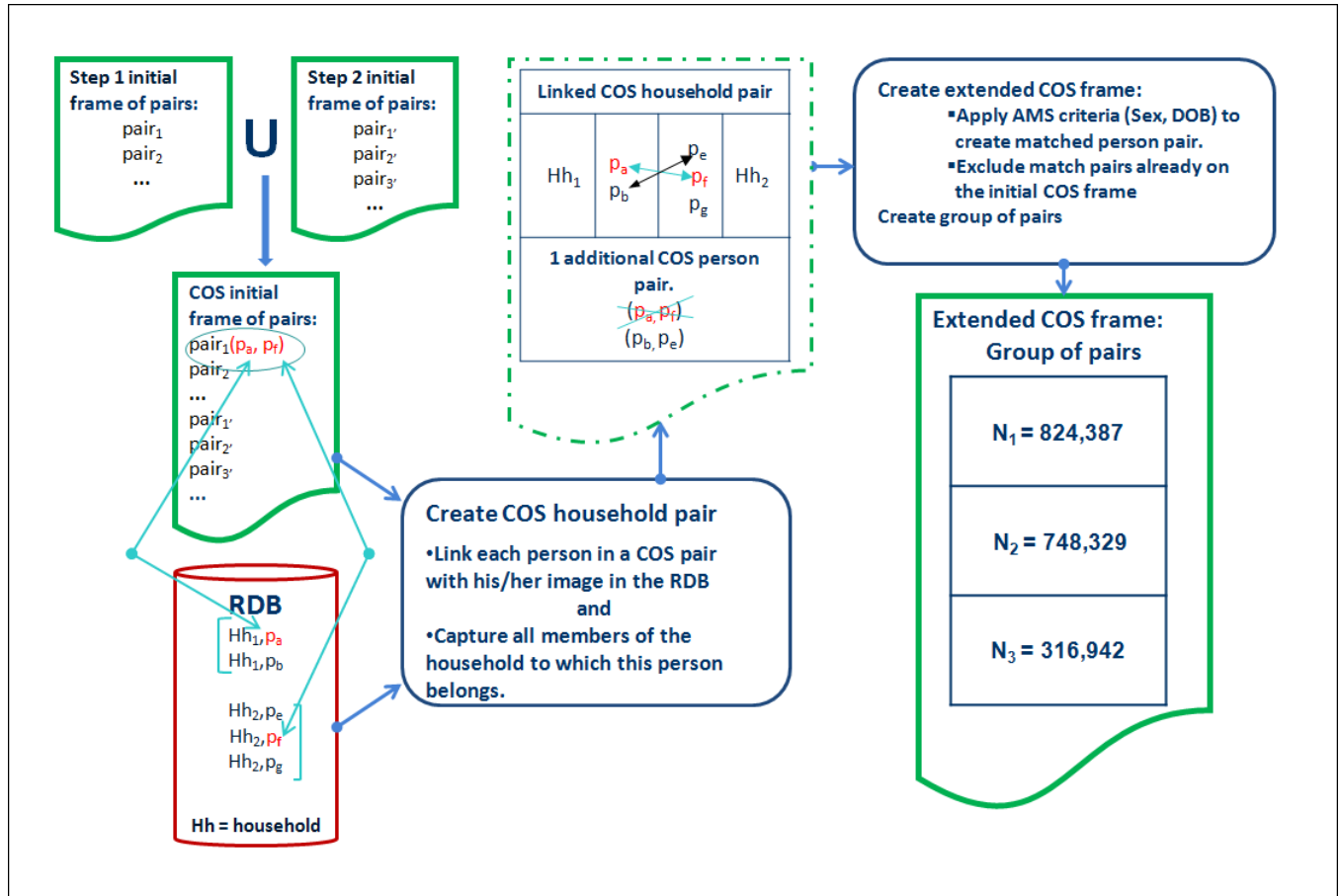
Source: Statistics Canada, 2011 Census Overcoverage Study.

First, a household pair was produced for each RDB-RDB person pair created in Step 1 or Step 2 (COS-initial) by adding the other household members to it. Second, new RDB-RDB person pairs were identified by comparing the persons present in the household pair using sex and date of birth as variables. Comparison rules were applied for the purpose of identifying cases that might represent overcoverage cases. New potential overcoverage cases were created by considering groups of RDB records that are linked using the new RDB-RDB record pairs. These groups were mutually exclusive and formed the extended sampling frame. The frame consisted of 316,942 groups.

Thus, the COS extended sampling frame (known as COS-extended) was composed of groups of RDB records linked by RDB record pairs from the Step 1, Step 2 or extension sampling frame. COS-extended

contained a total of 1,889,658 groups of RDB person pairs associated in some way. Although these groups were mutually exclusive within each of the frames from which they came, there might be some overlaps of groups between the three frames. This is covered in the next subsection.

8.2.4   Processing of frame overlap

Two or more groups from different frames overlapped if their RDB records were linked in some way. For example, two groups overlapped if they had an RDB record in common. Three groups overlapped if the first and second groups had an RDB record in common and the second and third groups had another RDB record in common, even if the first and third groups had no RDB records in common. In general, two or more groups overlapped if two different RDB records from these groups were linked by a path of RDB-RDB record pairs from the Step 1, Step 2 or extension sampling frame and all of their RDB records could represent the same person.

Consequently, overcoverage of a person was overestimated if the overcoverage cases in the overlapping groups were added together. Rather, overcoverage had to be calculated using a larger group of linked RDB records, that is, an overlap group containing all records and pairs from the overlapping groups. See Figure 8.2.4.

Figure 8.2.4: Processing of overlap between groups
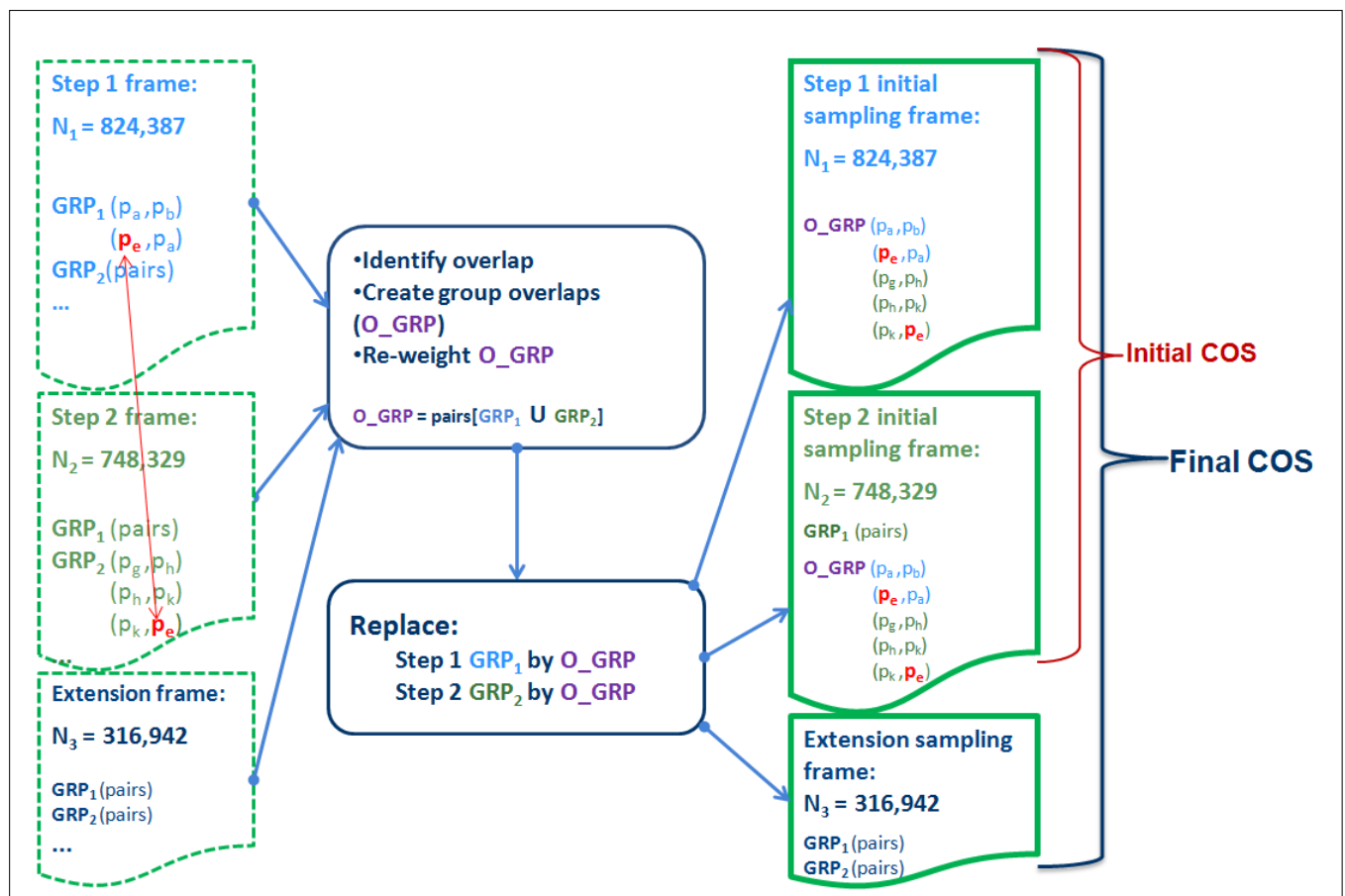
Source: Statistics Canada, 2011 Census Overcoverage Study.

To obtain an unbiased estimate of overcoverage, we assigned to a group involved in an overlap a portion of the overcoverage (e.g., an equal portion) from its overlap group instead of its own overcoverage. In other words, an overlap group's overcoverage was distributed among the groups concerned from Step 1, Step 2 or the extension. This distribution of overcoverage was applied by replacing each group involved in an overlap with its overlap group and adjusting its sampling weight with its portion of overcoverage during estimation.

8.3 COS sample design

The COS sample consisted of three independent samples selected from the frames of potential overcoverage cases constructed in Step 1, Step 2 and the extension phase. The sampling units were groups of RDB records linked by RDB record pairs; these groups were mutually exclusive and had been treated for frame overlap.

8.3.1 Step 1 sample

The sample was stratified. The stratum to which a potential overcoverage case belonged was defined by its number of RDB records, its number of AF records, and the provinces or territories to which the RDB records related. The sample size was allocated optimally among the various strata so as to minimize the total size, subject to the following constraints: a minimum number of observations in each stratum, and an upper limit on the coefficient of variation (CV) of the Step 1 overcoverage estimate for each province or territory. In each stratum, a systematic sample was selected after the potential cases were sorted by the values of the sex and date-of-birth variables in the RDB.

8.3.2 Step 2 sample

The sample was stratified. The stratum to which a potential overcoverage case belonged was defined by its number of RDB records, the provinces or territories to which these records related, and its match weight when it was a pair consisting of two RDB records only. The sample size was allocated optimally among the various strata so as to minimize the total size, subject to the following constraints: a minimum number of observations in each stratum, and an upper limit on the CV of the Step 2 overcoverage estimate for each province or territory. In each stratum, a systematic sample was selected after the potential cases were sorted by the sex and date-of-birth variables.

8.3.3 Extension sample

The sample was stratified. The groups of pairs were distributed among 13 intra-provincial/territorial strata and one inter-provincial/territorial stratum. The sample size was allocated uniformly among the various strata. In each stratum, a systematic sample was selected after the potential cases were sorted by sex and date of birth.

8.4 Collection

The collection process consisted in manual verification of the samples of groups of pairs from Step 1, Step 2 and the extension. When a group was sampled, all the pairs it contained were examined manually. The pairs from the overlap group were examined only once, even if other sampled groups were associated with the same overlap group.

Verification of a potential case (or overlap group) involved comparison of the RDB records in each RDB record pair included in the case for the purpose of recording the following data:

- The occurrence of overcoverage (i.e., the fact that the records actually represented the same person), and the type of overcoverage from Table 8.4a: Overcoverage type code.

- The overcoverage scenario, coded only when there was verified overcoverage between non-identical households, i.e., when the overcoverage type code was set at 2.1 or 2.2 (see Table 8.4a), as shown in Table 8.4b: Overcoverage scenario code.

Table 8.4a: Overcoverage type code

Code	Type of overcoverage
1.1	Identical household, one person, near
1.2	Identical household, one person, far
1.3	Identical household, more than one person, near
1.4	Identical household, more than one person, far
2.1	Non-identical household, more than one person, one in common
2.2	Non-identical household, more than one person, two or more in common
3.1	No overcoverage

Source: Statistics Canada, 2011 Census Overcoverage Study.

Table 8.4b: Overcoverage scenario code

Code	Scenario of overcoverage between non-identical households
1.1	Student/young adult who recently left the family home
1.2	Young adult who recently left the family home for a marriage or civil union
1.3	Adult who recently left a marital relationship or civil union
2.1	Child(ren) of parents in separate households
2.2	Child(ren) living with two parents/adults
3.1	Adult(s) with other relatives
3.2	Adult(s) with unrelated adults
4.1	A collective household
5.1	Other

Source: Statistics Canada, 2011 Census Overcoverage Study.

These determinations were based on a comparison of the selected RDB records and the corresponding households.

8.5 Processing

Processing includes the identification of overcoverage cases, also known as manual verification (MV) groups, based on the manual verification results. The manual verification groups were constructed by removing the RDB record pairs for which no overcoverage had been confirmed from the set of sampled potential cases. In this process, a sampled potential case might generate one or more smaller groups of RDB records in which the RDB records were linked by pairs whose overcoverage had been confirmed. If a sampled potential case was not involved in any overlaps, its verified overcoverage was equal to the total overcoverage for the set of MV groups that it contained. If not, as mentioned previously, its

overcoverage was set to a fraction of the total overcoverage of the set of MV groups that belonged to its overlap group.

The COS estimates were based on the weighted sum of the overcoverage cases counted in all MV groups.

8.6 Estimation

For each domain, overcoverage was estimated by calculating the weighted sum of verified overcoverage cases for the set of all sampled groups. In each stratum, the variance was estimated by assuming that the samples were selected by simple random sampling (SRS).

8.7 Adjustment based on the AMS

The COS estimates were then adjusted to account for the overcoverage that was measured by the AMS and was not covered by the COS extended sampling frame, for each domain of interest. The AMS-based adjustment modified the point estimates and the variance. The point estimate adjustment involved inflating the COS estimate with an estimated adjustment factor whose value was the ratio of the sum of the COS estimate and the AMS estimate not covered by the COS to the COS estimate. This estimated adjustment factor was calculated separately for each province and territory.

8.8 Final results

8.8.1 Overcoverage by step

Estimates of COS-initial overcoverage by step are shown in Table 8.8.1.

Table 8.8.1: COS-initial overcoverage by step

Provinces and territories	Step 1		Step 2		Total	
	estimated number	standard error	estimated number	standard error	estimated number	standard error
Canada	**456,198**	**2,038**	**132,658**	**4,659**	**588,856**	**5,085**
Newfoundland and Labrador	6,698	65	1,936	140	8,633	154
Prince Edward Island	1,598	12	457	31	2,054	33
Nova Scotia	10,702	94	4,212	256	14,914	272
New Brunswick	11,729	89	2,126	177	13,855	198
Quebec	132,021	911	24,063	1,741	156,085	1,965
Ontario	154,414	1,623	51,047	3,786	205,460	4,119
Manitoba	11,702	150	3,843	327	15,546	360
Saskatchewan	12,096	133	4,408	313	16,504	340
Alberta	43,061	499	17,155	1,099	60,216	1,207
British Columbia	71,020	615	22,881	1,676	93,902	1,786
Yukon	621	5	191	8	811	10
Northwest Territories	345	6	168	10	514	12
Nunavut	191	4	170	18	361	18

Source: Statistics Canada, 2011 Census Overcoverage Study.

Step 1 identified 456,198 overcovered persons, with a standard error of 2,038, and Step 2 identified an estimated 132,658, with a standard error of 4,659. In all, the COS-initial estimation process produced an estimate of 588,856 overcovered persons, with a standard error of 5,085.

8.8.2 Distribution of overcoverage by type (%)

The results for overcoverage by type are presented in Table 8.8.2; the overcoverage type codes were given in Section 8.4.

Table 8.8.2: Distribution of overcoverage by type (%)

Provinces and territories	Type of overcoverage						
	1.1	**1.2**	**1.3**	**1.4**	**2.1**	**2.2**	
	Identical, one person, near	Identical, one person, far	Identical, more than one person, near	Identical, more than one person, far	Non-identical, more than one person, one in common	Non-identical, more than one person, two or more in common	**Missing**
Canada	**4.3**	**1.1**	**39.2**	**7.4**	**27.6**	**20.1**	**0.4**
Newfoundland and Labrador	6.0	0.9	41.9	8.7	26.5	15.6	0.4
Prince Edward Island	3.6	2.1	39.0	8.0	30.5	16.7	0.1
Nova Scotia	7.1	0.7	39.7	3.8	30.9	17.4	0.5
New Brunswick	3.3	1.3	49.7	7.3	22.8	15.0	0.5
Quebec	4.7	1.2	34.6	6.4	31.6	21.3	0.2
Ontario	4.3	1.0	39.0	9.2	27.9	18.1	0.7
Manitoba	3.5	0.8	34.1	6.1	31.2	24.1	0.3
Saskatchewan	4.8	1.2	42.5	9.0	23.7	18.6	0.2
Alberta	5.1	1.7	37.8	7.2	28.6	19.4	0.2
British Columbia	2.9	0.8	46.5	5.8	19.9	23.8	0.3
Yukon	8.0	0.7	38.8	6.2	23.6	22.1	0.6
Northwest Territories	1.8	0.8	35.0	2.3	41.4	17.8	0.8
Nunavut	0.4	0.7	30.7	6.2	36.7	22.6	2.6

Source: Statistics Canada, 2011 Census Overcoverage Study.

The 'Identical household, more than one person, near' type accounted for 39.2% of the COS-initial overcoverage. 'Near' means two households that are at exactly the same address or very close geographically. Two households are identical if they contain the same persons with the same demographic characteristics. The 'Identical household, more than one person, far' type (further apart geographically) accounted for just 7.4% of the COS-initial overcoverage.

With regard to non-identical households, the 'Non-identical household, more than one person, one in common' type accounted for 27.6% of the COS-initial overcoverage, and the 'Non-identical household, more than one person, two or more in common' type for 20.1%.

8.8.3 Distribution of overcoverage by scenario (%)

The results for overcoverage by scenario are presented in Table 8.8.3; the overcoverage scenario codes were given in Section 8.4.

Table 8.8.3: Distribution of overcoverage by scenario (%)

| Provinces and territories | Overcoverage scenario | | | | | | | | | Missing |
| | 1.1 | 1.2 | 1.3 | 2.1 | 2.2 | 3.1 | 3.2 | 4.1 | 5.1 | |
	Student/young adult who recently left the family home	Young adult who recently left the family home for a marriage or civil union	Adult who recently left a marital relationship or civil union	Child(ren) of parents in separate households	Child(ren) living with two parents/adults	Adult(s) with other relatives	Adult(s) with unrelated adults	A collective household	Other	
Canada	**15.4**	**3.9**	**4.6**	**29.4**	**6.1**	**17.2**	**4.5**	**2.5**	**15.9**	**0.5**
Newfoundland and Labrador	23.7	6.4	3.6	20.9	5.9	19.6	2.1	0.9	16.7	0.2
Prince Edward Island	27.0	4.4	3.3	43.2	4.9	4.0	1.8	1.9	8.5	1.0
Nova Scotia	24.2	6.1	5.5	27.1	7.1	10.9	4.7	2.2	11.9	0.3
New Brunswick	20.4	4.4	3.4	21.6	8.6	17.3	2.7	1.2	19.8	0.5
Quebec	13.8	6.2	7.5	38.8	2.6	8.0	2.9	3.7	16.0	0.4
Ontario	15.5	3.1	2.7	27.1	7.3	24.1	7,0	1.3	11.6	0.2
Manitoba	11.9	2.1	3.0	36.8	7.7	17.3	3,0	2,0	15.0	1.3
Saskatchewan	16.8	3.7	4.4	30.0	10.4	13.7	2.4	0.2	17.9	0.5
Alberta	19.6	2.3	4.5	20.9	5.8	18.3	4.4	3.8	19.6	0.8
British Columbia	12.6	2.2	3.7	22.1	9.0	21.0	3.3	2.3	22.6	1.1
Yukon	14.4	2.9	3.8	42.3	5.6	10.8	3.2	0.0	16.6	0.3
Northwest Territories	17.8	3.7	4.7	29.9	10.9	14.6	1.1	0.0	17.3	0.0
Nunavut	5.7	8.0	5.1	14.9	19.8	8.9	2.2	0.2	34.6	0.6

Source: Statistics Canada, 2011 Census Overcoverage Study.

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As noted previously, the overcoverage scenario was coded only when there was overcoverage between non-identical households, i.e., when the overcoverage type code was set at 2.1 or 2.2.

The 'Child(ren) of parents in separate households' category accounted for 29.4% of the overcoverage between non-identical households, and the 'Child(ren) living with two parents/adults' category for 6.1%.

The 'Adult(s) with other relatives' category accounted for 17.2% of the overcoverage between non-identical households, and the 'Adult(s) with unrelated adults' category for 4.5%.

With regard to students and young adults, the proportion of overcoverage was 15.4% in the 'Student/young adult who recently left the family home' category and 3.9% in the 'Young adult who recently left the family home for a marriage or civil union' category.

The proportion of overcoverage between non-identical households was 4.6% in the 'Adult who recently left a marital relationship or civil union' category and 2.5% in the 'A collective household' category.

