The emergence of supercentenarians in Canada

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Abstract. As has happened in other developed countries with low mortality, Canada has seen a dramatic increase in the numbers of very old persons in its population, with a multiplication in the number of centenarians, and the concomitant emergence of supercentenarians. The extent of the phenomenon is, however, difficult to assess. On the one hand, because of a warped view of the protection of privacy, age data from Canadian censuses are available only in rounded figures, which renders them useless when reaching the small numbers associated with supercentenarianism. On the other hand, death statistics in general, and those from people born outside the country in particular, are suspect at the extreme ages, and the information necessary to validate the information is not accessible most of the time; with the Province of Quebec, representing some 23.5% of the Canadian population, being the only exception. Of the 25 reported deaths at an age of 110 or over in Quebec, careful validation has identified 10 true supercentenarians. Eight of them are women, but the earliest one, born in 1852, was a male. The oldest died in 2001 at the age of 112 years and four months, but this record will be soon shattered as a 115-year-old woman is currently living in Montreal. Eleven cases are known for the rest of Canada, but they necessarily represent a fraction of the total number of people who reached the 110-year milestone.

A member of the G8 (a forum which brings together the world's "major industrial democracies"), blessed with a high standard of living, and ranking with the best in life expectancy, Canada stands out as one of the most advanced countries in the world. Its population facts and vital events are registered in the structured manner characteristic of a sound public administration, with reputable statistical offices producing in due time the tabulations that allow analysts to monitor levels and changes in the basic behaviors of society.

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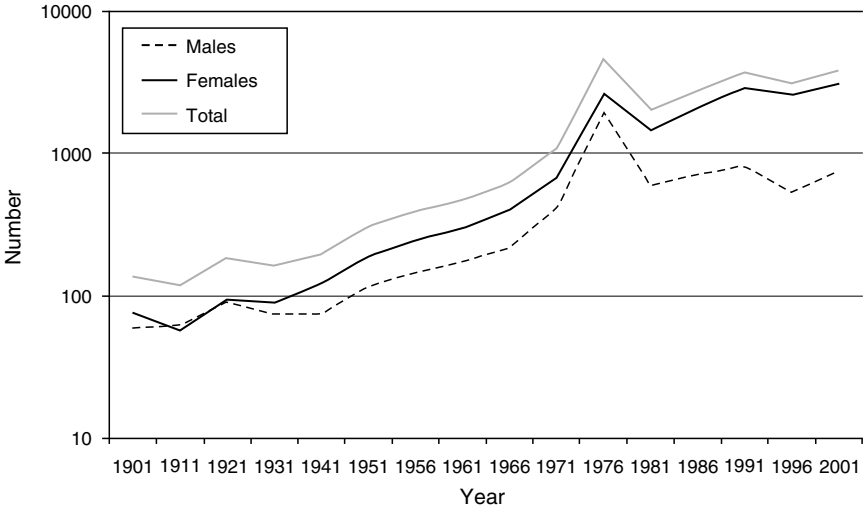
One would thus expect Canada to be in a position to provide complete and reliable data on one of the most fascinating developments of the modern era: the dramatic increase in the numbers of very old persons in populations, illustrated by the proliferation of centenarians and the concomitant emergence of supercentenarians. An overview of the Canadian picture, as it can be defined from the official statistics of the land, will demonstrate that this assumption needs, at the very least, to be qualified. We will then review the Canadian situation in terms of data collection and age validation to arrive at the current state of knowledge on the emergence of supercentenarians in Canada.