Lastly, the 'Other' category accounted for 15.9% of overcoverage, and missing scenario codes for 0.5%.

8.8.4   Overcoverage by match weight category

For the distribution of Step 1 overcoverage by match weight class, we considered only potential overcoverage cases that involved just two RDB records, that is, 2-to-1 cases. The results are shown in Table 8.8.4a.

Table 8.8.4.a: Percentage of RDB person pairs with verified overcoverage by match weight class for Step 1, 2-to-1 cases

Provinces and territories	200 to 299	300 to 399	400 to 499	500 to 599	600 to 699	700+
	Percentage (%)					
Newfoundland and Labrador	52.7	92.4	94.0	94.3	90.9	…
Prince Edward Island	72.7	97.1	95.3	98.2	100.0	…
Nova Scotia	53.6	95.9	95.7	96.5	100.0	…
New Brunswick	72.3	96.2	96.6	98.4	100.0	…
Quebec	73.6	95.6	96.5	96.7	96.8	100.0
Ontario	38.6	89.0	92.0	93.4	96.5	100.0
Manitoba	32.5	87.7	93.3	92.8	97.6	100.0
Saskatchewan	30.3	93.8	92.1	94.7	97.3	…
Alberta	25.8	89.8	89.9	95.4	98.0	93.3
British Columbia	47.1	92.8	94.7	95.5	96.1	94.4
Yukon	63.3	93.9	95.2	98.0	100.0	…
Northwest Territories	44.1	82.6	79.1	89.7	100.0	…
Nunavut	0.0	59.2	82.9	86.0	…	…
… not applicable						

Source: Statistics Canada, 2011 Census Overcoverage Study.

For the distribution of Step 2 overcoverage by match weight class, we considered only potential overcoverage cases that involved just two RDB records (RDB person pairs). The results are shown in Table 8.8.4b.

Table 8.8.4.b: Percentage of RDB person pairs with verified overcoverage by match weight class for Step 2 cases involving 2 persons

Provinces and territories	0 to 99	100 to 199	200 to 299	300 to 399	400 to 499	500 to 599
	Percentage (%)					
Newfoundland and Labrador	…	14	8	36	80	…
Prince Edward Island	…	10	5	52	33	…
Nova Scotia	…	18	11	50	100	…
New Brunswick	7	10	8	72	100	…
Quebec	…	13	17	36	66	100
Ontario	…	9	19	28	69	100
Manitoba	…	8	12	47	100	
Saskatchewan	…	12	16	39	89	100
Alberta	…	17	20	21	91	100
British Columbia	…	19	20	50	86	100
Yukon	…	30	9	67	100	…
Northwest Territories	…	2	2	75	100	…
Nunavut	…	18	2	43	62	…
… not applicable						

Source: Statistics Canada, 2011 Census Overcoverage Study.

8.8.5 Provincial/territorial distribution of the total overcoverage estimate and components of overcoverage

The COS total overcoverage estimate has three components: the estimate from COS-initial (steps 1 and 2), the estimate from the extension of COS-initial, and the estimate adjusted with the AMS. This last component is described in **Section 10, Evaluation of coverage studies**; it is the overcoverage identified by the AMS and not by the COS. The results are shown in Table 8.8.5.

Table 8.8.5: Total overcoverage estimate for Canada, provinces and territories

Provinces and territories	Total estimated overcoverage (1st)		Overcoverage from COS-initial (2nd)		Overcoverage from the extension of COS-initial (3rd)		Overcoverage from the AMS adjustment (4th)	
	estimated number	standard error	number	%	number	%	number	%
Canada	**632,846**	**6,675**	**588,856**	**93.05**	**31,939**	**5.05**	**12,051**	**1.90**
Newfoundland and Labrador	9,215	199	8,633	93.68	315	3.42	268	2.91
Prince Edward Island	2,214	58	2,054	92.77	123	5.56	37	1.67
Nova Scotia	16,239	404	14,914	91.84	991	6.10	334	2.06
New Brunswick	16,041	351	13,855	86.37	1,127	7.03	1,061	6.61
Quebec	165,276	2,550	156,085	94.44	6,621	4.01	2,571	1.56
Ontario	221,380	5,457	205,460	92.81	11,595	5.24	4,288	1.94
Manitoba	16,582	436	15,546	93.75	631	3.81	408	2.46
Saskatchewan	17,500	392	16,504	94.31	832	4.75	166	0.95
Alberta	64,298	1,659	60,216	93.65	2,945	4.58	1,131	1.76
British Columbia	102,214	2,202	93,902	91.87	6,674	6.53	1,679	1.64
Yukon	864	14	811	93.87	33	3.82	12	1.39
Northwest Territories	624	46	514	82.37	20	3.21	90	14.42
Nunavut	399	23	361	90.48	32	8.02	6	1.50

Sources: Statistics Canada, 2011 Census Overcoverage Study and 2011 Automated Match Study.

At the national level, the 2011 COS estimated the 2011 Census overcoverage at 632,846 persons, with a standard error of 6,675. The COS-initial estimate was 588,856, 93.05% of the total. The overcoverage estimated by the extension was 31,939 persons, or 5.05%, and the estimate contributed by the portion of the AMS not covered by the COS was just 12,051 persons, or 1.90%.

At the provincial/territorial level, the estimated proportions of overcoverage from COS-initial were above 90%, except for New Brunswick and the Northwest Territories, where the proportions were 86.37% and 82.37% respectively.

9. Estimation

Estimation for the DCS, the RRC and the COS is covered in Section 6.2, Section 7.4 and Section 8.6 respectively. This section provides a description of how the results of the census coverage studies were combined to produce estimates of population undercoverage (U), population overcoverage (O) and population net undercoverage (N) for various domains. The impact of sampling error on the quality of the estimates is also determined by calculating an estimated standard error for each estimate. Reverse Record Check (RRC) results and census data are used to construct estimates of undercoverage, while the Census Overcoverage Survey (COS) results provide estimates of overcoverage. Net undercoverage is the difference between undercoverage and overcoverage. This section contains details about the calculation of these estimates and the associated standard errors.

Let

C	=	published census count of the number of persons in the target population
$\hat{U}$	=	estimate of undercoverage
	=	estimate of the number of persons not included in C who should have been
$\hat{O}$	=	estimate of overcoverage
	=	estimate of the number of enumerations included in C that should not have been
$\hat{N}$	=	estimate of net undercoverage
	=	estimate of the number of persons not included in C who should have been less the number of enumerations included in C that should not have been
	=	$\hat{U} - \hat{O}$
$\hat{T}$	=	estimate of the number of persons in the census target population based on census enumerations and the estimate of population net undercoverage
	=	$C + \hat{N}$
$\hat{R}_U$	=	estimate of the undercoverage rate
	=	$100 * \dfrac{\hat{U}}{\hat{T}} = 100 * \dfrac{\hat{U}}{C + \hat{N}}$
$\hat{R}_O$	=	estimate of the overcoverage rate
	=	$100 * \dfrac{\hat{O}}{\hat{T}} = 100 * \dfrac{\hat{O}}{C + \hat{N}}$
$\hat{R}_N$	=	estimate of the net undercoverage rate
	=	$100 * \dfrac{\hat{N}}{\hat{T}} = 100 * \dfrac{\hat{U} - \hat{O}}{C + \hat{N}}$

$\hat{U}$ is obtained from RRC results and census data and $\hat{O}$ is obtained from COS as shown below:

Table 9.1 Components of the estimate of population coverage error for Canada

Components	Number of persons
Estimate of U	1,391,971
Estimate of O	632,846
Estimate of N	**759,124**
C	33,476,688
Estimation of T	**34,235,812**

Source: Statistics Canada, 2011 Census Coverage Studies.

The estimated standard errors are defined as shown below:

By definition, we have $v(\hat{U}) = v(\hat{M})$

$v(\hat{M})$ = estimated variance of $\hat{M}$ based on the RRC design

$v(\hat{O})$ = estimated variance of $\hat{O}$ based on the COS design

Then:

$$se(\hat{U}) = \sqrt{v(\hat{M})}$$

$$se(\hat{R}_U) = \sqrt{\left(\frac{\hat{U}^2 + \hat{T}^2 - 2\hat{U}\hat{T}}{\hat{T}^4}\right)v(\hat{M}) + \frac{\hat{U}^2}{\hat{T}^4}v(\hat{O})}$$

$$se(\hat{O}) = \sqrt{v(\hat{O})}$$

$$se(\hat{R}_O) = \sqrt{\left(\frac{\hat{O}^2}{\hat{T}^4}\right)v(\hat{M}) + \left(\frac{\hat{U}^2 + \hat{T}^2 - 2\hat{O}\hat{T}}{\hat{T}^4}\right)v(\hat{O})}$$

$$se(\hat{N}) = \sqrt{v(\hat{M}) + v(\hat{O})}$$

$$se(\hat{R}_N) = \sqrt{\left(\frac{(\hat{U} - \hat{O})^2 + \hat{T}^2 - 2(\hat{U} - \hat{O})\hat{T}^2}{\hat{T}^4}\right)\left[v(\hat{M}) + v(\hat{O})\right]}$$

10. Evaluation of coverage studies

10.1 Reverse Record Check

10.1.1 Introduction

The results of the largest coverage study, the Reverse Record Check (RRC), can be evaluated by comparing its estimates with data on the same characteristics from other sources, such as the 2011 Census database and administrative data. Comparisons with RRC estimates are used to evaluate RRC estimates and to quantify conceptual and measurement differences.

Despite some conceptual differences between the RRC and the 2011 Census, the RRC estimate of persons enumerated in the 2011 Census can be compared with the census count. To make the two figures comparable, certain adjustments were made in the census count before the comparison was carried out.

Estimates of the components of intercensal growth can be compared with estimates from other sources. In particular, the RRC estimate of the number of persons who died between the 2006 Census and the 2011 Census can be compared with the count from vital statistics files. Estimates of net interprovincial migration based on Canada Revenue Agency data can be compared with RRC estimates. However, strict comparisons for this characteristic are impossible, since adequate adjustments for conceptual differences cannot be made. Lastly, RRC estimates of population growth components can be compared with similar estimates from administrative data.

10.1.2 Comparisons with census counts

Since the RRC's single-stage stratified sampling design produces unbiased estimators, differences between RRC estimates and census counts are due to sampling error in the RRC estimates, conceptual differences between the two sources, and/or systematic biases in the two sources, which result in an underestimate or overestimate of the characteristic being studied.

10.1.2.1 Persons enumerated

Provincial and national comparisons are presented in Table 10.1.2.1 along with the standard error of the RRC estimate and the t-value for testing the hypothesis that there is no difference between the RRC estimate and the comparable census count. The adjustments below were made in the published census counts to account for conceptual differences between the two sources:

- Adjustments based on the Dwelling Classification Survey were excluded because, while they were included in the census counts, they were not part of the RRC estimate of enumerated persons.
- The estimate of 2011 Census overcoverage was subtracted, because the census database contained overcovered persons whereas the RRC estimate was based on the number of unique persons enumerated (and not on the number of enumerations).
- The estimate of the number of persons living outside Canada five years earlier (excluding intercensal immigrants and non-permanent residents) from the National Household Survey was also subtracted, because the RRC estimates did not include the majority of these persons.

Table 10.1.2.1 Comparison of RRC estimates of the number of enumerated persons and comparable census counts for Canada, provinces and territories

Provinces and territories	Enumerated persons				
	RRC		comparable census count	difference	t-value[1]
	estimated number	standard error			
Canada	**31,088,731**	**66,616**	**31,052,186**	**36,545**	**0.55**
Newfoundland and Labrador	482,237	6,491	485,855	-3,618	-0.56
Prince Edward Island	136,886	4,040	132,313	4,572	1.13
Nova Scotia	877,183	9,505	864,929	12,254	1.29
New Brunswick	700,858	6,544	702,764	-1,906	-0.29
Quebec	7,375,538	33,799	7,428,542	-53,004	-1.57
Ontario	12,004,507	54,096	12,007,692	-3,184	-0.06
Manitoba	1,152,309	9,568	1,120,415	31,894	3.33
Saskatchewan	948,706	9,716	948,729	-23	0.00
Alberta	3,415,234	25,449	3,372,956	42,278	1.66
British Columbia	3,995,273	23,929	3,987,991	7,282	0.30
Yukon	33,897	0	33,897	0	…
Northwest Territories	41,462	0	41,462	0	…
Nunavut	31,906	0	31,906	0	…

… not applicable

1. A t-value greater than 1.96 or less than -1.96 indicates that the difference is significant at the 95% level.

Source: Statistics Canada, 2011 Census Reverse Record Check.

Nationally, the RRC estimate of the number of persons enumerated in the 2011 Census was slightly higher (0.12%) than the comparable 2011 Census count. In the 2006 Census, the RRC estimate was slightly lower than the census count (-0.03%). In the 2001 Census, the RRC overestimated the census count by 0.07%, and in 1996, the RRC underestimated the census by 0.08%. Provincially, Manitoba had the largest difference (t-value of 3.33); the RRC estimate of the number of persons enumerated exceeded the comparable census count by 31,894. This difference is statistically significant, and Manitoba was the only province with a statistically significant difference. Significant differences were observed in previous RRCs as well. The most significant differences were investigated to make sure that there was no bias in the RRC classification (including, for example, province of residence on Census Day). Other factors may also play an important role. Apart from sampling error, biases in the adjustments (e.g., returning Canadians) applied to the published census count to obtain a conceptually comparable figure may be responsible for the observed differences. RRC non-response bias may also have had an impact, since the non-response adjustment was designed to obtain the best result for estimating missed persons rather than enumerated persons. Regular checks and quality controls were performed for all steps in the RRC. In view of the significant difference for Manitoba, a more detailed investigation was conducted to ensure that the operations and the estimates were not affected by any of the above-mentioned errors or problems. No such errors or problems were detected.

10.1.3   Comparison with population estimates

10.1.3.1   Deceased persons

Table 10.1.3.1 provides a comparison of the estimated number of persons who died during the intercensal period (May 16, 2006, to May 9, 2011) by RRC province of classification and counts from vital statistics files. At the national level, the RRC estimate exceeded the vital statistics count by 15,063 (1.3%). The largest relative difference was in Newfoundland and Labrador: -1,905 / 22,438, or -8.5%. In absolute value terms, the differences ranged from 0.7% to 8.5%. None of these differences is statistically significant. In t-value terms, the highest values were observed in British Columbia (1.23), where the RRC estimate was higher than the vital statistics count, and Newfoundland and Labrador (-1.09), where the RRC estimate was lower than the vital statistics count. All other estimates were well within one standard error of difference.

Table 10.1.3.1 Comparison of the RRC estimate of the number of deceased persons and the vital statistics count for the provinces

| | Persons deceased May 16, 2006 to May 9, 2011 | | | | |
| | RRC | | | | |
Provinces	estimated number	standard error	vital statistics count	difference	t-value[1]
Total	**1,201,876**	**33,634**	**1,186,813**	**15,063**	**0.45**
Newfoundland and Labrador	20,533	1,754	22,438	-1,905	-1.09
Prince Edward Island	5,866	480	6,150	-284	-0.59
Nova Scotia	43,590	3,032	41,399	2,191	0.72
New Brunswick	30,000	2,615	31,823	-1,823	-0.70
Quebec	291,160	17,567	286,203	4,957	0.28
Ontario	445,917	24,952	442,898	3,019	0.12
Manitoba	49,053	3,692	49,989	-936	-0.25
Saskatchewan	47,324	3,448	45,278	2,046	0.59
Alberta	100,024	8,007	104,081	-4,057	-0.51
British Columbia	168,407	9,657	156,554	11,853	1.23

1. A t-value greater than 1.96 or less than -1.96 indicates that the difference is significant at the 95% level.

Source: Statistics Canada, 2011 Reverse Record Check.

10.1.3.2   Interprovincial migration

Table 10.1.3.2 provides a comparison of RRC estimates of net interprovincial migration for the intercensal period and corresponding figures based on Canada Revenue Agency (CRA) files. In general, in-migration and out-migration statistics were not comparable because the RRC only took into account migration flows that occurred between the sampling frame reference date (e.g., May 16, 2006, for the census frame) and Census Day 2011, while estimates based on CRA data took annual migration into account. Accordingly, only net migration estimates are presented.

None of the observed differences was significant. Alberta had the highest t-value, at 1.65, as the RRC estimate of the net migration gain was much higher than the estimate based on CRA data. While both sources estimated a large net migration gain, the size of the gain differed with the source. It is recognized that there was substantial migration to Alberta, and that it might be difficult to distinguish between permanent and temporary migration. Some people migrated to Alberta for work and then settled there permanently. Others went there to work, but kept their residence in their province of origin and returned to it with varying frequency. Census respondents do not always correctly identify the location where they should be enumerated. As a result, the respondent may have provided a temporary place of residence, which led to a misinterpretation of his or her mobility and may have affected the accuracy of RRC mobility estimates.

For all provinces except Nova Scotia and Newfoundland and Labrador, both series of estimates showed net migration gains or net migration losses.

Table 10.1.3.2 Comparison of RRC estimates of net interprovincial migration and counts from Canada Revenue Agency data for provinces

| Provinces | Net interprovincial migration | | | | difference | t-value[2] |
| | RRC[1] | | | | | |
	sample size	estimated number	standard error	CRA count		
Newfoundland and Labrador	377	3,574	6,141	-1,322	4,896	0.80
Prince Edward Island	390	-655	3,345	-1,742	1,087	0.32
Nova Scotia	660	686	8,765	-6,583	7,269	0.83
New Brunswick	507	-7,746	5,805	-4,044	-3,702	-0.64
Quebec	369	-57,905	15,659	-40,753	-17,152	-1.10
Ontario	1,162	-91,843	26,342	-59,141	-32,702	-1.24
Manitoba	406	-15,414	7,713	-18,434	3,020	0.39
Saskatchewan	560	23,895	9,158	10,902	12,993	1.42
Alberta	1,472	105,444	22,044	68,976	36,468	1.65
British Columbia	921	39,964	17,901	52,141	-12,177	-0.68

1. The RRC excludes persons living in a province on May 10, 2011 who had lived in one of three territories five years before, on May 16, 2006.
3. A t-value either greater than 1.96 or less than -1.96 indicates that the difference is significant at the 95% level.

Source: Statistics Canada, 2011 Reverse Record Check.

10.1.4 Components of population growth

An extensive comparison of RRC estimates of the components of intercensal population growth and population estimates derived from administrative data was carried out by the Demography Division. (This topic is also discussed in Section 10.3.) The RRC estimates of the demographic components are a by-product of the RRC and therefore not necessarily very precise. Estimates of total population growth from these two sources are presented in Table 10.1.4. The estimates of returning Canadians and persons living on Indian reserves or in Indian settlements that were incompletely enumerated in 2006 and enumerated in 2011 were added to the RRC estimates to make them comparable to the estimates from administrative sources.

The estimates from administrative sources are a combination of many estimates of population growth components (births, deaths, immigration, internal migration, emigration, net number of non-permanent residents, and growth of unenumerated Indian reserves). These estimates are subject to varying amounts of measurement error depending on the source. It is also important to keep in mind that the RRC was not designed to produce estimates of this type and that these estimates are by-products. Consequently, differences between the two series of estimates are to be expected.

Nationally, the RRC estimates differed by 8.6% from the administrative data estimates. The largest differences were observed in Ontario (-136,686) and British Columbia (-56,885). As a percentage of the administrative data estimates, these differences were 19.0% and 18.2% respectively.

Table 10.1.4 Comparison of RRC estimates of population growth and estimates from administrative data for the provinces

Provinces	Population growth May 16, 2006 to May 9, 2011		difference
	RRC	Administrative data	
	estimated number	estimated number	
Total	**1,751,609**	**1,915,626**	**-164,017**
Newfoundland and Labrador	11,437	3,230	8,207
Prince Edward Island	10,220	7,991	2,229
Nova Scotia	15,624	10,677	4,947
New Brunswick	7,094	10,574	-3,480
Quebec	308,155	349,190	-41,035
Ontario	581,916	718,602	-136,686
Manitoba	78,439	69,931	8,508
Saskatchewan	75,280	64,498	10,782
Alberta	407,097	367,701	39,396
British Columbia	256,347	313,232	-56,885

Source: Statistics Canada, 2011 Reverse Record Check.

10.2 Census Overcoverage Study

Many changes were made in the methodology of the 2011 COS to improve the precision of the overcoverage estimates and identify more overcoverage cases than in 2006. To gauge the success of the 2011 COS, the evaluation had two objectives: measure overcoverage missed by the COS, and quantify the improvement attributable to the methodological changes made since 2006. The AMS is a good tool to use for both objectives, since its methodology has remained essentially unchanged since 2001. It is particularly useful for addressing the non-trivial problem of breaking down any increase in the estimated overcoverage into two components: a higher overcoverage in the studied population and an additional overcoverage detected because of improvement in the COS methodology.

10.2.1 Comparison of the 2006 and 2011 AMSs

The 2011 AMS was carried out using the same methodology as for the 2006 AMS, and then the two studies were compared. This made it possible to estimate the relative differences in overcoverage for various domains (e.g., national, provincial/territorial) between 2006 and 2011. The results of the comparison are shown in Table 10.2.1.

Table 10.2.1 Comparison of estimated overcoverage, 2006 AMS and 2011 AMS

Provinces and territories	Estimated number of overcovered persons		Relative difference (%)
	2006 AMS	2011 AMS	
Canada	**292,594**	**430,702**	**47**
Newfoundland and Labrador	4,710	7,221	53
Prince Edward Island	1,293	1,445	12
Nova Scotia	6,696	10,983	64
New Brunswick	5,807	12,708	119
Quebec	68,373	106,720	56
Ontario	108,488	146,962	35
Manitoba	8,873	11,171	26
Saskatchewan	7,601	12,421	63
Alberta	26,574	41,997	58
British Columbia	53,338	77,951	46
Yukon	230	643	180
Northwest Territories	446	355	-20
Nunavut	164	124	-24

Source: Statistics Canada, 2006 and 2011 Automated Match Study.

For 2006, the AMS produced an estimate of 292,594 overcovered persons at the national level. For 2011, the estimate was 430,702 persons, a relative difference of more than 47% compared with 2006. At the provincial and territorial level, the relative difference was positive in all cases except the Northwest Territories and Nunavut, where it was -20% and -24% respectively. The relative differences for New Brunswick and Yukon were particularly high, at 119% and 180% respectively.

10.2.2 Comparison of the 2011 COS and the 2011 AMS

The results of the 2011 COS were compared with the results of the 2011 AMS to estimate overcoverage missed by the COS but detected by the AMS, overcoverage missed by the AMS but detected by the COS, and overcoverage identified by both studies.

Differences of this kind are to be expected, because of the different approaches taken in the COS (person-based) and the AMS (household-based). The comparison was carried out in two steps.

The first step was to estimate the overcoverage detected by both the AMS and the COS in the COS sampling frames, i.e., overcoverage in the **AMS domain of the COS.** This overcoverage was estimated by matching person pairs that were in the AMS sampling frame with duplicates in the COS sample. It was estimated using the COS sample.

The second step was to estimate overcoverage detected by the AMS but missed by the COS. This overcoverage was equal to the total overcoverage for all AMS household pairs that contained no COS person pairs (from Step 1, Step 2 or the extension). It was estimated by matching the COS person pairs with the duplicates in the AMS sample. Unmatched AMS duplicates were the portion missed by the COS.

The two comparisons were carried out using the COS initial frame and the COS extended frame. The latter helped detect additional overcoverage cases missed by the COS initial frame, including overcoverage previously detected by the AMS and additional overcoverage not detected by the AMS or the COS initial frame.

10.2.2.1 Evaluation of COS-initial compared with the AMS

The results of comparing COS-initial and the AMS are presented in Table 10.2.2.1a.

Table 10.2.2.1a Comparison of COS-initial and the AMS

COS-initial universe		AMS universe	
Estimated overcoverage: 588,856		**Estimated overcoverage: 430,702**	
Overcoverage common to COS-initial and the AMS	386,661 65.7% of the COS-initial total	Overcoverage common to COS-initial and the AMS	392,302 91.1% of the AMS total
Overcoverage found by COS-initial, but **NOT** by the AMS	202,195 34.3% of the COS-initial total	No overcoverage found in the AMS	
No overcoverage found in the COS		Overcoverage found by the AMS, but **NOT** by COS-initial	**38,400** **8.9%** of the AMS total

Sources: Statistics Canada, 2011 Census Overcoverage Study and 2011 Automated Match Study.

The left side of Table 10.2.2.1a contains the following national estimates based on the **COS-initial sample**:

- overcoverage in the COS initial frame: 588,856
- overcoverage in the COS initial frame and the AMS frame: 386,661, or 65.7% of the total overcoverage detected using COS-initial
- overcoverage in the COS initial frame but not in the AMS frame: 202,195, or 34.3% of the total overcoverage detected using COS-initial.

The right side contains the following national estimates based on the **AMS sample**:

- overcoverage in the AMS frame: 430,702
- overcoverage in the COS initial frame and the AMS frame: 392,302, or 91.1% of the total overcoverage detected using the AMS

- overcoverage in the AMS frame but not in the COS initial frame: 38,400, or 8.9% of the total overcoverage detected using the AMS.

The overcoverage of 38,400 that was detected by the AMS but was not in the COS initial frame was analyzed in more detail. The estimates, presented in Table 10.2.2.1b, were based on the AMS sample.

Table 10.2.2.1b Characteristics of overcoverage found by the AMS but not by COS-initial

Overcoverage found by the AMS but NOT by COS-initial		
Two characteristics	**Total: 38,400**	**8.9% of 430,702**
1. AMS household pair with **at least one** person pair from COS-initial	28,978 **or 75.5%**	**6.7% of 430,702**
2. AMS household pair with **no** COS persons	9,422 **or 24.5%**	**2.2% of 430,702**

Sources: Statistics Canada, 2011 Census Overcoverage Study and 2011 Automated Match Study.

This overcoverage falls into one of the following two categories:

- Overcoverage among AMS household pairs containing at least one person pair from the COS initial frame: 28,978, or 75.5% of the total of 38,400 missed. This large portion of missed overcoverage was the target of the COS extension.
- Overcoverage among AMS household pairs that contain no person pairs from the COS initial frame: 9,422, or 24.5% of the total of 38,400 missed.

10.2.2.2 Evaluation of COS-extended compared with the AMS

The extension of the COS frame was formed independently of the AMS household pairs. It contains a large portion of the overcoverage detected using the AMS and missed in COS-initial. However, it also contains additional overcoverage not detected by either the AMS or COS-initial.

The results of comparing COS-extended and the AMS are presented in Table 10.2.2.2.

Table 10.2.2.2 Comparison of COS-extended and the AMS

COS-extended universe		AMS universe	
Estimated overcoverage: **632,846**		Estimated overcoverage: **430,702**	
Overcoverage common to COS-initial and the AMS	386,661 **or** **61.1%**	Overcoverage common to COS-initial and the AMS	392,302 **or** **91.1%**
Overcoverage found by COS-initial, but **NOT** by the AMS	202,195 **or** **32.0%**	No overcoverage found in the AMS	
Overcoverage added to COS-initial by the extension and common to COS-extended and the AMS	27,625 **or** **4.4%**	Overcoverage from AMS household pairs with **at least one** COS person pair and found by the extension	26,349 **or** **6.1%**
Overcoverage added to COS-initial by the extension, but **not covered** by the AMS	4,294 **or** **0.7%**	No overcoverage found in the AMS	
Adjustment of COS-extended overcoverage with the AMS	12,051 **or** **1.9%**	Overcoverage from AMS household pairs with at least one COS person pair but not found by the extension	2,629 **or** **0.6%**
		Overcoverage found by the AMS but NOT by COS-extended	9,422 **or** **2.2%**

Sources: Statistics Canada, 2011 Census Overcoverage Study and 2011 Automated Match Study.

The left side of Table 10.2.2.2 contains the following national estimates based on the **COS sample**. The various percentages were calculated in relation to the adjusted COS-extended overcoverage estimate of 632,846 persons.

- unadjusted overcoverage in the COS extended frame (COS initial estimate + extension estimate): 588,856[8] + 31,919[9] = 620,775
- overcoverage detected by COS-initial and the AMS: 386,661
- overcoverage detected by COS-initial but not by the AMS: 202,195
- overcoverage detected by COS-extended and the AMS: 27,625
- overcoverage detected by COS-extended but not by the AMS: 4,294
- adjustment of the COS-extended overcoverage with the AMS: 12,051.

Hence, following adjustment using the AMS results, the total overcoverage (COS-initial estimate + extension estimate + estimate from the AMS adjustment) was 588,856 + 31,919 + 12,051 = 632,846.

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8. 386,661 + 202,195 = **588,856**
9. 27,625 + 4,294 = **31,919**

The right side of Table 10.2.2.2 contains the following national estimates based on the **AMS sample**:

- overcoverage in the AMS frame: 430,702
- overcoverage common to the COS initial frame and the AMS frame: 392,302, or 91.1% of the total overcoverage detected by the AMS
- overcoverage in the COS extension and in AMS household pairs containing at least one COS-initial person pair: 26,349, or 6.1% of the total overcoverage detected by the AMS
- overcoverage not detected in the COS extension and in AMS household pairs containing at least one COS-initial person pair: 2,629, or 0.6% of the total overcoverage detected by the AMS. This overcoverage was missed by the extension because the rules applied for the COS extension were similar to but different from the rules applied for the AMS
- overcoverage in the AMS frame but not in the COS extended frame: 9,422, or 2.2% of the total overcoverage detected by the AMS.

The COS overcoverage estimate was adjusted using the total overcoverage detected by the AMS but not by COS-extended. This adjustment totalled 12,051 and consisted of the following components:

- overcoverage not detected in the COS extension and in AMS household pairs containing at least one COS-initial person pair: 2,629
- overcoverage in the AMS frame but not in the COS extended frame (containing no COS-initial person pairs): 9,422.

The above results show that the extension increased the coverage of the COS and detected additional overcoverage that would not have been identified by the AMS. Consequently, the extension eliminated a bias in the overcoverage estimate. Use of the extension also made it possible to assign the detected overcoverage to the appropriate domain when estimates were made for subpopulations. This improved the quality of the estimates for each domain. When the AMS was used for adjustment purposes, the additional overcoverage was distributed proportionally among all groups instead of being assigned to the particular domains in which overcoverage occurred.

10.3 Population estimates

10.3.1 Error of closure

Statistics Canada's Population Estimates Program (PEP) determines provincial and territorial population counts on Census Day by summing census population counts, estimates of census net undercoverage (CNU) and a population estimate for incompletely enumerated Indian reserves (IEIRs). The PEP then extends these adjusted census counts to July 1, at which point they become the base population for postcensal population estimates.

When determining the adjusted census counts, the PEP evaluates the quality of the postcensal estimates that it produced in the five-year period preceding the census. The evaluation focuses on the difference between the postcensal estimates for Census Day and the adjusted population count for this census. This difference is referred to as the error of closure. A detailed review of this error constitutes the main evaluation of the quality of the postcensal estimates.

Table 10.3.1 shows the errors of closure for 2011 and 2006 by province and territory. Note that a positive error of closure means that the postcensal estimate is higher than the adjusted census count. The 2011 error of closure for Canada was 171,115, an error rate of 0.50%. Hence, the national population estimates overestimated Canada's population. The error and error rate were higher in 2011 than in 2006 (44,127, or 0.14%).[10]

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10. The 2006 error of closure is based on a 2006 postcensal estimate updated in 2013 following a revision of the components for 2001 to 2006.

Four provinces and two territories had errors of closure greater than 1% or less than -1% in 2011: Newfoundland and Labrador (-2.09%), Prince Edward Island (1.50%), Manitoba (1.79%), British Columbia (1.27%), the Northwest Territories (1.55%) and Nunavut (-1.40%). By comparison, in 2006, two provinces and all three territories had errors of closure of this magnitude. In 2011, six provinces and one territory had larger errors of closure (in absolute value terms) than in 2006.

Table 10.3.1 Error of closure for Canada, provinces and territories, 2006 and 2011

	2006		2011	
Provinces and territories	number	rate (%)	number	rate (%)
Canada	**44,127**	**0.14**	**171,115**	**0.50**
Newfoundland and Labrador	-1,634	-0.32	-10,983	-2.09
Prince Edward Island	-6	0.00	2,155	1.50
Nova Scotia	-4,193	-0.45	5,059	0.54
New Brunswick	2,729	0.37	1,529	0.20
Quebec	22,806	0.30	-20,451	-0.26
Ontario	22,684	0.18	123,478	0.93
Manitoba	-5,812	-0.49	22,088	1.79
Saskatchewan	-3,755	-0.38	-7,741	-0.73
Alberta	-50,407	-1.48	-1,259	-0.03
British Columbia	64,074	1.51	56,932	1.27
Yukon	-1 026	-3.19	111	0.31
Northwest Territories	- 919	-2.13	674	1.55
Nunavut	-414	-1.35	-477	-1.40

Source: Statistics Canada, Demography Division.

10.3.2   Accuracy of postcensal estimates

The results of the census coverage studies are used to adjust census counts for CNU. However, since the studies are based in part on sample surveys, the CNU results contain some statistical variability due to the samples. To determine whether the errors of closure discussed above are statistically significant, the standard error of the adjusted census count must be taken into account. Since the 2006 adjusted census count was used as the base population for the 2006-2011 postcensal estimates, a standard error that combines the statistical variability of the adjusted census counts for 2011 and 2006 was calculated for each province and territory.

Table 10.3.2 shows the 2011 error of closure by province and territory, the combined standard error of the 2006 and 2011 adjusted census counts, and the t-value.[11] The error of closure is statistically significant at a 95% confidence level for Canada, Newfoundland and Labrador, Prince Edward Island (though only very slightly), Ontario, Manitoba and British Columbia. In other words, the sampling variability of the 2006 and 2011 adjusted census counts does not explain the majority of the error of closure.[12]

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11. If the t-value is greater than 1.96 or less than -1.96, the PEP estimate is statistically different from the adjusted census count at a 95% confidence level.
12. The analysis subsequently took account of the effect of a change in the RRC's undercoverage estimation method in 2011. Without that change, the error of closure for Prince Edward Island would not have been significant and the error for Ontario would have been just at the 1.96 cut-off level.

Table 10.3.2 Impact of the adjusted censuses' statistical variability on the accuracy of population estimates for Canada, provinces and territories, 2006 and 2011

Provinces and territories	Error of closure	Combined standard-error of the 2006 and the 2011 adjusted censuses	T-value [1]
	number	number	
Canada	**171,115**	**71,304**	**2.40**
Newfoundland and Labrador	-10,983	3,451	-3.18
Prince Edward Island	2,155	1,094	1.97
Nova Scotia	5,029	6,851	0.74
New Brunswick	1,529	4,328	0.35
Quebec	-20,451	31,260	-0.65
Ontario	123,478	54,037	2.29
Manitoba	22,088	8,399	2.63
Saskatchewan	-7,741	7,258	-1.07
Alberta	-1,259	23,018	-0.05
British Columbia	56,932	23,570	2.42
Yukon	111	360	0.31
Northwest Territories	674	400	1.69
Nunavut	-477	633	-0.75

1. A t-value greater than 1.96 or less than -1.96 indicates that the difference is significant at the 95% level.

Source: Statistics Canada, Demography Division.

10.3.3 Postcensal estimates and error of closure

The contribution of the PEP components of growth to the error of closure was evaluated in particular for provinces where the error is significant. The evaluation method involves using information from the RRC to decompose the error of closure and compare the growth components estimated by the PEP and the RRC.

From a growth standpoint, the error of closure can be decomposed as follows:

$$EOC = (\Delta PE - \Delta RRC) + (\Delta RRC - \Delta AC)$$

where

EOC = error of closure
ΔPE = growth determined by the PEP component estimates
ΔRRC = growth determined by the RRC component estimates
ΔAC = growth based on the difference between the 2006 and 2011 adjusted census counts.

This decomposition does not strictly separate the effect of bias in the PEP growth components from the effect of RRC sampling variability. This variability is present in both comparison terms. However, a significant difference in the first term could confirm larger biases in the PEP postcensal estimates for a province and offers the potential for identifying which components might be the source of the bias. The second term results mainly from the statistical variability of the RRC sample, but it provides no direct information about the effect that that variability has on the error of closure.[13] However, a significant difference in this term can affect the comparison of the PEP and RRC growth figures. In 2001, the error of closure is not equal to the sum of the two terms, mostly because the adjustment to account for the overcoverage of the 2006 Census sampling frame for the 2011 RRC is not equal to the 2006 Census Overcoverage estimate. However, the comparison of the relative importance of both terms is still valid when analysing the error of closure.

Table 10.3.3 shows the error of closure, the value of each of the two difference terms, the standard error and the t-value. For the provincial total and for Ontario and British Columbia, the error of closure is composed largely of the term consisting of the difference between PE growth and RRC growth, which is statistically significant at a 95% confidence level. For Newfoundland and Labrador and Prince Edward Island, neither term is statistically significant, but the PE-RRC growth difference term is dominant for the former while the RRC-AC growth difference term is dominant for the latter. For Manitoba, the RRC–AC difference term is larger and statistically significant.

Table 10.3.3 Error of closure in two terms for Canada, provinces, 2011

	Error of closure		$\Delta_{PE} - \Delta_{RRC}$			$\Delta_{RRC} - \Delta_{AC}$		
Provinces	estimated number	estimated rate	estimated number	standard error	t-value[1]	estimated number	standard error	t-value[1]
Provinces	**170,808**	**0.50**	**164,017**	**50,258**	**3.26**	**36,545**	**66,616**	**0.55**
Newfoundland and Labrador	-10,982	-2.09	-8,207	6,433	-1.28	-3,618	6,491	-0.56
Prince Edward Island	2,155	1.50	-2,229	4,059	-0.55	4,573	4,040	1.13
Nova Scotia	5,059	0.54	-4,947	9,506	-0.52	12,254	9,505	1.29
New Brunswick	1,529	0.20	3,480	6,405	0.54	-1,906	6,544	-0.29
Quebec	-20,451	-0.26	41,035	26,631	1.54	-53,004	33,799	-1.57
Ontario	123,477	0.93	136,686	46,621	2.93	-3,185	54,096	-0.06
Manitoba	22,089	1.79	-8,508	8,859	-0.96	31,894	9,568	3.33
Saskatchewan	-7,741	-0.73	-10,782	9,886	-1.09	- 23	9,716	0.00
Alberta	-1,259	-0.03	-39,396	24,697	-1.60	42,278	25,449	1.66
British Columbia	56,932	1.27	56,885	24,780	2.30	7,282	23,929	0.30

1. A t-value greater than 1.96 or less than -1.96 indicates that the difference is significant at the 95% level.

Source: Statistics Canada, Demography Division.

These results suggest that the PEP estimates may have overestimated the growth for the provincial total, Ontario and British Columbia and underestimated the growth for Newfoundland and Labrador. The PEP estimates may

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13. This term is equivalent to comparing the RRC estimate of persons enumerated to the comparable 2011 Census count. Instead, the impact that the sampling variability of the RRC estimates has on the error of closure is estimated by the sampling errors affecting 2006 and 2011 net undercoverage.

therefore partly account for the significant positive error of closure for the provincial total, Ontario and British Columbia and the significant negative error of closure for Newfoundland and Labrador.

The ΔPE – ΔRRC term was analyzed by growth component for these provinces. For Ontario and British Columbia, the largest difference lies in the net international migration component, with the PEP estimate being much higher. For Newfoundland and Labrador, the net interprovincial migration component shows the largest difference, the PEP estimate being lower.

For international migration, the largest difference is in emigration. The PEP appears to underestimate emigration. The difference is statistically significant at a 95% confidence level for the provincial total, Ontario and British Columbia. It is also statistically significant for Newfoundland and Labrador, but for this province, the PEP emigration estimate is larger.

For interprovincial migration, no province has a statistically significant difference between the net figures estimated by the PEP and the RRC. This is due both to the variance associated with the RRC sample size and to the fact that, for some provinces, the PEP overestimates both in-migration and out-migration. Significant differences are observed in the in-migration and out-migration estimates for some provinces. These differences appear to be due largely to migration flows to Alberta and, to a lesser extent, to Ontario.

10.3.4 Conclusion

From a population growth standpoint, the PEP overestimated the growth of Canada's population between 2006 and 2011. This overestimate was larger than the overestimate for the preceding period (2001 to 2006). The error-of-closure rate was 0.50% in 2011, compared with 0.14% in 2006. After the statistical variability of the adjusted census counts is taken into account, the error of closure is statistically significant for Canada, Newfoundland and Labrador, Prince Edward Island, Ontario, Manitoba and British Columbia. Hence, statistical variability alone may not explain the errors of closure for these provinces.

A decomposition analysis of the error of closure shows that the error for the provincial total, Ontario and British Columbia may be due to an overestimate of growth by the PEP, mainly caused by an underestimate of emigration. For Newfoundland and Labrador, the PEP may have underestimated net interprovincial migration.

While the errors of closure were generally larger than in 2006, the 2011 PEP estimates were still consistent with the census counts adjusted for net undercoverage.

11. Historical estimates of population coverage error

11.1 Estimates

This section presents historical estimates of population coverage error. Chart 11.1 shows the estimated population undercoverage rate $\hat{R}_U$ for the 1971 Census to the 2011 Census, and the estimated population overcoverage rate $\hat{R}_O$ and the estimated population net undercoverage rate $\hat{R}_N$ for the 1991 Census to the 2011 Census. The series for overcoverage and net undercoverage begin in 1991 because the overcoverage rate was first estimated for the 1991 Census following an experimental study done for the 1986 Census.