1 The tale of the official statistics: Data on population

Complete censuses started in 1851-1852 in Canada, 15 years before the country was organized as a Confederation of Provinces, its current political structure. The censuses were carried out every 10 years up to 1951, and every five years since. Because of the constraints of strict privacy laws, the census forms were kept out of the public domain for 90 years; and the current chief statistician, bent on making censuses from 1911 permanently inaccessible at the individual level, did not ease up on his obsessions until threats to take him to court were made. The price paid for this concession was, however, the introduction of a "consent clause" in the current censuses, which will inevitably lead to only part of the originals being made available to our descendants. Thus, beyond 1911, the only information available up to 1971 is based on tabulated data, in which the oldest were all classified as aged 95+, except for the 1911 to 1931 censuses, in which the grouping was temporarily set at 100+. With the introduction of computerization with the 1971 census, single years of age data became available to age 121 (see Annex). But, at the same time, privacy considerations imposed the rounding of figures to the nearest five, making them worthless for the precise observation of extreme ages. Furthermore, quality control problems were clearly present up to the 1990s, and, even today, extreme age declarations are not verified.

Despite these obstacles, we have plotted the progression in the numbers of centenarians by sex during the 20th century in Canada, as provided by the censuses. Numbers for 1901, and for 1941 to 1966, were derived from the number of persons age 95 and over (Figure 1). Numbering fewer than 100 for each sex for the early decades, the number of centenarians rises steadily from 1931 for females, and from 1941 for males. By 1971, their number reached more than 1,000. Disregarding

the data for 1976, which is clearly problematic (Reported numbers are 4,475 centenarians and 1,340 supercentenarians!), the censuses indicate an exponential increase at the annual rate of 6.1% in the number of centenarians for the following 20 years, from 1,075 in 1971, to 3,640 in 1991. The census of 1996 then shows a decrease to 3,120, probably due to the introduction of new data quality controls, and the last census counts 3,795 centenarians, a proportion of 120 per million.

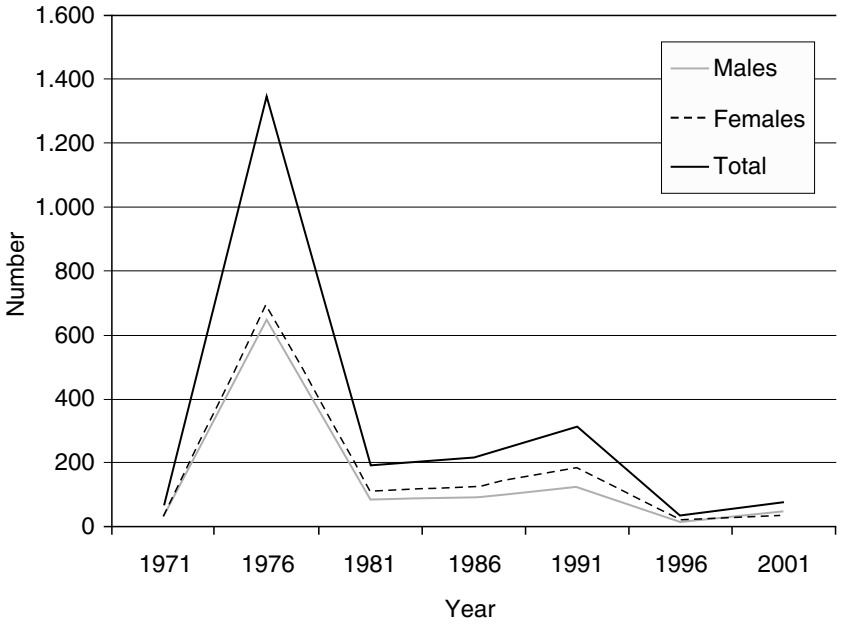


Source: Statistics Canada, Canadian Censuses from 1901 to 2001.

Fig. 1. Population of age 100+, by sex, Canada, Census data from 1901 to 2001

Figures for supercentenarians start in 1971, and, as mentioned earlier, they are rounded for privacy purposes (Figure 2). Even without taking into account the ridiculous numbers of 1976, figures are quite high up to 1991, which shows an improbable number of 310. Numbers that appear to be more realistic are given for 1996, when only 35 persons were listed as having reached the age of 110; and for 2001, when 80 Canadian supercentenarians were counted. But we will later demonstrate that these figures still overstate the real number of supercentenarians, and that only very few people, if any, should have been reported as such starting in the seventies. It is, therefore, important

to understand that census data cannot be counted on to monitor with any precision the rise of the extreme old in Canada.



Source: Statistics Canada, Canadian Censuses from 1971 to 2001.

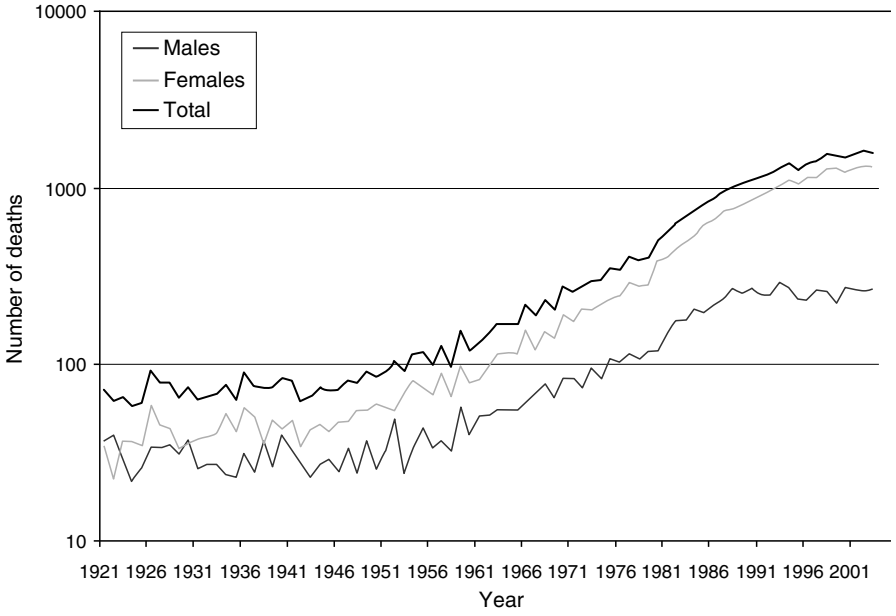
Fig. 2. Population of age 110+, by sex, Canada, Census data from 1971 to 2001

2 The tale of the official statistics: Data on deaths

The Canadian federation was created in 1867 by an initial group of four provinces, to which six others have since been added; the last one in 1949. Under the constitution, all aspects of civil registration fall to the individual provinces, which handle the initial collecting and processing of the data. Since 1921, the central government has produced tabulations from data sent in by the provinces. Data on deaths is thus available in single years of age up to age 100 from 1921 to 1949, and up to age 121 since. However, for reasons those familiar with public administrations will understand, supercentenarians simply disappeared from

the data from 1963 to 1973, with all deaths reported at age 110 and over being coded as being age 109! This distortion of the data notwithstanding, we will explore the question of what this death information, such as it is, tells us about the rise of the very old in Canada.