Chart 11.1 Estimated rates of population coverage error for Canada, 1971 Census to 2011 Census
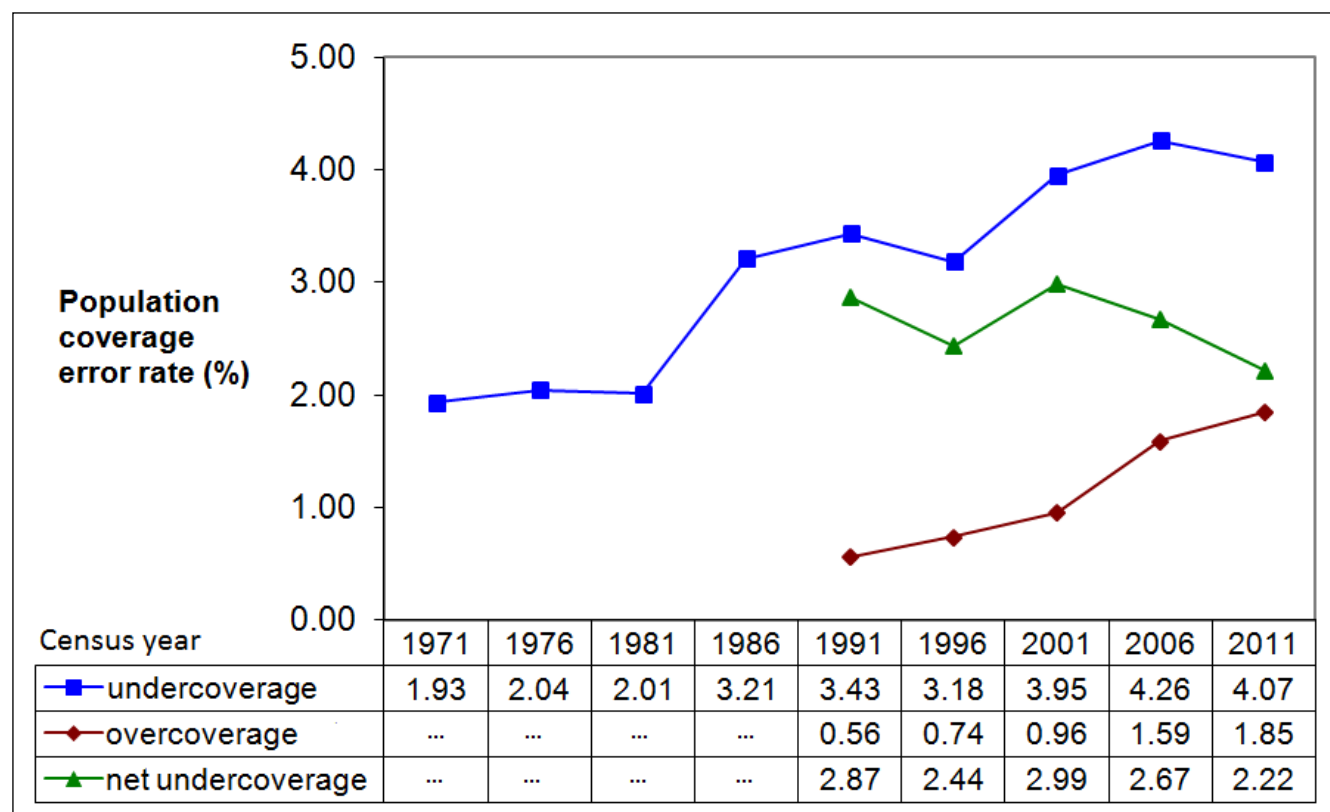
Census year	1971	1976	1981	1986	1991	1996	2001	2006	2011
undercoverage	1.93	2.04	2.01	3.21	3.43	3.18	3.95	4.26	4.07
overcoverage	...	...	...	...	0.56	0.74	0.96	1.59	1.85
net undercoverage	...	...	...	...	2.87	2.44	2.99	2.67	2.22

Sources: Statistics Canada, 2011 Census, 2011 Reverse Record Check and 2011 Census Overcoverage Study.

Population coverage error is a growing data quality concern; undercoverage has doubled since 1981 and overcoverage is two and a half times higher than it was 1996. Changes in net undercoverage from census to census reflect changes in undercoverage and/or overcoverage, which in turn reflect changes in the demographic situation, changes in the living arrangements of Canadians, changes in census methodology, and changes in the methodology of the coverage studies. The last issue is discussed in Section 11.2.

As shown in Chart 11.1, the undercoverage rate declined slightly in 2011, and the overcoverage rate continued to rise. The undercoverage rates were similar for the 1971, 1976 and 1981 censuses (1.93%, 2.04% and 2.01% respectively). Undercoverage increased to 3.21% for the 1986 Census and to 3.43% for the 1991 Census, and then decreased to 3.18% for the 1996 Census. It rose sharply to 3.95% for 2001 and then to 4.26% for the

2006 Census, after which it fell back to 4.07% in 2011, between the rates for 2001 and 2006. Overcoverage increased from 0.74% for the 1996 Census to 0.96% for the 2001 Census. The increase between 1991 and 1996 was due to a change in the methodology of the coverage studies. The largest increase in the overcoverage rate was between 2001 and 2006, when it rose from 0.96% to 1.59%. The rate reached its highest point in 2011, at 1.85%. From 2006 to 2011, Yukon and New Brunswick had the largest increases (0.83% and 0.71% respectively). There were also some decreases, including 0.54% for the Northwest Territories and 0.27% for Nunavut.

In 2011, net undercoverage continued the decline that began in 2006, as a result of a combination of lower undercoverage and higher overcoverage. Coverage error is attributable to errors by respondents, such as incorrect application of the rules on whom to include, and to errors by census staff, such as the erroneous exclusion of recently built dwellings. It is also worth noting that the methodology used in the 2011 Census included a number of modifications, which could have resulted in changes in undercoverage and overcoverage. Even though all census operations have to meet high standards of quality, those modifications may have had an impact on population coverage error. In the 2011 Census:

- The entire process of census enumeration was based on the short questionnaire.
- Mail-out areas (areas where the questionnaires were delivered by Canada Post) were expanded.
- A wave methodology was used. There were several follow-up waves after the initial mail-out of a letter asking dwelling residents to complete their census questionnaire online.
- Online responses jumped from 17.8% in 2006 to 53.9% in 2011.
- Recruitment of field staff was easier than in 2006.
- In 2011, enumerators checked only selected mail-out areas to update the dwelling list, whereas in 2006, they checked all mail-out areas.

Looking back at undercoverage since the 1981 Census, we see that the increase in undercoverage observed in the 1986 Census led to the creation of the Address Register (AR) for the 1991 Census. The AR provided a separate list of urban dwellings that should have been enumerated. For the 1996 Census, the use of enumerators (EN) instead of self-enumeration in some central parts of large cities reduced undercoverage. In addition, moving Census Day from early June to mid-May helped to control undercoverage because people were more likely to be at home and less likely to be moving. In 2006, mailing out the questionnaires in urban areas reduced the number of employees required for collection. The introduction of online questionnaires also reduced data capture problems. In 2011, the introduction of wave methodology made it possible to target census follow-up activities more effectively, and a sharp increase in online responses further reduced data capture problems. The elimination of the long questionnaire probably resulted in a slight decrease in the census non-response rate.

Estimates of undercoverage are presented in Table 11.1 and Table 11.2. Note that 1971 is not included in Table 11.2 because estimates were produced for different age groups for the over-24 population.

Table 11.1 Estimated population undercoverage rates and standard errors for Canada, provinces and territories, 1971 Census to 2011 Census[1]

Provinces and territories	1971 estimated rate (%)	1971 standard error (%)	1976 estimated rate (%)	1976 standard error (%)	1981 estimated rate (%)	1981 standard error (%)	1986 estimated rate (%)	1986 standard error (%)	1991 estimated rate (%)	1991 standard error (%)
Canada	**1.93**	**0.09**	**2.04**	**0.10**	**2.01**	**0.09**	**3.21**	**0.13**	**3.43**	**0.12**
Newfoundland and Labrador	2.25	0.72	1.10	0.39	1.74	0.45	1.92	0.33	2.47	0.30
Prince Edward Island	1.23	1.13	0.38	0.25	1.17	0.54	2.14	0.80	1.67	0.23
Nova Scotia	1.33	0.45	0.86	0.34	1.05	0.34	2.15	0.34	2.25	0.36
New Brunswick	1.65	0.56	2.16	0.37	1.81	0.30	2.71	0.33	3.71	0.42
Quebec	2.10	0.19	2.95	0.25	1.91	0.21	2.91	0.31	3.18	0.20
Ontario	1.68	0.12	1.52	0.17	1.94	0.14	3.43	0.19	4.23	0.28
Manitoba	1.13	0.38	1.07	0.33	0.98	0.35	2.94	0.40	2.31	0.36
Saskatchewan	1.00	0.37	1.33	0.34	0.99	0.37	2.38	0.37	2.15	0.32
Alberta	2.55	0.44	1.49	0.26	2.54	0.36	3.00	0.32	2.51	0.27
British Columbia	2.89	0.39	3.13	0.31	3.16	0.33	4.48	0.36	3.42	0.24
Yukon	..	..	..	..	..	..	..	..	4.12	0.58
Northwest Territories	..	..	..	..	..	..	..	..	5.73	0.57
Nunavut	...	...	...	...	...	...	...	...	...	...

Provinces and territories	1996 estimated rate (%)	1996 standard error (%)	2001 estimated rate (%)	2001 standard error (%)	2006 estimated rate (%)	2006 standard error (%)	2011 estimated rate (%)	2011 standard error (%)
Canada	**3.18**	**0.09**	**3.95**	**0.13**	**4.26**	**0.17**	**4.07**	**0.16**
Newfoundland and Labrador	2.45	0.29	2.43	0.32	2.62	0.54	3.70	0.53
Prince Edward Island	1.76	0.28	1.89	0.53	3.04	0.52	3.90	0.62
Nova Scotia	2.70	0.27	3.44	0.41	4.02	0.54	4.04	0.54
New Brunswick	2.49	0.28	3.57	0.42	3.56	0.43	2.64	0.43
Quebec	2.46	0.18	2.93	0.26	2.46	0.32	2.99	0.29
Ontario	3.40	0.18	4.56	0.25	5.18	0.34	4.47	0.32
Manitoba	2.55	0.29	3.49	0.43	4.32	0.57	3.11	0.48
Saskatchewan	3.30	0.32	3.18	0.37	3.81	0.50	4.43	0.57
Alberta	2.99	0.24	3.18	0.33	4.74	0.49	5.11	0.45
British Columbia	4.58	0.24	5.30	0.34	4.83	0.41	4.31	0.41
Yukon	3.92	0.51	5.59	1.16	7.23	0.64	6.30	0.81
Northwest Territories	4.28	0.67	9.10	0.80	5.74	0.57	5.99	0.69
Nunavut	6.54	0.63	5.07	1.39	5.55	0.60	7.39	1.65

.. not available for this reference period
... not applicable

1. Excludes incompletely enumerated Indian reserves. Includes non-permanent residents and territories in 1991, 1996, 2001, 2006 and 2011.
   Includes revisions to 1986 original publication. Excludes estimates of persons missed in dwellings incorrectly classified as unoccupied in 1971 and1976.
   The counts account for modifications to the original publication of 1986. The counts exclude estimates of persons missed in dwellings incorrectly classified as unoccupied in 1971 and 1976.

   Sources: Statistics Canada, 1971 to 2011 Census Coverage Studies.

Table 11.2 Estimated population undercoverage rates and standard errors, sex and age group for Canada, 1976 Census to 2011 Census[1]

Sex and age group	1976		1981		1986		1991		1996		2001		2006		2011	
	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)
Both sexes	**2.04**	**0.10**	**2.01**	**0.09**	**3.21**	**0.13**	**3.43**	**0.12**	**3.18**	**0.09**	**3.95**	**0.13**	**4.26**	**0.17**	**4.07**	**0.16**
0 to 4 years	2.31	0.28	1.21	0.22	2.14	0.49	3.55	0.49	2.89	0.36	4.42	0.71	4.07	0.65	3.36	0.62
5 to 14 years	1.20	0.16	1.23	0.21	2.08	0.26	2.49	0.27	1.45	0.14	2.90	0.38	3.10	0.46	2.61	0.42
15 to 17 years[2]	1.99	0.38	2.96	0.52	3.58	0.60	3.75	0.42	3.48	0.42	4.36	0.53	1.56	0.60	3.83	0.85
18 to 19 years	..	..	..	..	..	..	..	..	..	..	..	..	8.86	1.58	6.28	0.93
20 to 24 years	5.31	0.38	5.51	0.29	8.66	0.46	8.18	0.52	8.00	0.34	9.85	0.62	10.50	0.74	9.60	0.69
25 to 34 years	2.85	0.28	2.31	0.28	4.51	0.35	5.65	0.35	5.81	0.29	8.07	0.36	9.43	0.56	8.96	0.48
35 to 44 years	1.54	0.26	2.20	0.26	2.32	0.31	2.84	0.29	2.78	0.24	4.04	0.33	5.36	0.50	4.66	0.45
45 to 54 years	1.22	0.33	0.81	0.23	1.58	0.29	1.61	0.27	1.90	0.21	1.79	0.29	2.64	0.43	2.95	0.42
55 to 64 years	0.92	0.20	0.91	0.29	2.06	0.31	1.69	0.28	2.23	0.34	1.22	0.37	0.95	0.53	1.02	0.41
65 years and over	1.20	0.25	0.71	0.30	1.76	0.31	1.51	0.28	1.52	0.26	1.29	0.34	0.21	0.40	1.19	0.45
Males	**2.46**	**0.17**	**2.37**	**0.13**	**3.75**	**0.16**	**3.95**	**0.16**	**3.89**	**0.14**	**4.90**	**0.19**	**5.51**	**0.26**	**5.07**	**0.24**
0 to 4 years	2.53	0.46	1.32	0.33	2.22	0.67	2.79	0.58	2.56	0.47	3.36	0.89	4.24	0.95	3.14	0.82
5 to 14 years	1.14	0.21	1.27	0.29	1.98	0.32	2.32	0.34	1.46	0.24	2.38	0.49	3.04	0.64	3.00	0.62
15 to 17 years[2]	1.93	0.48	3.12	0.68	4.09	0.74	3.55	0.60	3.68	0.43	5.49	0.80	1.88	0.88	4.31	1.13
18 to 19 years	..	..	..	..	..	..	..	..	..	..	..	..	10.06	2.45	5.42	1.19
20 to 24 years	5.99	0.52	6.03	0.48	10.36	0.57	8.98	0.81	9.48	0.50	11.68	0.92	12.21	1.12	9.37	0.88
25 to 34 years	3.64	0.46	2.70	0.44	5.43	0.45	7.28	0.56	7.74	0.42	10.67	0.55	11.42	0.86	10.54	0.73
35 to 44 years	2.33	0.48	3.42	0.40	3.29	0.51	3.65	0.41	3.94	0.39	5.71	0.51	7.77	0.79	6.34	0.68
45 to 54 years	1.63	0.41	1.21	0.38	1.95	0.52	2.05	0.45	2.12	0.27	2.50	0.44	4.14	0.69	4.69	0.66
55 to 64 years	1.28	0.34	0.91	0.40	1.88	0.47	2.04	0.44	2.50	0.54	1.35	0.54	2.13	0.77	2.58	0.69
65 years and over	1.90	0.44	0.69	0.47	1.57	0.50	1.41	0.50	1.64	0.45	1.50	0.53	-0.05	0.56	1.32	0.60

Table 11.2 Estimated population undercoverage rates and standard errors, sex and age group for Canada, 1976 Census to 2011 Census[1]
(continued)

Sex and age group	1976		1981		1986		1991		1996		2001		2006		2011	
	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)
Females	**1.61**	**0.10**	**1.65**	**0.12**	**2.68**	**0.17**	**2.93**	**0.17**	**2.49**	**0.12**	**3.02**	**0.18**	**3.04**	**0.23**	**3.08**	**0.22**
0 to 4 years	2.07	0.36	1.10	0.33	2.06	0.62	4.35	0.71	3.24	0.55	5.50	1.14	3.88	0.92	3.59	0.95
5 to 14 years	1.26	0.27	1.19	0.31	2.20	0.33	2.65	0.39	1.45	0.22	3.44	0.58	3.17	0.66	2.20	0.57
15 to 17 years[2]	2.05	0.51	2.80	0.73	3.05	0.76	3.96	0.54	3.28	0.55	3.13	0.69	1.23	0.83	3.31	1.28
18 to 19 years	..	..	..	..	..	..	..	..	..	..	..	..	7.58	1.96	7.17	1.45
20 to 24 years	4.62	0.48	4.98	0.43	6.89	0.72	7.36	0.71	6.45	0.48	7.91	0.84	8.70	0.98	9.83	1.07
25 to 34 years	2.03	0.38	1.92	0.32	3.59	0.45	3.98	0.37	3.84	0.40	5.41	0.46	7.43	0.73	7.37	0.63
35 to 44 years	0.72	0.24	0.93	0.31	1.33	0.32	2.01	0.35	1.62	0.28	2.35	0.43	2.90	0.61	2.99	0.58
45 to 54 years	0.81	0.38	0.41	0.26	1.20	0.35	1.16	0.34	1.68	0.33	1.09	0.37	1.13	0.51	1.21	0.52
55 to 64 years	0.58	0.25	0.92	0.34	2.23	0.50	1.35	0.33	1.97	0.40	1.09	0.52	-0.22	0.73	-0.52	0.44
65 years and over	0.64	0.38	0.71	0.42	1.89	0.44	1.58	0.36	1.43	0.32	1.13	0.45	0.40	0.56	1.08	0.66

.. not available for this reference period

1. Excludes incompletely enumerated Indian reserves. Includes non-permanent residents and territories in 1991, 1996, 2001, 2006 and 2011. Includes revisions to 1986 original publication. Excludes estimates of persons missed in dwellings incorrectly classified as unoccupied in 1976.
2. Data for all years except 2006 and 2011 is for persons aged 15 to 19.

Sources: Statistics Canada, 1976 to 2011 Census Coverage Studies.

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These tables show the following

Undercoverage is usually higher in the three territories. Among the provinces, undercoverage is generally higher in British Columbia and Ontario. However, in 2011, Alberta was the province with the highest rate. Between 1971 and 2006, British Columbia was the province with the highest undercoverage rate in every census except 1991 and 2006, when Ontario had the highest rate. Undercoverage rates for Quebec and the Atlantic provinces tend to be lower than the national rate.

Undercoverage is higher for young adults and higher for males. There are two persistent demographic trends. First, undercoverage for males is higher than undercoverage for females. Second, undercoverage is higher for young adults, especially those who have never been married, regardless of sex (Dolson 2012). As shown in Chart 11.2, undercoverage for males is higher than undercoverage for females for every census since 1971, increasing from 2.27% to 5.51% in 2006 and falling back to 5.07% in 2011 for males, and increasing from 1.59% to 3.08% for females. Chart 11.2 also shows that undercoverage for men aged 20 to 24 is higher than undercoverage for all males. This is also the case for women aged 20 to 24, but the rate for women aged 20 to 24 is lower than the rate for men in the same age group in every census except 2011, when the rates were 9.83% and 9.37% respectively. The undercoverage rate for young women was at its highest in 2011 (9.83%). In contrast, the rate for young men is at its lowest since 1991. Though somewhat lower, the undercoverage rates for never-married people aged between 25 and 34 are also high. Higher undercoverage for young adults is due in part to their less stable living arrangements. Young adults are more likely than older adults or children to change their living arrangements because they are moving away from home to work or attend a postsecondary institution or moving in with friends or spouses.

Chart 11.2 Estimated rates of population undercoverage, sex and age group for Canada, 1971 Census to 2011 Census

Census year	1971	1976	1981	1986	1991	1996	2001	2006	2011
all males	2.27	2.46	2.37	3.75	3.95	3.89	4.90	5.51	5.07
all females	1.59	1.61	1.65	2.68	2.93	2.49	3.02	3.04	3.08
males 20 to 24	4.97	5.99	6.03	10.36	8.98	9.48	11.68	12.21	9.37
females 20 to 24	4.01	4.62	4.98	6.89	7.36	6.45	7.91	8.71	9.83

Sources: Statistics Canada, 2011 Census, 2011 Reverse Record Check.

Estimates of overcoverage rates are presented in Table 11.3 and Table 11.4.

Table 11.3 Estimated population overcoverage rates and standard errors for Canada, provinces and territories, 1991 Census to 2011 Census[1]

Provinces and territories	1991		1996		2001		2006		2011	
	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)
Canada	**0.56**	**0.04**	**0.74**	**0.04**	**0.96**	**0.05**	**1.59**	**0.01**	**1.85**	**0.02**
Newfoundland and Labrador	0.48	0.09	0.77	0.12	0.63	0.10	1.63	0.05	1.76	0.04
Prince Edward Island	0.74	0.15	0.91	0.14	0.92	0.18	1.66	0.06	1.54	0.04
Nova Scotia	0.36	0.09	0.47	0.07	0.81	0.14	1.40	0.03	1.72	0.04
New Brunswick	0.46	0.09	0.60	0.10	0.89	0.19	1.41	0.03	2.12	0.05
Quebec	0.51	0.07	0.85	0.08	1.03	0.10	1.66	0.02	2.07	0.03
Ontario	0.59	0.07	0.67	0.07	0.88	0.09	1.49	0.02	1.67	0.04
Manitoba	0.45	0.11	0.88	0.15	0.80	0.15	1.42	0.04	1.35	0.04
Saskatchewan	0.35	0.08	0.55	0.11	1.06	0.20	1.53	0.04	1.65	0.04
Alberta	0.51	0.09	0.59	0.10	0.89	0.13	1.47	0.02	1.70	0.05
British Columbia	0.68	0.10	0.89	0.09	1.26	0.12	1.96	0.03	2.28	0.05
Yukon	0.29	0.07	0.70	0.17	0.86	0.16	1.62	0.08	2.45	0.05
Northwest Territories	0.29	0.07	1.32	0.22	1.00	0.11	1.98	0.08	1.44	0.11
Nunavut	…	…	0.99	0.22	0.59	0.10	1.44	0.07	1.17	0.07

… not applicable

1. Excludes incompletely enumerated Indian reserves. Includes non-permanent residents and territories.

Sources: Statistics Canada, 1991 to 2011 Census Coverage Studies.

Table 11.4 Estimated population overcoverage rates and standard errors, sex and age group for Canada, 1996 Census to 2011 Census[1,2]

Sex and age groups	1996		2001		2006		2011	
	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)
Both sexes	**0.74**	**0.04**	**0.96**	**0.05**	**1.59**	**0.01**	**1.85**	**0.02**
0 to 4 years	0.61	0.10	0.96	0.18	1.35	0.07	1.61	0.10
5 to 14 years	0.96	0.09	1.52	0.15	2.24	0.07	2.79	0.10
15 to 17 years[3]	1.24	0.15	1.85	0.26	2.33	0.14	2.98	0.23
18 to 19 years	..	..	..	..	2.65	0.17	3.37	0.27
20 to 24 years	2.44	0.28	2.66	0.32	2.88	0.11	3.11	0.13
25 to 34 years	0.66	0.08	0.92	0.09	1.43	0.06	1.69	0.08
35 to 44 years	0.38	0.06	0.49	0.06	1.05	0.05	1.23	0.06
45 to 54 years	0.48	0.11	0.39	0.04	1.13	0.05	1.36	0.06
55 to 64 years	0.52	0.11	0.38	0.05	1.24	0.06	1.50	0.07
65 years and over	0.36	0.07	0.77	0.21	1.60	0.06	1.64	0.08
Males	**0.70**	**0.04**	**0.92**	**0.06**	**1.62**	**0.02**	**1.86**	**0.04**
0 to 4 years	0.52	0.09	0.69	0.07	1.35	0.09	1.65	0.13
5 to 14 years	0.99	0.15	1.59	0.21	2.25	0.10	2.77	0.14
15 to 17 years[3]	1.12	0.24	1.45	0.31	2.37	0.20	3.04	0.27
18 to 19 years	..	..	..	..	2.28	0.21	3.06	0.33
20 to 24 years	2.34	0.34	2.44	0.45	2.75	0.15	3.03	0.19
25 to 34 years	0.65	0.11	1.03	0.14	1.51	0.08	1.75	0.11
35 to 44 years	0.38	0.06	0.46	0.06	1.10	0.06	1.26	0.09
45 to 54 years	0.35	0.07	0.34	0.03	1.16	0.07	1.32	0.09
55 to 64 years	0.37	0.12	0.33	0.04	1.30	0.09	1.54	0.11
65 years and over	0.33	0.02	0.74	0.21	1.69	0.10	1.68	0.14
Females	**0.77**	**0.06**	**1.00**	**0.08**	**1.56**	**0.01**	**1.83**	**0.04**
0 to 4 years	0.69	0.18	1.25	0.36	1.35	0.10	1.57	0.15
5 to 14 years	0.92	0.14	1.44	0.21	2.23	0.10	2.81	0.15
15 to 17 years[3]	1.36	0.29	2.27	0.43	2.28	0.19	2.93	0.38
18 to 19 years	..	..	..	..	3.04	0.28	3.69	0.43
20 to 24 years	2.55	0.46	2.89	0.46	3.01	0.17	3.19	0.18
25 to 34 years	0.66	0.11	0.81	0.12	1.35	0.08	1.63	0.11
35 to 44 years	0.37	0.10	0.53	0.11	0.99	0.06	1.20	0.10
45 to 54 years	0.61	0.20	0.43	0.07	1.11	0.06	1.39	0.09
55 to 64 years	0.66	0.19	0.42	0.09	1.18	0.07	1.46	0.10
65 years and over	0.38	0.11	0.80	0.33	1.53	0.08	1.60	0.10

.. not available for this reference period

1. Estimates by sex and age groups are not available for the 1991 Census.
2. Excludes incompletely enumerated Indian reserves.
3. Data for all years except 2006 and 2011 are for persons aged 15 to 19.

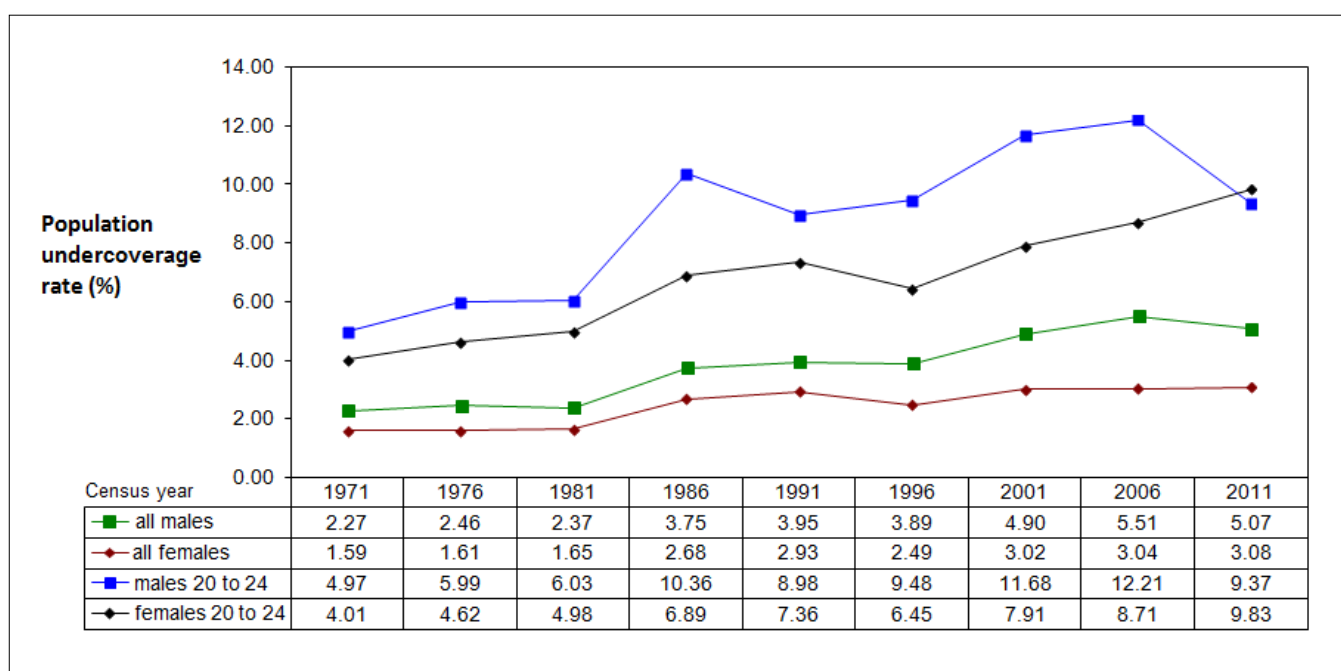**Sources:** Statistics Canada, 1996 to 2011 Census Coverage Studies.

These tables show the following:

Overcoverage is consistently higher for British Columbia than for the other provinces. British Columbia has been the province with the highest rate of population overcoverage for the past three censuses.

Overcoverage is more common for school-aged children and young adults. The 5-to-17 and 18-to-24 age groups have higher overcoverage rates. For school-aged children, this situation is largely due to the fact that children whose parents do not live together are often enumerated by both parents. Overcoverage for young adults is probably attributable to the same less stable living arrangements that can also lead to undercoverage. Overcoverage was up in the majority of provinces and territories in 2011. There were large increases in Yukon (+0.83%) and New Brunswick (+0.71%). Yukon, Manitoba and the Northwest Territories had the lowest rates, at 1.17%, 1.35% and 1.44% respectively. Nationally, overcoverage rates were above 3% for young adults (18 to 24), both men and women, and for males aged 15 to 17. In some provinces, the rates for some age-sex groups even exceeded 4%.

11.2 Changes in the design of population coverage studies

Because of differences in the design of the coverage studies over time, the rates in Table 11.1, Table 11.2, Table 11.3 and Table 11.4 are not strictly comparable. A list of the methodological changes made since 1976 is provided below. It is worth noting that the fundamentals of the Reverse Record Check (RRC) approach to measuring undercoverage have not changed much since the 1966 Census. A sample is selected from frames covering the target population that are independent of the census. Census records are then checked (Reverse Record Check) to determine whether the sampled persons were actually enumerated. There have been more changes in the measurement of overcoverage. Multiple studies were carried out for 1991, 1996 and 2001. In 1996, the RRC was expanded to include the measurement of overcoverage. In 2006, the RRC was no longer used to estimate overcoverage, and a new study was introduced to measure all overcoverage cases on the basis of probabilistic and exact matches using name, date of birth and sex.

2011 Census coverage studies:

(a) The 2011 RRC was very similar to the 2006 RRC. Some changes were introduced to make it more efficient, including improvements in the monster match program, more effective strategies for searching the Census Response Database, and the use of new births frames.
(b) For the first time, the weighting of the census frame sample took into consideration the overcoverage in this frame.
(c) With automated methods, it was possible to use provincial and territorial parameters instead of national parameters in developing the COS frame.

Like the 1996, 2001 and 2006 RRCs, the 2011 RRC did not estimate the number of persons missed for incompletely enumerated Indian reserves and Indian settlements. For more information on this topic, see Section 12.2.

2006 Census coverage studies:

Both the RRC and the Census Overcoverage Study (COS) made optimal use of the name field added to the 2006 Census Response Database (RDB) in their matching and searching operations. In addition,

(a) The measurement of overcoverage was restricted to the COS. The methodology of the RRC was subsequently changed so that not all cases were sent for field collection. Since 2006, the RRC has had a processing step that is carried out prior to collection to determine whether collection is required. The RRC version of the Census Response Database (RRC RDB) was searched for the sampled persons using information from the sampling frame and the various update sources, such as tax data. If the search located

the sampled person in the RRC RDB, collection was not required. The only exception was a sample of persons that had been found in order to collect data required for the non-response adjustment.

(b) The three coverage studies conducted in 2001 to measure overcoverage were replaced by the COS in 2006. The COS used a methodology that was different from any previous overcoverage study. Essentially, it employed a matching technique based on surnames, given names, sex and date of birth and manual verification to identify overcoverage.

2001 Census coverage studies:

(a) The institutional component of the Collective Dwelling Study (CDS) was dropped, and overcoverage estimates for this population were produced by the RRC.

(b) The Dwelling Classification Study (DCS) replaced the Vacancy Check (VC), which was used in previous censuses to re-examine dwellings classified as unoccupied by the enumerator. The DCS is an extension of the VC that estimates the number of persons living in non-response dwellings.

1996 Census coverage studies:

(a) The 1996 RRC did not estimate the number of persons missed on incompletely enumerated Indian reserves.

(b) The Temporary Residents Study was cancelled because of concerns about the quality of the data, and because it was recognized that the RRC would measure most of this type of undercoverage appropriately.

(c) First, a measure of overcoverage that was more comprehensive than the 1991 measure was produced by incorporating the Private Dwelling Study into the RRC so that each sampled person could be identified as having been enumerated more than once. This approach resulted in an increase in the number of addresses to be processed where overcoverage could have occurred. Second, the Automated Match Study (AMS) was expanded substantially compared with 1991, so that overcoverage could be measuring not only for an enumeration area (EA) but also for a large region (Atlantic, Quebec, Ontario, western Canada and the territories).

1991 Census coverage studies:

(a) Non-permanent residents were included in the target population for the first time.

(b) Following experimental studies in 1986, the measurement of population overcoverage commenced in 1991. The results of three studies were combined to form a comprehensive estimate: the Private Dwelling Study (PDS), the Collective Dwelling Study (CDS) and the Automated Match Study (AMS).

1986 Census coverage studies: The rates shown in Table 11.1 for the 1986 Census differ from the results published in the *User's Guide to the Quality of 1986 Census Data: Coverage*, as they include revisions made after the 1986 publication, when incompletely enumerated Indian reserves were included as missed. In the original 1986 publication, they were included as 'enumerated' since provincial data included an estimate of persons missed for Indian reserves.

1976 Census coverage studies: Census data did not include an estimate from the Vacancy Check (VC) of persons missed in dwellings incorrectly classified as unoccupied. The 1976 population undercoverage rate would have been 1.78% if it had included the results of the 1976 VC. There was no VC in the 1971 Census.

For more details on the history of coverage studies, see Dolson (2010).

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12. Special topics

12.1 Collection undercoverage

Up to now, we have been concerned with undercoverage in the census population count. This section introduces the concept of population collection undercoverage. It is useful to expand the concept of undercoverage to include persons not enumerated for any reason. Undercoverage is defined as the number of persons not included in the census counts. As discussed in [Section 3.3](#), the census counts C are composed of two elements: $C = E + I$,

where E = the number of enumerations and I = the number of persons imputed.

Undercoverage, therefore, is a secondary series of all persons who were not listed on a census form but should have been. It does not include persons who were not enumerated either because no census form was returned for the dwelling (non-response dwelling) or because the dwelling was erroneously classified as unoccupied (misclassified occupied dwelling) and was not covered by non-response follow-up.

Also from [Section 3.3](#), an estimate of the actual number of persons in the census target population T is given by

$$\hat{T} = C + \hat{N} = C + \hat{U} - \hat{O}$$

If we combine these two equations, we get:

$$\hat{T} = C + \hat{N} = C + \hat{U} - \hat{O} = E + \left(I + \hat{U}\right) - \hat{O}$$

This formulation of $\hat{T}$ has three components:

E = the number of persons listed on a census form[14] (enumerations)

$\hat{O}$ = an estimate of the number of excess enumerations[15]

$\left(I + \hat{U}\right)$ = an estimate of the number of persons who were not listed on a census form but should have been.

The last component, $\left(I + \hat{U}\right)$, is an estimate of the number of persons missed in the census for any reason. The Census of Population collection undercoverage (L) refers to persons not enumerated for any reason. The estimate of population collection undercoverage is given by:

$$\hat{L} = \left(I + \hat{U}\right),$$

and the corresponding estimate of the census of population collection undercoverage rate is:

$$\hat{R}_L = 100 * \frac{\hat{L}}{\hat{T}} = 100 * \left(\frac{I + \hat{U}}{C + \hat{N}}\right).$$

Census of population net collection undercoverage can be calculated by subtracting overcoverage $\hat{O}$ from $\hat{L}$.

Thus we have:

---

14. It is possible that some of the persons listed on the form may not appear in the final census database. Thus, the expression 'persons listed on the form' is used in this section to refer to persons in the final census database.
15. Most cases of overcoverage involve duplicate enumerations, where the same person appears twice in the database. In a small number of cases, however, the same person appears more than twice. The variable $\hat{R}$ denotes the estimate of the number of excess enumerations rather than the number of persons involved in multiple enumerations.

$$\hat{T} = C + \hat{N} = E + \left(I + \hat{U}\right) - \hat{O} = E + \hat{L} - \hat{O}$$

Although net collection undercoverage cannot be applied to census data to adjust for coverage error, $\hat{L}$ and $\hat{R}_L$ provide a broader picture of how well the census was able to enumerate the target population. In fact, they include persons not enumerated, whether they were taken into account in the census through imputations or not.

Table 12.1 shows the 2011 Census population collection undercoverage estimates $\hat{L}$ and $\hat{R}_L$, and the population undercoverage estimates $\hat{U}$ and $\hat{R}_U$ (see also Table 1.3) and their estimated standard errors for provinces and territories and for Canada, by age group and sex. At the national level, the 2011 Census enumerated 93.65% of the target population ($100 - \hat{R}_L$), compared with 95.93% of the 33,476,688 persons included in the official 2011 Census count ($100 - \hat{R}_U$). The difference between these two rates is simply the inclusion of the imputations in $\hat{R}_L$. The 2006 Census enumerated 92.87% of the target population, compared with 95.74% of the 31,612,867 persons in the official 2006 Census figure. Hence, the 2011 Census enumerated a larger percentage of the population, and there were fewer imputations than in 2006.

Table 12.1 Estimated population collection undercoverage, population undercoverage and standard errors for various characteristics, 2011 Census

Characteristics	Population collection undercoverage				Population undercoverage			
	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)	estimated rate (%)	standard error (%)
Canada	**2,172,708**	**57,144**	**6.35**	**0.16**	**1,391,971**	**57,144**	**4.07**	**0.16**
Provinces and territories								
Newfoundland and Labrador	29,877	2,905	5.69	0.52	19,406	2,905	3.70	0.53
Prince Edward Island	8,073	921	5.62	0.61	5,600	921	3.90	0.62
Nova Scotia	59,369	5,330	6.29	0.53	38,150	5,330	4.04	0.54
New Brunswick	38,774	3,317	5.13	0.42	19,971	3,317	2.64	0.43
Quebec	410,599	23,523	5.15	0.28	238,516	23,523	2.99	0.29
Ontario	866,466	43,782	6.55	0.31	591,255	43,782	4.47	0.32
Manitoba	66,394	6,089	5.40	0.47	38,279	6,089	3.11	0.48
Saskatchewan	77,538	6,294	7.29	0.55	47,080	6,294	4.43	0.57
Alberta	279,139	17,927	7.40	0.44	192,882	17,927	5.11	0.45
British Columbia	323,148	19,369	7.19	0.40	193,495	19,369	4.31	0.41
Yukon	3,890	303	11.03	0.76	2,220	303	6.30	0.81
Northwest Territories	4,236	320	9.75	0.66	2,601	320	5.99	0.69
Nunavut	5,204	608	15.30	1.51	2,515	608	7.39	1.65
Sex and age group								
Both sexes, all ages	**2,172,708**	**57,144**	**6.35**	**0.16**	**1,391,971**	**57,144**	**4.07**	**0.16**
0 to 4 years	100,297	12,279	5.25	0.61	64,239	12,279	3.36	0.62
5 to 14 years	166,050	16,113	4.46	0.41	97,305	16,113	2.61	0.42
15 to 17 years	74,305	11,501	5.71	0.83	49,778	11,501	3.83	0.85
18 to 19 years	75,395	9,112	8.24	0.91	57,441	9,112	6.28	0.93
20 to 24 years	274,423	17,833	11.73	0.67	224,475	17,833	9.60	0.69
25 to 34 years	526,219	24,797	11.26	0.47	418,543	24,797	8.96	0.48
35 to 44 years	317,733	21,808	6.82	0.44	217,040	21,808	4.66	0.45
45 to 54 years	286,730	23,535	5.29	0.41	160,105	23,535	2.95	0.42
55 to 64 years	159,779	18,158	3.65	0.40	44,627	18,158	1.02	0.41
65 years and over	191,777	22,611	3.90	0.44	58,418	22,611	1.19	0.45
Males, all ages	**1,242,195**	**42,396**	**7.33**	**0.23**	**859,830**	**42,396**	**5.07**	**0.24**
0 to 4 years	49,238	8,309	5.05	0.81	30,655	8,309	3.14	0.82
5 to 14 years	92,893	12,147	4.85	0.60	57,499	12,147	3.00	0.62
15 to 17 years	41,563	7,935	6.20	1.11	28,928	7,935	4.31	1.13
18 to 19 years	34,314	5,838	7.39	1.16	25,166	5,838	5.42	1.19
20 to 24 years	136,173	11,548	11.50	0.86	110,936	11,548	9.37	0.88
25 to 34 years	301,464	19,181	12.87	0.71	246,863	19,181	10.54	0.73
35 to 44 years	198,167	16,810	8.53	0.66	147,279	16,810	6.34	0.68
45 to 54 years	190,700	18,714	7.01	0.64	127,470	18,714	4.69	0.66
55 to 64 years	111,542	15,443	5.13	0.67	56,021	15,443	2.58	0.69
65 years and over	86,142	13,266	3.93	0.58	29,014	13,266	1.32	0.60
Females, all ages	**930,512**	**39,198**	**5.39**	**0.21**	**532,140**	**39,198**	**3.08**	**0.22**
0 to 4 years	51,059	9,222	5.46	0.93	33,584	9,222	3.59	0.95
5 to 14 years	73,156	10,618	4.04	0.56	39,805	10,618	2.20	0.57
15 to 17 years	32,743	8,332	5.19	1.25	20,851	8,332	3.31	1.28
18 to 19 years	41,081	7,003	9.13	1.41	32,275	7,003	7.17	1.45
20 to 24 years	138,250	13,658	11.97	1.04	113,539	13,658	9.83	1.07
25 to 34 years	224,755	15,874	9.65	0.62	171,680	15,874	7.37	0.63
35 to 44 years	119,566	13,963	5.12	0.57	69,761	13,963	2.99	0.58
45 to 54 years	96,030	14,305	3.55	0.51	32,635	14,305	1.21	0.52
55 to 64 years	48,237	9,569	2.19	0.43	-11,394	9,569	-0.52	0.44
65 years and over	105,635	18,327	3.87	0.64	29,404	18,327	1.08	0.66

Sources: Statistics Canada, 2011 Census, 2011 Reverse Record Check and 2011 Census Overcoverage Study.

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12.2 Participation of Indian reserves and Indian settlements

Introduction

Users should also be aware of the extent to which Indian reserves and Indian settlements participated in the 2011 Census. In some cases, enumeration was not permitted or was interrupted even before it started. In other cases, the quality of the enumeration was considered inadequate. These geographic areas, 31 in all, are referred to as incompletely enumerated Indian reserves and Indian settlements. There are no 2011 data for the incompletely enumerated Indian reserves and Indian settlements, and they are not included in any calculations. Similar problems have occurred in previous censuses. In the 2006 Census, 22 Indian reserves and Indian settlements were declared incompletely enumerated (30 in 2001). Fourteen of them took part in the 2011 Census.

The estimates for **incompletely enumerated Indian reserves and Indian settlements** are based on a model. Since no reliable source is available to verify the assumptions used in the models, these estimates must be used with caution.

Incompletely enumerated Indian reserves and Indian settlements

For 31 incompletely enumerated Indian reserves and settlements, the 2011 Census was not in a position to produce population counts and the coverage studies could not directly estimate net population undercoverage both due to limited 2011 Census data. The counts and net undercoverage were estimated using approximations.