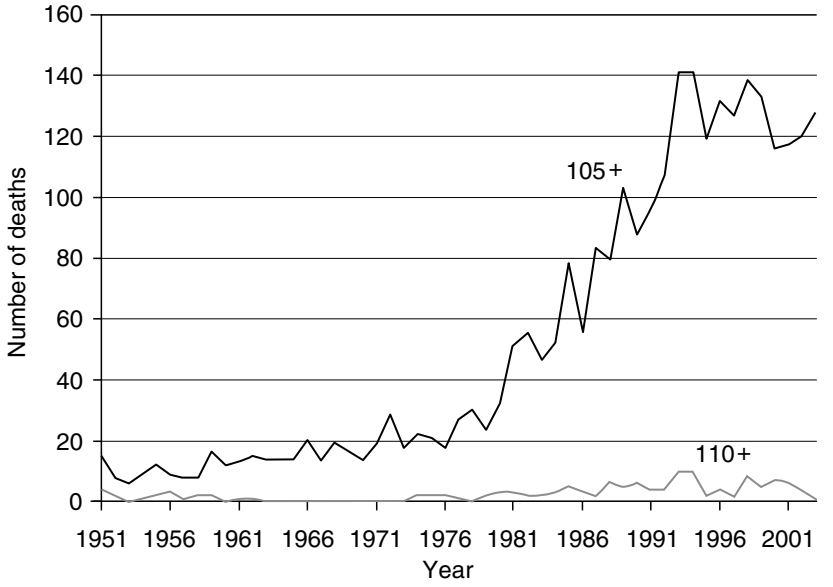
The reported number of deaths of centenarians did not increase significantly from 1921 to the end of the 1940s for either sex, which contradicts the picture given by the census data (Figure 3). It thus seems that the real emergence of centenarians began in the middle of the century, with the number of deaths reaching 151 in 1959, or two times the 1921 count; the next doubling is achieved by 1973, with 301 deaths. But most of the increase took place from 1973 to 2003, when the yearly count reached 1,597 deaths among centenarians, or more than five times the 1973 count. The number of female deaths rose steadily over the period, but the number of deaths of male centenarians leveled off in the 1990s.



Source: Statistics Canada, Vital statistics 1921 to 2003.

Fig. 3. Deaths of centenarians, by sex, Canada, 1921-2003

Focusing on the deaths at ages 105 and over, a sudden surge in the number of reported deaths can be seen starting in the second half of the 1970s (Figure 4). The rise stalls in the 1990s, however, which again points to problems in the older data, with better controls being introduced around 1990 in several provinces. The number of deaths among supercentenarians is very small of course; a better picture is obtained from the detail given in Table 1.



Source: Statistics Canada, Health Statistics Division, unpublished.

Fig. 4. Number of deaths from age 105 and 110, both sexes, Canada, 1951-2003

For the whole period (1951-2003), there are 135 reported deaths among persons aged 110 and over in Canadian vital statistics. For obvious reasons, most of the cases date from after the mid-1970s. There are no cases reported between 1963 and 1973, due to the age limit imposed by the administration, and it is quite reasonable to expect cases occurring before 1963 to be the result of coding mistakes, or of exagger-

Table 1. Reported deaths of supercentenarians, by age and time period, Canada, 1951-2003

Age	Period				
	1951-1962	1963-1973	1974-1989	1990-2003	1951-2003
110	14	0	21	32	67
111	0	0	12	21	33
112	3	0	2	10	15
113	1	0	3	7	11
114	0	0	3	0	3
115	0	0	0	1	1
116	0	0	1	1	2
117	0	0	0	1	1
118	0	0	1	0	1
119	1	0	0	0	1
Total	19	0	43	73	135
Maximum age at death	119	109	118	117	119

Source: Statistics Canada, Health Statistics Division, unpublished data.

ation of age at death. Maximum ages at death point in that direction; it should be noted, however, that a death at 117 did occur in 1998; it is the case of Marie-Louise Chass-Meilleur, who became the world's oldest known individual upon the death of Jeanne Calment, the miraculous French long-liver who died at age 122. Mrs. Chass-Meilleur's age at death was proven correct following a thorough investigation (Desjardins, 1999).

It is impossible to know exactly at the level of each province if and when some kind of validation was performed for these extreme cases. Numbers are obviously too high, especially when one compares them with the numbers for England and Wales: with a population roughly 60% that of England and Wales, Canadian statistics recorded 85 deaths at age 110 or over, compared with 41 for England and Wales for the period 1968 to 1997.

To summarize, four periods can be identified concerning the quality of Canadian data on reported deaths of supercentenarians:

1951-1962: The quality of the data is most suspect, and it is reasonable to think that very few real supercentenarian deaths occurred in Canada.
1963-1973: No deaths were reported over age 109, by administrative decision.