To estimate census population counts, a model-based methodology was used for 18 of the incompletely enumerated Indian reserves and settlements. The estimation model is as follows; the linear regression was constructed using all Indian reserves that were completely enumerated in both the 2006 and the 2011 Census. The model assumes that the 2011 Census count is a linear function of the 2006 Census count for all provinces with separate estimates, for the intercept and the regression parameters for each province. The model was evaluated for the basic regression assumptions of independence of errors, homogeneity of variances and normality of errors. For each of the 18 incompletely enumerated reserves for which the model based methodology was used, the input variable for the regression model was either the actual census count in 2006 or the best predicted census count from the 2006 model. The output of the model was the estimated census count in 2011 for these 18 communities. **The resulting estimates should be used with caution as they are based entirely on a model whose assumptions cannot be verified. The validity of these model based estimates depends on the extent to which the model assumptions capture the true underlying situation.**

For the remaining 13 incompletely enumerated Indian reserves and settlements that were affected by forest fires in Northern Ontario, a special National Household Survey data collection was done in the fall of 2011. The population counts were estimated from this collected data and released separately for these 13 incompletely enumerated Indian reserves and settlements. Refer to the following link for the Profile for the NHS Special Collection for 13 Indian reserves and Indian settlements in Northern Ontario, 2011:

http://www12.statcan.gc.ca/nhs-enm/2011/ref/no13reserves/index.cfm?Lang=E

In the 2006 Census, 22 reserves, with approximately 40,000 persons, were classified as 'incompletely enumerated.' Among the 18 reserves and settlements used in the model-based estimates in the 2011 Census, five were considered to have had complete enumerations in the 2006 Census, while the other 13 were 'incompletely enumerated' or 'refusal.' The total population for the 18 incompletely enumerated Indian reserves and settlements for which model-based estimates were produced and the 13 incompletely enumerated Indian reserves and settlements that were affected by forest fires in Northern Ontario was estimated at 37,392, a decrease from 2006.

The estimated population counts for the 31 incompletely enumerated Indian reserves and settlements are subject to coverage errors in the same way as are the census population counts for the rest of the country. Net undercoverage for these 31 areas was estimated by calculating the net undercoverage rate for all completely enumerated reserves in each province and then applying that rate to the estimated 'census' count of all the incompletely enumerated Indian reserves and settlements in the province.

Further information and results can be found at:

http://www12.statcan.gc.ca/census-recensement/2011/ref/aboriginal-autochtones-eng.cfm

The estimates for incompletely enumerated Indian reserves and Indian settlements are not included in the estimates of undercoverage, collection undercoverage, overcoverage and net undercoverage presented in this report because they are based on a model and not on census coverage studies. In addition, they do not provide the same level of detail (for example, estimates by mother tongue or marital status) as the other estimates.

Appendix A Reverse Record Check Survey questionnaires

Non-proxy and short non-proxy questionnaires

Proxy and short proxy questionnaires

Deceased before Census Day questionnaire

2011 Reverse Record Check
Census Quality Survey

Non-proxy | 1E

Ce questionnaire est aussi disponible en français

SPIN: ☐☐☐☐☐☐ **INT#:** ☐☐☐☐☐☐

This survey is used to estimate the number of persons missed in the 2011 Census and to determine their characteristics.

1. Have you changed your name since May 16, 2006, or is it different from the name recorded on the label above?

² ◯ No

¹ ◯ Yes ➤ *Print new name(s) below*

Given name(s)

Family name

1A. Is there a different spelling or another name that you use?

² ◯ No

¹ ◯ Yes ➤ *Print the name(s) below*

2. What is the language that you first learned at home in childhood and still understand?
If you no longer understand the first language learned, indicate the second language learned.

¹ ◯ English

² ◯ French

³ ◯ Other

3. Was your usual home on Census Day, MAY 10, 2011 in Canada or outside Canada?
For a definition of "usual home", please see the Questionnaire Instructions on the back page of the covering letter.

¹ ◯ In Canada

² ◯ Outside Canada ➤ *Go to Question 23 on Page 5*

4. Please read the instructions below carefully before filling in the HOUSEHOLD MEMBERS LIST for Census Day, May 10, 2011 on the next page.

WHOM TO INCLUDE IN THE HOUSEHOLD MEMBERS LIST

- All persons who had the same **usual home** as you on May 10, 2011, including newborn babies, room-mates and persons who were temporarily away;
- **Canadian citizens, permanent residents** (landed immigrants), persons asking for **refugee status** (refugee claimants), persons from **another country** with a **work** or **study permit** and family members who were living here with them;
- Persons who were staying with you temporarily on May 10, 2011 who had **no usual home elsewhere**.

WHERE TO INCLUDE PERSONS WITH MORE THAN ONE RESIDENCE

- **CHILDREN IN JOINT CUSTODY** should be included in the home of the parent where they lived most of the time. Children who spent equal time with each parent should be included in the home of the parent with whom they were staying on May 10, 2011.
- **STUDENTS** who returned to live with their parents during the year should be included at their parents' address, even if they lived elsewhere while attending school or working at a summer job.
- **SPOUSES OR COMMON-LAW PARTNERS TEMPORARILY AWAY** who stayed elsewhere while working or studying, should be listed at the usual home of their family, if they returned periodically.
- **PERSONS IN AN INSTITUTION** who had been there for **less than six months** (for example, in a home for the aged, a hospital or a prison) should be listed at their usual home.

Statistics Canada / Statistique Canada

Canada

Question 4 (continued)

DO NOT INCLUDE THESE PERSONS IN THE HOUSEHOLD MEMBERS LIST

- Persons who had their **usual home elsewhere in Canada** and who were staying with you temporarily (for example, persons visiting or persons who had their secondary residence with you);

- Residents of another country who were **visiting** Canada (for example, persons on a business trip or on vacation);

- Government representatives of another country or members of the Armed Forces of another country and their family members;

- Persons other than you living in a collective dwelling or institution (other than a Hutterite colony) such as a hotel or motel, nursing home or seniors' residence, hospital, group home, prison, staff residence, etc. **Note that you should still enter your information in the Household Members List.**

Please fill in the Household Members List <u>for all persons</u> who lived at your usual home on Census Day, May 10, 2011, even if they were temporarily away. Also indicate the date of birth, sex, legal marital status, common-law status and the relationship to you for each person, using the codes below. <u>**PUT YOUR OWN INFORMATION ON THE FIRST LINE.**</u>

USE THESE CODES IN THE HOUSEHOLD MEMBERS LIST:

Sex	Legal Marital Status	Common-Law* Status	Relationship to you
F – Female **M** –Male	**1** – Never legally married (single) **2** – Legally married (and not separated) **3** – Separated, but still legally married **4** – Divorced **5** – Widowed	**1** – Yes **2** – No	**1** – Spouse or common-law partner **2** – Son or daughter** **3** – Father or mother or step father/mother **4** – Brother or sister or step brother/sister **5** – Other person related to you **6** – Other person not related to you

* **Common-law**, *refers to two people who live together as a couple but who are not legally married to each other.*
** *Stepchildren, adopted children, foster children and children of a common-law partner are to be considered sons and daughters.*

◯ This is a collective dwelling or institution (other than a Hutterite colony). A collective dwelling or institution includes, for example, a nursing home, hospital, rooming house, group home, etc.
➤ ***Fill in your information on the first line then go to Question 5***

HOUSEHOLD MEMBERS LIST – CENSUS DAY, MAY 10, 2011

Person #	Given Name(s)	Family Name	Date of Birth DD-MM-YYYY	Sex	Legal Marital Status	Common-Law Status	Relationship to you
	⬇ **Put <u>your</u> information on the first line.** ⬇						
01							
02							
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							

Please enter below any additional information you wish to add about the Household Members List.

6720101021

CURRENT ADDRESS

5. Is your current usual home in Canada?

1 ◯ Yes

2 ◯ No ➤ *Go to Question 7*

6. What is the address or exact location of your current usual home? If you have a mailing address based on a Post Office box, general delivery, rural route or business, please record as specifically as possible a home address based on civic style street name or 911 numbering.

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Name of residence, if any

[   ]

Province/Territory   Postal code

[   ]   [ ][ ][ ] [ ][ ][ ]

Telephone number

[ ][ ][ ] – [ ][ ][ ] – [ ][ ][ ][ ]

CENSUS DAY 2011

7. What was the address or exact location of your <u>usual home</u> on CENSUS DAY, Tuesday, MAY 10, 2011?

1 ◯ Outside Canada ➤ *Go to Question 23*

2 ◯ Same address as in Question **6**

3 ◯ In Canada – Different address from that in Question **6** ➤ *Specify address below*

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Province/Territory   Postal code

[   ]   [ ][ ][ ] [ ][ ][ ]

Telephone number

[ ][ ][ ] – [ ][ ][ ] – [ ][ ][ ][ ]

8. Was your usual home on Census Day one of the following:

- a nursing home or hospital,
- a lodging or rooming house,
- a work camp, prison or mission,
- a group home, hotel or motel,
- a staff residence or communal quarters of a military camp or
- a residence of a similar type?

1 ◯ Yes

7 ◯ No ➤ *Go to Question 10*

9. What was the name of that residence?

[   ]

➤ *Go to Question 11*

10. What are the names and characteristics of an adult, if any, who lived with you at that address on Census Day, Tuesday, May 10, 2011?

◯ That address is a collective dwelling or institution

◯ No other adult lived with me there

◯ The adult is listed in the Household Members List (Question **4**) ➤ *Enter list number* [ ][ ]

◯ Otherwise, enter information below:

Given name(s)

[   ]

Family name

[   ]

Relationship to you

[   ]

Sex (*M or F*)   Date of Birth *(Day / Month / Year)*

[   ]   [D][D] [M][M] [Y][Y][Y][Y]

11. Have you lived at the same address as in Question 7 (your 2011 Census Day address) since May 10, <u>2006</u>?

1 ◯ Yes ➤ *Go to Question 22*

2 ◯ No

RECENT ADDRESS

12. Besides your current address (listed in Question 6), have you lived elsewhere <u>after</u> Census Day (May 10, 2011)?

1 ◯ Yes

2 ◯ No ➤ *Go to Question 15*

13. What was the address or exact location of that residence?

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Name of residence, if any

[   ]

Province/Territory   Postal code

[   ]   [ ][ ][ ] [ ][ ][ ]

Telephone number

[ ][ ][ ] – [ ][ ][ ] – [ ][ ][ ][ ]

14. What are the names and characteristics of an adult, if any, who lived with you at that address?

- ( ) That address is a collective dwelling or institution
- ( ) No other adult lived with me there
- ( ) The adult is listed in the Household Members List (Question **4**) ➤ **Enter list number** [ ][ ]
- ( ) Otherwise, enter information below:

Given name(s)

[   ]

Family name

[   ]

Relationship to you

[   ]

Sex (*M or F*)   Date of Birth *(Day / Month / Year)*

[   ]   [D][D] [M][M] [Y][Y][Y][Y]

PREVIOUS ADDRESSES

15. What was the address or exact location where you lived ONE year before Census Day (May 10, 2010)?

- ( ) Same address as in Question **6**
- ( ) Same address as in Question **7**   } *Go to Question 17*
- ( ) Same address as in Question **13**
- ( ) Another address ➤ **Specify below**

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Province/Territory   Postal code

[   ]   [ ][ ][ ] [ ][ ][ ]

Telephone number

[ ][ ][ ] - [ ][ ][ ] - [ ][ ][ ][ ]

- ( ) Do not know ➤ **Go to Question 17**

16. What are the names and characteristics of an adult, if any, who lived with you at that address?

- ( ) That address is a collective dwelling or institution
- ( ) No other adult lived with me there
- ( ) The adult is listed in the Household Members List (Question **4**) ➤ **Enter list number** [ ][ ]
- ( ) Otherwise, enter information below:

Given name(s)

[   ]

Family name

[   ]

Relationship to you

[   ]

Sex (*M or F*)   Date of Birth *(Day / Month / Year)*

[   ]   [D][D] [M][M] [Y][Y][Y][Y]

---

17. Did you live at another address between the address given in Question 15 (May 10, 2010, one year before Census Day) and your 2011 Census Day address (given in Question 7)?

- 1 ( ) Yes
- 2 ( ) No ➤ *Go to Question 20*

18. What was the address or exact location of that residence?

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Province/Territory   Postal code

[   ]   [ ][ ][ ] [ ][ ][ ]

Telephone number

[ ][ ][ ] - [ ][ ][ ] - [ ][ ][ ][ ]

---

19. What are the names and characteristics of an adult, if any, who lived with you at that address?

- ( ) That address is a collective dwelling or institution
- ( ) No other adult lived with me there
- ( ) The adult is listed in the Household Members List (Question **4**) ➤ **Enter list number** [ ][ ]
- ( ) Otherwise, enter information below:

Given name(s)

[   ]

Family name

[   ]

Relationship to you

[   ]

Sex (*M or F*)   Date of Birth *(Day / Month / Year)*

[   ]   [D][D] [M][M] [Y][Y][Y][Y]

20. What was the address that you lived at FIVE years before Census Day (May 10, 2006)?

- ( ) Same address as in Question **6**
- ( ) Same address as in Question **7**
- ( ) Same address as in Question **13**   } *Go to Question 22*
- ( ) Same address as in Question **15**
- ( ) Another address ➤ **Specify below**

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Province/Territory   Postal code

[   ]   [ ][ ][ ] [ ][ ][ ]

Telephone number

[ ][ ][ ] - [ ][ ][ ] - [ ][ ][ ][ ]

- ( ) Do not know ➤ **Go to Question 22**

21. What are the names and characteristics of an adult, if any, who lived with you at that address?

- ◯ That address is a collective dwelling or institution
- ◯ No other adult lived with me there
- ◯ The adult is listed in the Household Members List (Question **4**) ➤ *Enter list number* ☐☐
- ◯ Otherwise, enter information below:

Given name(s)

[   ]

Family name

[   ]

Relationship to you

[   ]

Sex (*M or F*)   Date of Birth *(Day / Month / Year)*

[ ]   [D] [D] [M] [M] [Y] [Y] [Y] [Y]

OUTSIDE OF CANADA

22. On Census Day, May 10, 2011 were you outside Canada?

- 1 ◯ Yes
- 2 ◯ No ➤ *Go to Question 34*

23. When did you leave Canada?

If exact date is not known, give best estimate

[D] [D] [M] [M] [Y] [Y] [Y] [Y]

24. What is the main reason you were outside Canada on Census Day, May 10, 2011?

- 1 ◯ Work or looking for work
- 2 ◯ Accompanying or joining a spouse or family member ➤ *Go to Question 25*
- 3 ◯ Studies
- 4 ◯ Vacation
- 5 ◯ Visiting or temporarily caring for family or friends
- 6 ◯ Returned to home country (e.g. permit expired)
- 7 ◯ Moved outside Canada permanently (e.g. retirement, work)
- 8 ◯ Posted with either the Canadian Armed Forces or Foreign Affairs and International Trade
- 9 ◯ Other reason ➤ *Specify below*

[   ]

*Only answer this question if you answered "**Accompanying or joining a spouse or family member**" in the previous question.*

25. What is the main reason this family member was outside Canada on May 10, 2011?

- 1 ◯ Posted with either the Canadian Armed Forces or Foreign Affairs and International Trade
- 2 ◯ Studies
- 3 ◯ Visiting or temporarily caring for family or friends
- 4 ◯ Moved outside Canada permanently (e.g. retirement, work)
- 5 ◯ Returned to home country (e.g. permit expired)
- 6 ◯ Other reason ➤ *Specify below*

[   ]

26. In what country were you living or staying on May 10, 2011?

[   ]

27. Have you returned to live in Canada?

- 1 ◯ Yes ➤ *Specify date and go to Question 29 (If exact date is not known, give best estimate)*

[D] [D] [M] [M] [Y] [Y] [Y] [Y]

- 2 ◯ No

28. Do you intend to return to live in Canada?

- 1 ◯ Yes ➤ *Specify date (If exact date is not known, give best estimate)*

[D] [D] [M] [M] [Y] [Y] [Y] [Y]

- 2 ◯ No ➤ *Specify reason,* such as: emigrated, foreign student who left Canada after completing studies, foreign worker who left Canada after completing work, etc.

[   ]

[   ]

- 9 ◯ Do not know if I will return to live in Canada.

29. What was the last address in Canada where you lived before residing outside of Canada?

- ◯ Same address as in Question **6**
- ◯ Another address ➤ *Specify below*

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Province/Territory   Postal code

[   ]   [ ][ ][ ] [ ][ ][ ]

Telephone number

[ ][ ][ ] – [ ][ ][ ] – [ ][ ][ ][ ]

FOR INFORMATION ONLY

30. What are the names and characteristics of an adult, if any, who lived with you at that address?

- ○ That address is a collective dwelling or institution
- ○ No other adult lived with me there
- ○ The adult is listed in the Household Members List (Question **4**)
  ➤ **Enter list number** ☐☐
- ○ Otherwise, enter information below:

Given name(s)
☐

Family name
☐

Relationship to you
☐

Sex (*M or F*) ☐   Date of Birth (*Day / Month / Year*)
D D M M Y Y Y Y

31. On May 10, 2011, did you have a residence in Canada either occupied by one or more members of your family or available for your immediate occupancy?

- 1 ○ Yes
- 2 ○ No ➤ **Go to Question 34**

32. What was the address or exact location of that residence?

- ○ Same address as in Question **6** ⎫ **Go to**
- ○ Same address as in Question **29** ⎬ **Question 34**
- ○ Another address ➤ **Specify below**

Number and street name or lot and concession number
☐

Apartment number   City, municipality, town, village, Indian reserve
☐   ☐

Province/Territory   Postal code
☐   ☐☐☐ ☐☐☐

Telephone number
☐☐☐ - ☐☐☐ - ☐☐☐☐

33. What are the names and characteristics of an adult, if any, who lived at that address on Census Day, Tuesday, May 10, 2011?

- ○ That address is a collective dwelling or institution
- ○ No other adult lived with me there
- ○ The adult is listed in the Household Members List (Question **4**)
  ➤ **Enter list number** ☐☐
- ○ Otherwise, enter information below:

Given name(s)
☐

Family name
☐

Relationship to you
☐

Sex (*M or F*) ☐   Date of Birth (*Day / Month / Year*)
D D M M Y Y Y Y

---

34. During the month of May, 2011, did you live or stay elsewhere *in Canada*?

- 0 ○ Yes
- 8 ○ No ➤ **Go to Question 37**

35. What was the address or exact location of that residence?

- ○ Same address as in Question ☐☐
  ➤ **Enter question number then go to Question 37**
- ○ Another address ➤ **Specify below**

Number and street name or lot and concession number
☐

Apartment number   City, municipality, town, village, Indian reserve
☐   ☐

Province/Territory   Postal code
☐   ☐☐☐ ☐☐☐

Telephone number
☐☐☐ - ☐☐☐ - ☐☐☐☐

36. What are the names and characteristics of an adult, if any, who lived with you at that address?

- ○ That address is a collective dwelling or institution
- ○ No other adult lived with me there
- ○ The adult is listed in the Household Members List (Question **4**)
  ➤ **Enter list number** ☐☐
- ○ Otherwise, enter information below:

Given name(s)
☐

Family name
☐

Relationship to you
☐

Sex (*M or F*) ☐   Date of Birth (*Day / Month / Year*)
D D M M Y Y Y Y

37. Is there a secondary residence in Canada, such as a cottage or condominium, that you (or another household member) own(ed) or rent(ed) and where you stay or have stayed on occasion?

- 2 ○ No ➤ **Go to Question 39**
- 1 ○ Yes ➤ **Specify below**

Number and street name or lot and concession number
☐

Apartment number   City, municipality, town, village, Indian reserve
☐   ☐

Province/Territory   Postal code
☐   ☐☐☐ ☐☐☐

Telephone number
☐☐☐ - ☐☐☐ - ☐☐☐☐

38. What are the names and characteristics of an adult, if any, who lived with you at that address?

- ( ) That address is a collective dwelling or institution
- ( ) No other adult lived with me there
- ( ) The adult is listed in the Household Members List (Question **4**)
  ➤ *Enter list number* [ ][ ]
- ( ) Otherwise, enter information below:

Given name(s)
[ ]

Family name
[ ]

Relationship to you
[ ]

Sex (*M or F*)   Date of Birth *(Day / Month / Year)*
[ ]   [D][D] [M][M] [Y][Y][Y][Y]

39. Was there any other residence *in Canada* where someone, such as a parent, relative or friend, may have included your name on a 2011 Census questionnaire?

1 ( ) Yes
2 ( ) No   ⎫
9 ( ) Do not know ⎬ *Go to end of questionnaire*

40. What was the address or exact location of that residence?

- ( ) Same address as in Question [ ][ ]
  ➤ *Enter question number then go to end of questionnaire*
- ( ) Another address ➤ *Specify below*

Number and street name or lot and concession number
[ ]

Apartment number   City, municipality, town, village, Indian reserve
[ ]   [ ]

Province/Territory   Postal code
[ ]   [ ][ ][ ] [ ][ ][ ]

Telephone number
[ ][ ][ ] – [ ][ ][ ] – [ ][ ][ ][ ]

41. What are the names and characteristics of an adult, if any, who lived with you at that address?

- ( ) That address is a collective dwelling or institution
- ( ) No other adult lived with me there
- ( ) The adult is listed in the Household Members List (Question **4**)
  ➤ *Enter list number* [ ][ ]
- ( ) Otherwise, enter information below:

Given name(s)
[ ]

Family name
[ ]

Relationship to you
[ ]

Sex (*M or F*)   Date of Birth *(Day / Month / Year)*
[ ]   [D][D] [M][M] [Y][Y][Y][Y]

YOU HAVE NOW COMPLETED YOUR QUESTIONNAIRE

Please return your completed questionnaire in the pre-paid envelope provided.