1974-1985: Quality is still to be evaluated outside Quebec.
1986-2003: The quality of the data seems better, but some exaggeration is certainly still present.

Clearly, vital registration data alone cannot used to establish with a sufficient degree of precision the level of extreme survival in Canada. Age validation must be performed to separate the good from the bad in Canadian statistics.

3 About data collection and age validation in Canada

In the absence of a population register, it is impossible to monitor the number of supercentenarians alive at a given moment in the country. Administrative files should contain the information, but the updating of these files is often unreliable in practice; and, in any case, access to detailed versions of these files is unimaginable in the present context of paranoia regarding individual privacy in Canada. Although one might have thought that the mere feat of achieving such longevity would make a person so notorious that cases could be found in their great majority through diverse means–such as through systematic tracking of newspapers and other media–it is evident from our experience that some cases go unnoticed for a variety of reasons (e.g., personal desire for anonymity, discretion of relatives, state of mind or health of the person, etc.). And clearly, as can be seen from the tale of the official statistics, Canadian censuses cannot be used to establish the number of supercentenarians living in Canada: given its current population of 31.5 million inhabitants, only a handful of supercentenarians can be expected to be alive; thus random rounding of the number of cases at each age makes any tabulation at ages 110 and over worthless.

The only possibility of obtaining systematic data on supercentenarians in Canada therefore lies with death registration. Provincial statistical offices do not object to publishing yearly exact numbers of deaths by year of age and sex, but our review of the information currently available has demonstrated they cannot be used as they are. Past data suffers from the fact that they originate from 10 different administrations, each with their own history and traditions, and with 10 different sets of rules and methods varying over time. Given that many cases were suspect, and investigating them would have required going back to the people who had made the initial declaration, collection agencies were slow to adopt controls at the time of data entry because of the costs involved.

Current data collection appears to be better standardized, both in terms of content and quality control. However, structural problems remain due to the characteristics of the country itself. One is that Canada has always been, and still remains, a country of immigration: 28% of the people aged 75 and over in 2001 were born outside the country, and 43% of reported deaths of centenarians during the 1990-1997 period were of foreign-born people. The majority of immigrants up until the 1960s came from European countries, but, as one would expect, many migrated from troubled areas or during difficult times of war or revolution. For example, in an obituary of a reported supercentenarian published in a Montreal newspaper, it was noted that the deceased "never had a birth certificate because he was Jewish, and Jews were not considered important enough to benefit from the care of the Administration." In recent decades, immigration to Canada has become much more diversified, with significant numbers arriving from Asia, Africa, South America, and the West Indies, where the risk of age inexactitude or exaggeration could be greater. Again, a newspaper obituary, that of a prominent member of the Chinese community with many descendants, illustrates the point : the deceased, according to the obituary, "passed peacefully away at the *approximate age* of one hundred and five years." Finally, one can imagine a variety of reasons or circumstances linked to immigration in which age would be unknown, incorrect, or even willfully misstated. For these reasons, there seems to be a strong case not to retain ages at death of the foreign-born which, by definition, can rarely be fully validated, to establish the emergence of supercentenarians in Canada.

But problems are present even if one relies strictly on death registration of the people born in Canada. Civil registration only began late in the 19th century, or even in the 20th century, for all provinces except Quebec (Table 2), and even there, not all events were reported and recorded, as many people and local institutions were suspicious of the government and refused to comply. Church records existed for the preceding periods, but they have no systematic character and are often of poor quality in terms of identifying the persons involved. These possible discrepancies, which may have been exacerbated by the pioneer character of many areas of the country at the turn of the 20th century, mean that a significant number of people born in Canada and dying at very high ages today could be without documentary evidence of their date of birth. Adding the ever present reality that extreme age declarations tend to include errors in any context for various reasons, and the fact that a few inexact ages are sufficient to interfere with the

correct observation of extreme age at death given the small number of cases, it is evident that specific age validation is a prerequisite for the observation of supercentenarians in Canada.

Table 2. Year systematic civil recording of births and deaths began in each of the ten Canadian provinces

Province	Year
Alberta	1898
British Columbia	1872
Manitoba	1882
New Brunswick	1888
Newfoundland	1892
Nova Scotia	1908
Ontario	1869
Prince Edward Island	1906
Quebec	1679
Saskatchewan	1895

Although far from perfect, Canadian birth registration of 110 years ago nonetheless allows age validation. Also, the nominative rolls of the censuses, available up to 1911, represent a good secondary source of information in the absence of birth registration; presently, the 1881, 1901, and 1911 censuses are completely indexed and available online. But no age validation can be envisioned without first knowing the names of the persons whose ages are to be verified. And therein lies the overwhelming problem in Canada: contemporary nominative information in any official document is outside of the public domain, and requires specific permission from privacy protection agencies to be disclosed. For death registration, which is a provincial jurisdiction, 10 different organisms are thus involved. There is no guarantee a request for research purposes will be granted, especially since age validation pretty much requires not only the name of the deceased, but also the names of the parents or spouse, and the place of birth. The largest province in Canada, Ontario, for example, has refused a request for the names and other information on people reported to having died at age 110 or over, seeing no reason to supply such "sensitive" information for the purposes of establishing the exact ages of the persons. Luckily, Quebec's *Commission d'accès à l'information* has granted standing permission to access the information under its jurisdiction; as for the rest of Canada, persistent

efforts have to this day not yielded any results. The information on the emergence of supercentenarians in Canada is thus restricted at this time to the province of Quebec, which, with a population of 7.5 million, represents 23.7% of the Canadian population.

4 The supercentenarians of Quebec

Although civil registration dates back to the 17th century in Quebec, compilation of the information started in 1926, which means that age at death is only available from that date onwards. A list of all declared deaths of supercentenarians from 1926 up to 2004 was obtained, giving for each case, when available, the name of the deceased, the names of his or her parents and spouse, dates of birth and death, and place of birth. The list numbers 25 cases (Table 3). Eight are immigrants (the country of birth was not given in one case); they originated from the USSR, Poland, Romania, Turkey, China and Belgium. These immigrants are excluded outright from any validation effort, leaving 17 names of possible supercentenarians, 13 of whom were born in Quebec. Age at death is obtained from the difference between the date of death

Table 3. Number of reported deaths of supercentenarians in Quebec, 1926-2004, according to sex and to place of birth

	Born in Canada		Born outside Canada	Place of Birth unknown	Total
	In Quebec	Outside Quebec			
Males	4	1	2	0	7
Females	9	3	5	1	18
Total	13	4	7	1	25

and the date of birth, as they appear on the death certificate of the person. Logically, the ideal way to validate the age is by finding the actual birth registration of the person and comparing it to the date on the death certificate. This means forging a link between two documents recorded a century apart, essentially on the basis of the name of the person; this would have been a simple thing to do if births of the 19th century had been indexed across Canada, but several provinces, notably Quebec, have no indexes of births for that period. It is, therefore, often necessary to have more information on the person in order

to search for his or her birth registration. Church parish registers were the official registration in Quebec up until recently; they are readily available on microfilm well into the 20th century. But, because death certificates do not record the exact place of birth of the deceased–only the country or province of birth are required–finding a specific baptism would be impossible if the names of the parents and of the spouse are not available to help pinpoint where in Quebec the person might have been born; since all Quebec marriages up to the 1930s are indexed, it is possible to identify among the hundreds of Quebec parishes the one where the baptism of a child might be found on the basis of the place of marriage of the parents. The possibility of finding births elsewhere in Canada is dependent on many different situations, but Ontario, by far the most important province, is, fortunately, one which has an index.