Thank you

THE LAW PROTECTS YOUR INFORMATION

The confidentiality of your completed questionnaire is protected by law.
All Statistics Canada employees have taken an oath of secrecy. Personal information cannot be given to anyone outside Statistics Canada.

COMMENTS?

2011 Reverse Record Check
Census Quality Survey

Non-proxy (short) **4E**

Ce questionnaire est aussi disponible en français

SPIN: **INT#:**

This survey is used to estimate the number of persons missed in the 2011 Census and to determine their characteristics.

1. **Have you changed your name since May 16, 2006, or is it different from the name recorded on the label above?**

2 ◯ No

1 ◯ Yes ➤ *Print new name(s) below*

Given name(s)   Family name

2. **Is there a different spelling or another name that you use?**

2 ◯ No

1 ◯ Yes ➤ *Print the name(s) below*

3. **Please read the instructions below carefully before filling in the HOUSEHOLD MEMBERS LIST for Census Day, May 10, 2011 on the next page.**

WHOM TO INCLUDE IN THE HOUSEHOLD MEMBERS LIST

- All persons who had the same **usual home** as you on May 10, 2011, including newborn babies, room-mates and persons who were temporarily away;

- **Canadian citizens, permanent residents** (landed immigrants), persons asking for **refugee status** (refugee claimants), persons from **another country** with a **work** or **study permit** and family members who were living here with them;

- Persons who were staying with you temporarily on May 10, 2011 who had **no usual home elsewhere**.

WHERE TO INCLUDE PERSONS WITH MORE THAN ONE RESIDENCE

- **CHILDREN IN JOINT CUSTODY** should be included in the home of the parent where they lived most of the time. Children who spent equal time with each parent should be included in the home of the parent with whom they were staying on May 10, 2011.

- **STUDENTS** who returned to live with their parents during the year should be included at their parents' address, even if they lived elsewhere while attending school or working at a summer job.

- **SPOUSES OR COMMON-LAW PARTNERS TEMPORARILY AWAY** who stayed elsewhere while working or studying, should be listed at the usual home of their family, if they returned periodically.

- **PERSONS IN AN INSTITUTION** who had been there for **less than six months** (for example, in a home for the aged, a hospital or a prison) should be listed at their usual home.

Statistics Canada   Statistique Canada

Canada

Question 3 (continued)

DO NOT INCLUDE THESE PERSONS IN THE HOUSEHOLD MEMBERS LIST

- Persons who had their **usual home elsewhere in Canada** and who were staying with you temporarily (for example, persons visiting or persons who had their secondary residence with you);

- Residents of another country who were **visiting** Canada (for example, persons on a business trip or on vacation);

- Government representatives of another country or members of the Armed Forces of another country and their family members;

- Persons other than you living in a collective dwelling or institution (other than a Hutterite colony) such as a hotel or motel, nursing home or seniors' residence, hospital, group home, prison, staff residence, etc. **Note that you should still enter your information in the Household Members List.**

Please fill in the Household Members List for all persons who lived at your usual home on Census Day, May 10, 2011, even if they were temporarily away. Also indicate the date of birth, sex, legal marital status, common-law status and the relationship to you for each person, using the codes below.
PUT YOUR OWN INFORMATION ON THE FIRST LINE.

USE THESE CODES IN THE HOUSEHOLD MEMBERS LIST:

Sex	Legal Marital Status	Common-Law* Status	Relationship to you
F – Female **M** –Male	**1** – Never legally married (single) **2** – Legally married (and not separated) **3** – Separated, but still legally married **4** – Divorced **5** – Widowed	**1** – Yes **2** – No	**1** – Spouse or common-law partner **2** – Son or daughter** **3** – Father or mother or step father/mother **4** – Brother or sister or step brother/sister **5** – Other person related to you **6** – Other person not related to you

* **Common-law**, refers to two people who live together as a couple but who are not legally married to each other.
** *Stepchildren, adopted children, foster children and children of a common-law partner are to be considered sons and daughters.*

◯ This is a collective dwelling or institution (other than a Hutterite colony). A collective dwelling or institution includes, for example, a nursing home, hospital, rooming house, group home, etc.
   ➤ *Fill in your information on the first line then go to Question 4*

HOUSEHOLD MEMBERS LIST – CENSUS DAY, MAY 10, 2011

Person #	Given Name(s)	Family Name	Date of Birth DD-MM-YYYY	Sex	Legal Marital Status	Common-Law Status	Relationship to you
	⬇ **Put your information on the first line.** ⬇						
01							
02							
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							

Please enter below any additional information you wish to add about the Household Members List.

CURRENT ADDRESS

4. **Is your current usual home in Canada?**

1 ◯ Yes

2 ◯ No ➤ *Go to Question 6*

5. **What is the address or exact location of your current usual home? If you have a mailing address based on a Post Office box, general delivery, rural route or business, please record as specifically as possible a home address based on civic style street name or 911 numbering.**

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Name of residence, if any

[   ]

Province/Territory   Postal code

[   ]   [ ][ ][ ] [ ][ ][ ]

Telephone number

[ ][ ][ ] – [ ][ ][ ] – [ ][ ][ ][ ]

CENSUS DAY 2011

6. **What was the address or exact location of your usual home on CENSUS DAY, Tuesday, MAY 10, 2011?**

1 ◯ Outside Canada ➤ *Specify country below and go to Question 10*

[   ]

2 ◯ Same address as in Question **5**

3 ◯ In Canada – Different address from that in Question **5** ➤ *Specify address below*

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Province/Territory   Postal code

[   ]   [ ][ ][ ] [ ][ ][ ]

Telephone number

[ ][ ][ ] – [ ][ ][ ] – [ ][ ][ ][ ]

7. **Was your usual home on Census Day a(n):**

- a nursing home or hospital,
- a lodging or rooming house,
- a work camp, prison or mission,
- a group home, hotel or motel,
- a staff residence or communal quarters of a military camp or
- a residence of a similar type?

1 ◯ Yes

7 ◯ No ➤ *Go to Question 9*

8. **What was the name of that residence?**

[   ]

➤ *Go to Question 10*

9. **What are the names and characteristics of an adult, if any, who lived with you at that address on Census Day, Tuesday, May 10, 2011?**

◯ That address is a collective dwelling or institution

◯ No other adult lived with me there

◯ The adult is listed in the Household Members List (Question **3**) ➤ *Enter list number* [ ][ ]

◯ Otherwise, enter information below:

Given name(s)

[   ]

Family name

[   ]

Relationship to you

[   ]

Sex (*M or F*)   Date of Birth (*Day / Month / Year*)

[ ]   [D][D] [M][M] [Y][Y][Y][Y]

PREVIOUS ADDRESSES

10. **What was the address or exact location where you lived ONE year before Census Day (May 10, 2010)?**

◯ Outside Canada ➤ *Specify country below*

[   ]

◯ Same address as in Question **5**

◯ Same address as in Question **6**

◯ Another address ➤ *Specify address below*

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Name of residence, if any

[   ]

Province/Territory   Postal code

[   ]   [ ][ ][ ] [ ][ ][ ]

Telephone number

[ ][ ][ ] – [ ][ ][ ] – [ ][ ][ ][ ]

11. What was the address that you lived at **FIVE years before Census Day (May 10, 2006)?**

◯ Outside Canada ➤ *Specify country below*

[   ]

◯ Same address as in Question **5**

◯ Same address as in Question **6**

◯ Same address as in Question **10**

◯ Another address ➤ *Specify address below*

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Name of residence, if any

[   ]

Province/Territory   Postal code

[   ]   [ ][ ][ ] [ ][ ][ ]

Telephone number

[ ][ ][ ] – [ ][ ][ ] – [ ][ ][ ][ ]

YOU HAVE NOW COMPLETED YOUR QUESTIONNAIRE

Please return your completed questionnaire in the pre-paid envelope provided.

Thank you

THE LAW PROTECTS YOUR INFORMATION

The confidentiality of your completed questionnaire is protected by law.
All Statistics Canada employees have taken an oath of secrecy. Personal information
cannot be given to anyone outside Statistics Canada.

COMMENTS?

2011 Reverse Record Check
Census Quality Survey

Proxy   **2E**

CONFIDENTIAL when completed.

This information is collected under the
Authority of the *Statistics Act*, R.S.C. 1985,
c.S-19, and must be provided by law.

Ce questionnaire est aussi disponible en français

SPIN: ☐☐☐☐☐☐   **INT#:** ☐☐☐☐☐☐

> *This survey is used to estimate the number of persons missed in the 2011 Census and to determine their characteristics.*

1. Did … change his or her name since May 16, 2006, or is it different from the name recorded on the label above?

² ◯   No

¹ ◯   Yes ➤ *Print new name(s) below*

Given name(s)	Family name

1A. Is there a different spelling or another name that … uses/used?

² ◯   No

¹ ◯   Yes ➤ *Print the name(s) below*

2. Is … deceased?

¹ ◯   No, … is not deceased

² ◯   Yes, … died <u>before</u> Census Day, May 10, 2011 ➤ *Go to Question 1 of the Questionnaire 3E*

³ ◯   Yes, … died <u>on or after</u> Census Day, May 10, 2011 ➤ *Specify date below*

If exact date is not known, give best estimate.

D D   M M   Y Y Y Y

3. Was …'s usual home on Census Day, MAY 10, 2011 in Canada or outside Canada? *For a definition of "usual home", please see the Questionnaire Instructions on the back page of the covering letter.*

¹ ◯   In Canada

² ◯   Outside Canada ➤ *Go to Question 23 on Page 5*

4. Please read the instructions below carefully before filling in the HOUSEHOLD MEMBERS LIST for Census Day, May 10, 2011 on the next page.

WHOM TO INCLUDE IN THE HOUSEHOLD MEMBERS LIST

- All persons who had the same **usual home** as … on May 10, 2011, including newborn babies, room-mates and persons who were temporarily away;

- **Canadian citizens, permanent residents** (landed immigrants), persons asking for **refugee status** (refugee claimants), persons from **another country** with a **work** or **study permit** and family members who were living here with them;

- Persons who were staying with … temporarily on May 10, 2011 who had **no usual home elsewhere**.

WHERE TO INCLUDE PERSONS WITH MORE THAN ONE RESIDENCE

- **CHILDREN IN JOINT CUSTODY** should be included in the home of the parent where they lived most of the time. Children who spent equal time with each parent should be included in the home of the parent with whom they were staying on May 10, 2011.

- **STUDENTS** who returned to live with their parents during the year should be included at their parents' address, even if they lived elsewhere while attending school or working at a summer job.

- **SPOUSES OR COMMON-LAW PARTNERS TEMPORARILY AWAY** who stayed elsewhere while working or studying, should be listed at the usual home of their family, if they returned periodically.

- **PERSONS IN AN INSTITUTION** who had been there for **less than six months** (for example, in a home for the aged, a hospital or a prison) should be listed at their usual home.

Statistics Canada   **Statistique Canada**   **Canada**

DO NOT INCLUDE THESE PERSONS IN THE HOUSEHOLD MEMBERS LIST

- Persons who had their **usual home elsewhere in Canada** and who were staying with ... temporarily (for example, persons visiting or persons who had their secondary residence with ...);

- Residents of another country who were **visiting** Canada (for example, persons on a business trip or on vacation);

- Government representatives of another country or members of the Armed Forces of another country and their family members;

- Persons other than ... living in a collective dwelling or institution (other than a Hutterite colony) such as a hotel or motel, nursing home or seniors' residence, hospital, group home, prison, staff residence, etc. **Note that you should still enter ...'s information in the Household Members List.**

Please fill in the Household Members List <u>for all persons</u> who lived at ...'s usual home on Census Day, May 10, 2011, even if they were temporarily away. Also indicate the date of birth, sex, legal marital status, common-law status and the relationship to ... for each person, using the codes below. **<u>PUT ...'s OWN INFORMATION ON THE FIRST LINE</u>.**

USE THESE CODES IN THE HOUSEHOLD MEMBERS LIST:

Sex	Legal Marital Status	Common-Law* Status	Relationship to ...
F – Female **M** – Male	**1** – Never legally married (single) **2** – Legally married (and not separated) **3** – Separated, but still legally married **4** – Divorced **5** – Widowed	**1** – Yes **2** – No	**1** – Spouse or common-law partner **2** – Son or daughter** **3** – Father or mother or step father/mother **4** – Brother or sister or step brother/sister **5** – Other person related to ... **6** – Other person not related to ... **7** – Unknown relationship to …

* **Common-law**, refers to two people who live together as a couple but who are not legally married to each other.
** *Stepchildren, adopted children, foster children and children of a common-law partner are to be considered sons and daughters.*

◯ This is a collective dwelling or institution (other than a Hutterite colony). A collective dwelling or institution includes, for example, a nursing home, hospital, rooming house, group home, etc.
➢ *Fill in ...'s information on the first line then go to Question 5A*

HOUSEHOLD MEMBERS LIST – CENSUS DAY, MAY 10, 2011

Person #	Given Name(s)	Family Name	Date of Birth DD-MM-YYYY	Sex	Legal Marital Status	Common-Law Status	Relationship to ...
	➡ Put ...'s information on the first line. ➡						
01							
02							
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							

Please enter below any additional information you wish to add about the Household Members List.

6720102021

CURRENT ADDRESS

5A. **If … is deceased** ➤ *Go to Question 7*

5. **Is …'s current usual home in Canada?**

1 ◯ Yes

2 ◯ No ➤ *Go to Question 7*

6. **What is the address or exact location of …'s current usual home? If … has a mailing address based on a Post Office box, general delivery, rural route or business, please record as specifically as possible a home address based on civic style street name or 911 numbering.**

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Name of residence, if any

[   ]

Province/Territory   Postal code

[   ]   [   ] [   ] [   ] [   ] [   ] [   ]

Telephone number

[   ][   ][   ] – [   ][   ][   ] – [   ][   ][   ][   ]

CENSUS DAY 2011

7. **What was the address or exact location of …'s <u>usual home</u> on CENSUS DAY, Tuesday, MAY 10, 2011?**

1 ◯ Outside Canada ➤ *Go to Question 23*

2 ◯ Same address as in Question **6**

3 ◯ In Canada – Different address from that in Question **6** ➤ *Specify address below*

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Province/Territory   Postal code

[   ]   [   ] [   ] [   ] [   ] [   ] [   ]

Telephone number

[   ][   ][   ] – [   ][   ][   ] – [   ][   ][   ][   ]

8. **Was …'s usual home on Census Day one of the following:**

- a nursing home or hospital,
- a lodging or rooming house,
- a work camp, prison or mission,
- a group home, hotel or motel,
- a staff residence or communal quarters of a military camp or
- a residence of a similar type?

1 ◯ Yes

7 ◯ No or do not know ➤ *Go to Question 10*

9. **What was the name of that residence?**

[   ]

➤ *Go to Question 11*

10. **What are the names and characteristics of an adult, if any, who lived with … at that address on Census Day, Tuesday, May 10, 2011?**

◯ That address is a collective dwelling or institution

◯ No other adult lived with ... there

◯ The adult is listed in the Household Members List (Question **4**) ➤ *Enter list number* [   ][   ]

◯ Otherwise, enter information below:

Given name(s)

[   ]

Family name

[   ]

Relationship to ...

[   ]

Sex (*M or F*)   Date of Birth *(Day / Month / Year)*

[   ]   [D][D] [M][M] [Y][Y][Y][Y]

11. **Has/had … lived at the same address as in Question 7 (…'s 2011 Census Day address) since May 10, 2006?**

1 ◯ Yes ➤ *Go to Question 22*

2 ◯ No

RECENT ADDRESS

12. **Besides …'s current address (listed in Question 6), has … lived elsewhere <u>after</u> Census Day (May 10, 2011)?**

1 ◯ Yes

8 ◯ No   *Go to*

9 ◯ Do not know *Question 15*

13. **What was the address or exact location of that residence?**

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Name of residence, if any

[   ]

Province/Territory   Postal code

[   ]   [   ] [   ] [   ] [   ] [   ] [   ]

Telephone number

[   ][   ][   ] – [   ][   ][   ] – [   ][   ][   ][   ]

14. **What are the names and characteristics of an adult, if any, who lived with … at that address?**

○ That address is a collective dwelling or institution

○ No other adult lived with ... there

○ The adult is listed in the Household Members List (Question **4**)
➤ *Enter list number* ☐☐

○ Otherwise, enter information below:

Given name(s)

☐

Family name

☐

Relationship to ...

☐

Sex (*M or F*) | Date of Birth *(Day / Month / Year)*
☐ | D D M M Y Y Y Y

PREVIOUS ADDRESSES

15. **What was the address or exact location where … lived ONE year before Census Day (May 10, 2010)?**

○ …'s birth date is after May 10, 2010 ➤ *Go to Question 22*

○ Same address as in Question **6**
○ Same address as in Question **7** } *Go to Question 17*
○ Same address as in Question **13**

○ Another address ➤ *Specify below*

Number and street name or lot and concession number

☐

Apartment number | City, municipality, town, village, Indian reserve
☐ | ☐

Province/Territory | Postal code
☐ | ☐☐☐ ☐☐☐

Telephone number

☐☐☐ - ☐☐☐ - ☐☐☐☐

○ Do not know ➤ *Go to Question 17*

16. **What are the names and characteristics of an adult, if any, who lived with … at that address?**

○ That address is a collective dwelling or institution

○ No other adult lived with ... there

○ The adult is listed in the Household Members List (Question **4**)
➤ *Enter list number* ☐☐

○ Otherwise, enter information below:

Given name(s)

☐

Family name

☐

Relationship to ...

☐

Sex (*M or F*) | Date of Birth *(Day / Month / Year)*
☐ | D D M M Y Y Y Y

17. **Did … live at another residence between the address given in Question 15 (May 10, 2010, one year before Census Day) and their 2011 Census Day address (given in Question 7)?**

1 ○ Yes
2 ○ No   *Go to*
9 ○ Do not know *Question 20*

18. **What was the address or exact location of that residence?**

Number and street name or lot and concession number

☐

Apartment number | City, municipality, town, village, Indian reserve
☐ | ☐

Province/Territory | Postal code
☐ | ☐☐☐ ☐☐☐

Telephone number

☐☐☐ - ☐☐☐ - ☐☐☐☐

19. **What are the names and characteristics of an adult, if any, who lived with … at that address?**

○ That address is a collective dwelling or institution

○ No other adult lived with ... there

○ The adult is listed in the Household Members List (Question **4**)
➤ *Enter list number* ☐☐

○ Otherwise, enter information below:

Given name(s)

☐

Family name

☐

Relationship to ...

☐

Sex (*M or F*) | Date of Birth *(Day / Month / Year)*
☐ | D D M M Y Y Y Y

20. **What was the address that … lived at FIVE years before Census Day (May 10, 2006)?**

○ …'s birth date is after May 10, 2006 ➤ *Go to Question 22*

○ Same address as in Question **6**
○ Same address as in Question **7** } *Go to Question 22*
○ Same address as in Question **13**
○ Same address as in Question **15**

○ Another address ➤ *Specify below*

Number and street name or lot and concession number

☐

Apartment number | City, municipality, town, village, Indian reserve
☐ | ☐

Province/Territory | Postal code
☐ | ☐☐☐ ☐☐☐

Telephone number

☐☐☐ - ☐☐☐ - ☐☐☐☐

○ Do not know ➤ *Go to Question 22*

21. What are the names and characteristics of an adult, if any, who lived with … at that address?

- ◯ That address is a collective dwelling or institution
- ◯ No other adult lived with ... there
- ◯ The adult is listed in the Household Members List (Question **4**)
  - ➤ *Enter list number* ▢▢
- ◯ Otherwise, enter information below:

Given name(s)

[   ]

Family name

[   ]

Relationship to ...

[   ]

Sex (*M or F*)   Date of Birth (*Day / Month / Year*)

▢   D D M M Y Y Y Y

OUTSIDE OF CANADA

22. On Census Day, May 10, 2011 was … outside Canada?

- 1 ◯ Yes
- 2 ◯ No   } *Go to Question 34*
- 9 ◯ Do not know

23. When did … leave Canada?

If exact date is not known, give best estimate

D D M M Y Y Y Y

24. What is the main reason … was outside Canada on Census Day, May 10, 2011?

- 1 ◯ Work or looking for work
- 2 ◯ Accompanying or joining a spouse or family member ➤ *Go to Question 25*
- 3 ◯ Studies
- 4 ◯ Vacation
- 5 ◯ Visiting or temporarily caring for family or friends
- 6 ◯ Returned to home country (e.g. permit expired)
- 7 ◯ Moved outside Canada permanently (e.g. retirement, work)
- 8 ◯ Posted with either the Canadian Armed Forces or Foreign Affairs and International Trade
- 9 ◯ Other reason ➤ *Specify below*

[   ]

---

*Only answer this question if you answered "**Accompanying or joining a spouse or family member**" in the previous question.*

25. What is the main reason this family member was outside Canada on May 10, 2011?

- 1 ◯ Posted with either the Canadian Armed Forces or Foreign Affairs and International Trade
- 2 ◯ Studies
- 3 ◯ Visiting or temporarily caring for family or friends
- 4 ◯ Moved outside Canada permanently (e.g. retirement, work)
- 5 ◯ Returned to home country (e.g. permit expired)
- 6 ◯ Other reason ➤ *Specify below*

[   ]

26. In what country was … living or staying on May 10, 2011?

[   ]

27. Has … returned to live in Canada?

- 1 ◯ Yes ➤ *Specify date and go to Question 29* (*If exact date is not known, give best estimate*)

  D D M M Y Y Y Y

- 2 ◯ No
- 9 ◯ Do not know

➤ *If … is deceased, Go to Question 29*

28. Does … intend to return to live in Canada?

- 1 ◯ Yes ➤ *Specify date (If exact date is not known, give best estimate)*

  D D M M Y Y Y Y

- 2 ◯ No ➤ *Specify reason, such as: emigrated, foreign student who left Canada after completing studies, foreign worker who left Canada after completing work, etc.*

  [   ]

  [   ]

- 9 ◯ Do not know if … intends to return to live in Canada.