The result of the examination of the 17 reported deaths of supercentenarians in Quebec is given in Table 4. Seven were proven incorrect; the most recent false case is from 1995, one is from 1991, but all the others are more than 20 years old, which probably reflects that minimum controls were introduced by the registration offices. Ten cases were ultimately recognized as valid deaths of supercentenarians. Because that province had no civil registration at the time of his birth, the validation of a case of a male supercentenarian born in Nova Scotia is based on the 1901 census, which confirms his date of birth to the day. Although eight out the 10 are women, the earliest case is that of a male, who died in 1962. The first confirmed death of a female supercentenarian occurred in 1983, and over eight years elapsed before the next one. Since 1991, they have occurred regularly, probably establishing a pattern that is here to stay. The highest age attained is 112 years, four months, and six days; but a person living in Montreal when these lines were written has just celebrated her 115th birthday and will thus augment this maximum by a significant degree. The 10 died on average at age 110 years and 11 months.

Of course, the emergence of supercentenarians means a growing number of people are reaching ages 105 to 109. A good picture of things to come can thus be obtained from deaths at these ages, limited here for the reasons explained above, to French-Canadians born and deceased in Quebec (Table 5). Although some cases with age mistakes could be included, the overall picture is clear: supercentenarians will appear in greater numbers in the death records of the years to come, as the numbers of people reaching the preceding age group slowly but surely rises. Based on validated deaths, the proportion of deaths at ages 105 and over among all deaths of centenarians is estimated at 7.3%, a propor-

Table 4. List of the reported deaths of supercentenarian deaths in Quebec with date and place of birth, date and age at death and validity status, 1926-2004

Sex	Date of birth	Place of birth	Date of death	Age at death	Valid?
F	1866-07-05	Quebec	1979-06-12	112y,11m	No
F	1867-02-28	Quebec	1980-12-22	113y, 9m	No
F	1867-09-23	Quebec	1978-03-03	110y, 5m	No
F	1883-11-15	Nova Scotia	1995-04-06	111y, 4m	No
M	1862-07-07	Quebec	1974-11-29	112y, 4m	No
M	1881-09-10	Quebec	1991-12-11	110y, 3m	No
M	1859-09-02	Quebec	1978-09-02	118y, 9m	No[3]
F	1879-07-15	USSR	1990-02-11	110y, 7m	xxx
F	1880-04-06	Poland	1993-09-21	113y, 5m	xxx
F	1881-07-05	China	1993-04-14	111y, 9m	xxx
F	1883-09-27	Unknown	1994-07-23	110y, 9m	xxx
F	1885-02-07	Belgium	1995-08-10	110y, 6m	xxx
F	1890-00-00	Romania	2001-10-23	111y, 0m	xxx
M	1875-03-10	USSR	1988-11-03	113y, 7m	xxx
M	1875-05-01	Turkey	1985-12-01	110y, 7m	xxx
F	1872-09-06	Quebec	1983-02-18	110y, 5m	Yes
F	1880-06-08	Ontario	1991-12-09	111y, 6m	Yes
F	1882-01-31	Quebec	1993-07-29	111y, 5m	Yes
F	1885-11-10	Quebec	1996-01-28	110y, 2m	Yes
F	1887-03-15	Quebec	1998-10-24	111y, 7m	Yes
F	1889-04-12	Quebec	2001-08-18	112y, 4m	Yes
F	1889-09-08	New Brunswick	2000-02-29	110y, 5m	Yes
F	1892-03-20	Quebec	2002-09-30	110y, 6m	Yes
M	1852-02-26	Quebec	1962-03-16	110y, 0m	Yes
M	1884-06-24	Nova Scotia	1994-07-22	110y, 1m	Yes

tion that exceeds the expected value of about 5% in countries with very good data.

As explained earlier, the 25 cases from Quebec, of which 17 could be examined, represent the only systematic observation of supercentenarian deaths available at this time for Canada. However, several other cases were brought to our attention through media coverage, of which about a dozen appeared quite credible. The list is given in Table 6. It includes the case of Marie-Louise Chassé-Meilleur, a Quebec-born woman

[3] Actually, no record whatsoever could be found that matched the information on the death certificate; given the very high improbability of a male reaching age 118 in 1978, it was considered to be non-valid outright.

Table 5. Deaths at age 105 to 109 by year of age, by sex and year, Quebec, 1985-2004

	Female						Male					
Year	Age					Total	Age					Total
	105	106	107	108	109		105	106	107	108	109	
1985	4		2			6			1			1
1986		1				1		1				1
1987	3	2	1			6	1					1
1988	3	1				4						0
1989	4	1				5	2		1			3
1990	2	2	1			5						0
1991	3		2	1	2	8	1					1
1992	3					3	1	1				2
1993	3		1	2	1	7	1	1		1		3
1994	7	5	1			13	2		1			3
1995	5	3	1	1		10		1				1
1996	3	3	2	1		9				1		1
1997	8	2	2		1	13			2			2
1998	7	2	2	1		12		1	1			2
1999	7	6	2	1		16	2	3				5
2000	6	4	4	1		15	1					1
2001	5	4	3	1		13	1	1			1	3
2002	9	3	1			13		1				1
2003	6	8	1	3	1	19	1	1	1			3
2004	7	7	4	1	2	21	2					2
Total	95	54	30	13	7	199	15	11	7	2	1	36

who died in Ontario at the age of 117, making her at the time of her death the oldest known living person in the world; she holds today the fourth-place ranking among the perfectly validated cases of extreme longevity. Eleven confirmed Canadian deaths of supercentenarians are added; they were validated using birth indexes or census returns of 1901. Being known through media coverage, they are most probably biased towards higher ages. Even if we set aside the exceptional case of Marie-Louise Chassé-Meilleur, they indeed died on average a good four months older than the Quebec cases.

Table 6. List of some validated supercentenarian deaths outside Quebec

Sex	Date of birth	Place of birth	Date of death	Place at death	Age at death
F	1890-09-11	New Brunswick	2002-03-19	New Brunswick	111y, 6m
F	1888-03-28	Ontario	2001-08-06	Ontario	113y, 4m
F	1890-09-05	Nova Scotia	2000-09-16	Nova Scotia	110y, 0m
F	1880-08-29	Quebec	1998-04-16	Ontario	117y, 7m
M	1881-11-17	England	1993-04-12	British Columbia	111y, 4m
F	1879-08-24	Ontario	1993-03-20	Ontario	113y, 7m
F	1878-10-21	Ontario	1989-11-27	Ontario	111y, 1m
F	1878-11-10	Nova Scotia	1989-04-20	Nova Scotia	110y, 5m
F	1878-11-16	Nova Scotia	1988-12-29	Nova Scotia	110y, 1m
F	1877-01-17	Ontario	1988-12-17	Alberta	111y,11m
F	1891-02-27	New Brunswick	2002-03-19	New Brunswick	113y, 9m

5 Conclusion

The observation of supercentenarians in Canada is to be divided into two worlds. In Quebec, observation is systematic from death registration starting in 1926 up to 2004, and new cases will continue to be reported and validated. Each case is known by sex, name, and place of birth, although names cannot be published for privacy reasons, with the exception of cases of exceptional notoriety, which are in the public domain anyway. For the rest of Canada, only numbers of uncertain quality are systematically available. There exists a very partial list of names of which a proportion have been validated; the list carries an ascertainment bias.

Of the 25 reported cases from Quebec, 10 are known to be true supercentenarians. Another 11 cases are known from the rest of Canada, a number which must be augmented to reflect the true Canadian reality. Concerted efforts will be made to obtain a comprehensive list from the province of Ontario to that effect. As things stand today, 1962 has to be considered as the year of the first occurrence of a supercentenarian death in Canada. This date might be pushed back if systematic data from other provinces becomes available.

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