29. What was the last address in Canada where … lived before residing outside of Canada?

- ◯ Same address as in Question **6**
- ◯ Another address ➤ *Specify below*

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Province/Territory   Postal code

[   ]   [   ] [   ] [   ] [   ] [   ] [   ]

Telephone number

[   ][   ][   ] – [   ][   ][   ] – [   ][   ][   ][   ]

- 9 ◯ Do not know ➤ *Go to Question 31*

30. What are the names and characteristics of an adult, if any, who lived with … at that address?

○ That address is a collective dwelling or institution

○ No other adult lived with ... there

○ The adult is listed in the Household Members List (Question **4**)
➤ *Enter list number* ☐☐

○ Otherwise, enter information below:

Given name(s)

[   ]

Family name

[   ]

Relationship to ...

[   ]

Sex (*M or F*)   Date of Birth (*Day / Month / Year*)
☐   D D M M Y Y Y Y

31. On May 10, 2011, did … have a residence in Canada either occupied by one or more members of his/her family or available for their immediate occupancy?

1 ○ Yes

2 ○ No   ⎫ *Go to*
9 ○ Do not know ⎬ *Question 34*

32. What was the address or exact location of that residence?

○ Same address as in Question **6**   ⎫ *Go to*
○ Same address as in Question **29** ⎬ *Question 34*
○ Another address ➤ *Specify below*

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Province/Territory   Postal code

[   ]   ☐☐☐ ☐☐☐

Telephone number

☐☐☐ – ☐☐☐ – ☐☐☐☐

33. What are the names and characteristics of an adult, if any, who lived at that address on Census Day, Tuesday, May 10, 2011?

○ That address is a collective dwelling or institution

○ No other adult lived with ... there

○ The adult is listed in the Household Members List (Question **4**)
➤ *Enter list number* ☐☐

○ Otherwise, enter information below:

Given name(s)

[   ]

Family name

[   ]

Relationship to ...

[   ]

Sex (*M or F*)   Date of Birth (*Day / Month / Year*)
☐   D D M M Y Y Y Y

---

34. During the month of May, 2011, did … live or stay elsewhere *in Canada*?

0 ○ Yes

8 ○ No   ⎫ *Go to*
9 ○ Do not know ⎬ *Question 37*

35. What was the address or exact location of that residence?

○ Same address as in Question ☐☐
➤ *Enter question number then go to Question 37*

○ Another address ➤ *Specify below*

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Province/Territory   Postal code

[   ]   ☐☐☐ ☐☐☐

Telephone number

☐☐☐ – ☐☐☐ – ☐☐☐☐

36. What are the names and characteristics of an adult, if any, who lived with ... at that address?

○ That address is a collective dwelling or institution

○ No other adult lived with ... there

○ The adult is listed in the Household Members List (Question **4**)
➤ *Enter list number* ☐☐

○ Otherwise, enter information below:

Given name(s)

[   ]

Family name

[   ]

Relationship to ...

[   ]

Sex (*M or F*)   Date of Birth (*Day / Month / Year*)
☐   D D M M Y Y Y Y

37. Is there a secondary residence in Canada, such as a cottage or condominium, that … (or another household member) owns/owned or rents/rented and where … stays/stayed on occasion?

2 ○ No ➤ *Go to Question 39*

1 ○ Yes ➤ *Specify below*

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Province/Territory   Postal code

[   ]   ☐☐☐ ☐☐☐

Telephone number

☐☐☐ – ☐☐☐ – ☐☐☐☐

9 ○ Do not know ➤ *Go to Question 39*

38. What are the names and characteristics of an adult, if any, staying or who stayed with … at that address?

- ◯ That address is a collective dwelling or institution
- ◯ No other adult lived with ... there
- ◯ The adult is listed in the Household Members List (Question **4**) ▢▢
  ➤ *Enter list number*
- ◯ Otherwise, enter information below:

Given name(s)
[   ]

Family name
[   ]

Relationship to ...
[   ]

Sex (*M or F*)   Date of Birth (*Day / Month / Year*)
[   ]   [D][D] [M][M] [Y][Y][Y][Y]

39. Was there any other residence in *Canada* where someone, such as a parent, relative or friend, may have included …'s name on a 2011 Census questionnaire?

¹ ◯ Yes
² ◯ No ⎫ *Go to*
⁹ ◯ Do not know ⎭ *Question 42*

40. What was the address or exact location of that residence?

- ◯ Same address as in Question ▢▢
  ➤ *Enter question number then go to Question 42*
- ◯ Another address ➤ *Specify below*

Number and street name or lot and concession number
[   ]

Apartment number   City, municipality, town, village, Indian reserve
[   ]   [   ]

Province/Territory   Postal code
[   ]   [   ][   ][   ] [   ][   ][   ]

Telephone number
[   ][   ][   ] – [   ][   ][   ] – [   ][   ][   ][   ]

41. What are the names and characteristics of an adult, if any, staying or who stayed with … at that address?

- ◯ That address is a collective dwelling or institution
- ◯ No other adult lived with ... there
- ◯ The adult is listed in the Household Members List (Question **4**) ▢▢
  ➤ *Enter list number*
- ◯ Otherwise, enter information below:

Given name(s)
[   ]

Family name
[   ]

Relationship to ...
[   ]

Sex (*M or F*)   Date of Birth (*Day / Month / Year*)
[   ]   [D][D] [M][M] [Y][Y][Y][Y]

OTHER INFORMATION

42. What is/was the language that … first learned at home in childhood and still understands/understood?

If … no longer understands/understood the first language learned, indicate the second language learned.

¹ ◯ English
² ◯ French
³ ◯ Other

43. What are the names and characteristics of the person who completed this questionnaire?

- ◯ The adult is listed in the Household Members List (Question **4**) ▢▢
  ➤ *Enter list number*
- ◯ Otherwise, enter information below:

Given name(s)
[   ]

Family name
[   ]

Relationship to ...
[   ]

Sex (*M or F*)
[   ]

YOU HAVE NOW COMPLETED THIS QUESTIONNAIRE

Please return this completed questionnaire in the pre-paid envelope provided.

Thank you

THE LAW PROTECTS YOUR INFORMATION

The confidentiality of this completed questionnaire is protected by law.
All Statistics Canada employees have taken an oath of secrecy. Personal information cannot be given to anyone outside Statistics Canada.

COMMENTS?

2011 Reverse Record Check
Census Quality Survey

Proxy (short) 5E

CONFIDENTIAL when completed.

This information is collected under the
Authority of the *Statistics Act*, R.S.C. 1985,
c.S-19, and must be provided by law.

Ce questionnaire est aussi disponible en français

SPIN: ☐☐☐☐☐☐   **INT#:** ☐☐☐☐☐☐

> *This survey is used to estimate the number of persons missed in the 2011 Census
> and to determine their characteristics.*

1. Did … change his or her name since May 16, 2006, or is it different from the name recorded on the label above?

2 ◯ No

1 ◯ Yes ➤ *Print new name(s) below*

Given name(s)

_____

Family name

_____

1A. Is … deceased?

1 ◯ No, … is not deceased

2 ◯ Yes, … died <u>before</u> Census Day, May 10, 2011 ➤ *Go to Question 1 of the Questionnaire 3E*

3 ◯ Yes, … died <u>on or after</u> Census Day, May 10, 2011 ➤ *Specify date below*

If exact date is not known, give best estimate.

D D M M Y Y Y Y

2. Is there a different spelling or another name that … uses/used?

2 ◯ No

1 ◯ Yes ➤ *Print the name(s) below*

_____

3. Please read the instructions below carefully before filling in the HOUSEHOLD MEMBERS LIST for Census Day, May 10, 2011 on the next page.

WHOM TO INCLUDE IN THE HOUSEHOLD MEMBERS LIST

- All persons who had the same **usual home** as … on May 10, 2011, including newborn babies, room-mates and persons who were temporarily away;

- **Canadian citizens, permanent residents** (landed immigrants), persons asking for **refugee status** (refugee claimants), persons from **another country** with a **work** or **study permit** and family members who were living here with them;

- Persons who were staying with … temporarily on May 10, 2011 who had **no usual home elsewhere**.

WHERE TO INCLUDE PERSONS WITH MORE THAN ONE RESIDENCE

- **CHILDREN IN JOINT CUSTODY** should be included in the home of the parent where they lived most of the time. Children who spent equal time with each parent should be included in the home of the parent with whom they were staying on May 10, 2011.

- **STUDENTS** who returned to live with their parents during the year should be included at their parents' address, even if they lived elsewhere while attending school or working at a summer job.

- **SPOUSES OR COMMON-LAW PARTNERS TEMPORARILY AWAY** who stayed elsewhere while working or studying, should be listed at the usual home of their family, if they returned periodically.

- **PERSONS IN AN INSTITUTION** who had been there for **less than six months** (for example, in a home for the aged, a hospital or a prison) should be listed at their usual home.

FOR INFORMATION ONLY

DO NOT INCLUDE THESE PERSONS IN THE HOUSEHOLD MEMBERS LIST

- Persons who had their **usual home elsewhere in Canada** and who were staying with ... temporarily (for example, persons visiting or persons who had their secondary residence with ...);

- Residents of another country who were **visiting** Canada (for example, persons on a business trip or on vacation);

- Government representatives of another country or members of the Armed Forces of another country and their family members;

- Persons other than ... living in a collective dwelling or institution (other than a Hutterite colony) such as a hotel or motel, nursing home or seniors' residence, hospital, group home, prison, staff residence, etc. **Note that you should still enter ...'s information in the Household Members List.**

Please fill in the Household Members List <u>for all persons</u> who lived at ...'s usual home on Census Day, May 10, 2011, even if they were temporarily away. Also indicate the date of birth, sex, legal marital status, common-law status and the relationship to ... for each person, using the codes below.
<u>PUT ...'s OWN INFORMATION ON THE FIRST LINE</u>.

USE THESE CODES IN THE HOUSEHOLD MEMBERS LIST:

Sex	Legal Marital Status	Common-Law* Status	Relationship to ...
F – Female **M** –Male	**1** – Never legally married (single) **2** – Legally married (and not separated) **3** – Separated, but still legally married **4** – Divorced **5** – Widowed	**1** – Yes **2** – No	**1** – Spouse or common-law partner **2** – Son or daughter** **3** – Father or mother or step father/mother **4** – Brother or sister or step brother/sister **5** – Other person related to ... **6** – Other person not related to ... **7** – Unknown relationship to …

* **Common-law**, refers to two people who live together as a couple but who are not legally married to each other.
** *Stepchildren, adopted children, foster children and children of a common-law partner are to be considered sons and daughters.*

○ This is a collective dwelling or institution (other than a Hutterite colony). A collective dwelling or institution includes, for example, a nursing home, hospital, rooming house, group home, etc.
➤ *Fill in ...'s information on the first line then go to Question 4A*

HOUSEHOLD MEMBERS LIST – CENSUS DAY, MAY 10, 2011

Person #	Given Name(s)	Family Name	Date of Birth DD-MM-YYYY	Sex	Legal Marital Status	Common-Law Status	Relationship to ...
	Put ...'s information on the first line.						
01							
02							
03							
04							
05							
06							
07							
08							
09							
10							
11							
12							

Please enter below any additional information you wish to add about the Household Members List.

FOR INFORMATION ONLY

CURRENT ADDRESS

4A. If … is deceased ➤ *Go to Question 6*

4. Is …'s current usual home in Canada?

¹ ◯ Yes

² ◯ No ➤ *Go to Question 6*

5. What is the address or exact location of …'s current usual home? If … has a mailing address based on a Post Office box, general delivery, rural route or business, please record as specifically as possible a home address based on civic style street name or 911 numbering.

Number and street name or lot and concession number

[ ]

Apartment number City, municipality, town, village, Indian reserve

[ ] [ ]

Name of residence, if any

[ ]

Province/Territory Postal code

[ ] [ ][ ][ ] [ ][ ][ ]

Telephone number

[ ][ ][ ] – [ ][ ][ ] – [ ][ ][ ][ ]

CENSUS DAY 2011

6. What was the address or exact location of …'s <u>usual home</u> on CENSUS DAY, Tuesday, MAY 10, 2011?

¹ ◯ Outside Canada ➤ *Specify country below and go to Question 10*

[ ]

² ◯ Same address as in Question **5**

³ ◯ In Canada – Different address from that in Question **5** ➤ *Specify address below*

Number and street name or lot and concession number

[ ]

Apartment number City, municipality, town, village, Indian reserve

[ ] [ ]

Province/Territory Postal code

[ ] [ ][ ][ ] [ ][ ][ ]

Telephone number

[ ][ ][ ] – [ ][ ][ ] – [ ][ ][ ][ ]

7. Was …'s usual home on Census Day one of the following:

- a nursing home or hospital,
- a lodging or rooming house,
- a work camp, prison or mission,
- a group home, hotel or motel,
- a staff residence or communal quarters of a military camp or
- a residence of a similar type?

¹ ◯ Yes

⁷ ◯ No ➤ *Go to Question 9*

8. What was the name of that residence?

[ ]

➤ *Go to Question 10*

9. What are the names and characteristics of an adult, if any, who lived with … at that address on Census Day, Tuesday, May 10, 2011?

◯ That address is a collective dwelling or institution

◯ No other adult lived with ... there

◯ The adult is listed in the Household Members List (Question **3**) ➤ *Enter list number* [ ][ ]

◯ Otherwise, enter information below:

Given name(s)

[ ]

Family name

[ ]

Relationship to ...

[ ]

Sex (*M or F*) Date of Birth *(Day / Month / Year)*

[ ] [D][D] [M][M] [Y][Y][Y][Y]

PREVIOUS ADDRESSES

10. What was the address or exact location where … lived ONE year before Census Day (May 10, 2010)?

◯ …'s birth date is after May 10, 2010 ➤ *Go to Question 12*

◯ Address was outside of Canada ➤ *Specify country*

[ ]

◯ Same address as in Question **5**

◯ Same address as in Question **6**

◯ Another address ➤ *Specify address below*

Number and street name or lot and concession number

[ ]

Apartment number City, municipality, town, village, Indian reserve

[ ] [ ]

Name of residence, if any

[ ]

Province/Territory Postal code

[ ] [ ][ ][ ] [ ][ ][ ]

Telephone number

[ ][ ][ ] – [ ][ ][ ] – [ ][ ][ ][ ]

⁹ ◯ Do not know

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11. What was the address that … lived at FIVE years before Census Day (May 10, 2006)?

○ …'s birth date is after May 10, 2006

○ Address was outside of Canada ➤ *Specify country*

[_____]

○ Same address as in Question **5**

○ Same address as in Question **6**

○ Same address as in Question **10**

○ Another address ➤ *Specify address below*

Number and street name or lot and concession number

[_____]

Apartment number   City, municipality, town, village, Indian reserve

[_____]   [_____]

Name of residence, if any

[_____]

Province/Territory   Postal code

[_____]   [__][__][__] [__][__][__]

Telephone number

[__][__][__] – [__][__][__] – [__][__][__][__]

9 ○ Do not know

12. What are the names and characteristics of the person who completed this questionnaire?

○ The adult is listed in the Household Members List (Question **3**)
➤ *Enter list number*   [__][__]

○ Otherwise, enter information below:

Given name(s)

[_____]

Family name

[_____]

Relationship to …

[_____]

Sex (*M or F*)

[____]

YOU HAVE NOW COMPLETED THIS QUESTIONNAIRE

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Thank you

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COMMENTS?

FOR INFORMATION ONLY

2011 Reverse Record Check
Census Quality Survey

Deceased (before May 10, 2011) | **3E**

Ce questionnaire est aussi disponible en français

SPIN: ⬚⬚⬚⬚⬚⬚

INT#: ⬚⬚⬚⬚⬚⬚

This survey is used to estimate the number of persons missed in the 2011 Census and to determine their characteristics.

Questions relating to a person deceased <u>before</u> CENSUS DAY, May 10, 2011.

---

1. Did … change his or her name since May 16, 2006, or was it different from the name recorded on the label above?

² ◯ No

¹ ◯ Yes ➤ *Print new name(s) below*

Given name(s)

Family name

2. Is there a different spelling or another name that … used?

² ◯ No

¹ ◯ Yes ➤ *Print the name(s) below*

3. What was …'s sex?

¹ ◯ Female

² ◯ Male ➤ *Go to Question 5*

4. What was …'s maiden name?

◯ Not applicable

⁹ ◯ Do not know

5. What was …'s date of birth?

If exact date is not known, give best estimate.

D D M M Y Y Y Y

6. On what date did … die?

If exact date is not known, give best estimate.

D D M M Y Y Y Y

7. In what province, territory or country did … die?

◯ Newfoundland and Labrador

◯ Prince Edward Island

◯ Nova Scotia

◯ New Brunswick

◯ Quebec

◯ Ontario

◯ Manitoba

◯ Saskatchewan

◯ Alberta

◯ British Columbia

◯ Yukon Territory

◯ Northwest Territories

◯ Nunavut

◯ Outside Canada ➤ *Specify country*

⁹ ◯ Do not know

8. What was the address or exact physical location of …'s last known usual home in Canada? If … had a mailing address based on a Post Office box, general delivery, rural route or business, please record as specifically as possible …'s home address based on civic style street name or 911 numbering.

If … had no usual home, enter the place where … last stayed.

Number and street name or lot and concession number

Apartment number

City, municipality, town, village, Indian reserve

Name of residence, if any

Province/Territory

Postal code

Telephone number

⬚⬚⬚ – ⬚⬚⬚ – ⬚⬚⬚⬚

6-7200-103.1: 2011-11-24

Statistics Canada **Statistique Canada**

Canada

9. What are the names and characteristics of an adult, if any, who was living with … at that address?

○ That address is a collective dwelling or institution
○ No other adult lived with … there
○ Otherwise, enter information below:

Given name(s)

[   ]

Family name

[   ]

Relationship to ...

[   ]

Sex (*M or F*)   Date of Birth *(Day / Month / Year)*
[ ]   [D][D] [M][M] [Y][Y][Y][Y]

9 ○ Do not know

10. Is there another residence in Canada such as a cottage, condominium or any type of second home that … (or another household member) owned or rented and where … stayed on occasion?

1 ○ Yes ➤ *Specify*

Number and street name or lot and concession number

[   ]

Apartment number   City, municipality, town, village, Indian reserve

[   ]   [   ]

Name of residence, if any

[   ]

Province/Territory   Postal code

[   ]   [ ][ ][ ] [ ][ ][ ]

Telephone number

[ ][ ][ ] – [ ][ ][ ] – [ ][ ][ ]

2 ○ No ➤ *Go to Question 12*

9 ○ Do not know ➤ *Go to Question 12*

11. What are the names and characteristics of an adult, if any, living at that address?

○ The same person as in Question **9**
○ That address is a collective dwelling or institution
○ No other adult lived with … there
○ Otherwise, enter information below:

Given name(s)

[   ]

Family name

[   ]

Relationship to ...

[   ]

Sex (*M or F*)   Date of Birth *(Day / Month / Year)*
[ ]   [D][D] [M][M] [Y][Y][Y][Y]

9 ○ Do not know

12. What are the names and characteristics of the person who completed this questionnaire?

○ The same person as in Question **9**
○ The same person as in Question **11**
○ Otherwise, enter information below:

Given name(s)

[   ]

Family name

[   ]

Relationship to ...

[   ]

Sex (*M or F*)

[ ]

FOR INFORMATION ONLY

YOU HAVE NOW COMPLETED THIS QUESTIONNAIRE

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Thank you

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COMMENTS?

Appendix B Acronyms

The following abbreviations are used in this report.

AMS	Automated Match Study
AC	adjusted census counts
AR	Address Register
CA	census agglomeration
CANCEIS	Canadian Census Edit and Imputation System
CATI	computer-assisted telephone interview
CDS	Collective Dwelling Study
CHL	Census Help Line
CLD	crew leader district
CMA	census metropolitan area
CNU	census net undercoverage
COS	Census Overcoverage Study
CRA	Canada Revenue Agency
CSD	census subdivision
CU	collection unit
CV	coefficient of variation
DCS	Dwelling Classification Survey
DOV	dwelling occupancy verification
DPC	data processing centre
E&I	edit and imputation
EA	enumeration area
EN	enumerator
EOC	error of closure
G-Link	Statistics Canada record linkage system
GRLS	Generalized Record Linkage System
HO	head office (of Statistics Canada)
IEIR	incompletely enumerated Indian reserves
L/L	list/leave
MO	mail-out

NPR	non-permanent resident
NRFU	non-response follow-up
PDS	Private Dwelling Study
PE	PEP component estimates
PED	provincial electoral district
PEP	Population Estimates Program
RDB	Census Response Database
RO	regional office (of Statistics Canada)
RRC	Reverse Record Check
RRC RDB	Census Response Database used by the RRC and the COS
SAC	secure access code
SP	selected person
StatMx	Statistical Macro Extensions
VC	vacancy check
VR	Visitation Record
VS	vital statistics
WHI	whole household imputation

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