Supercentenarians in the Nordic Countries

Axel Skytthe[1], Antti Hervonen[2], Celvin Ruisdael[3], and Bernard Jeune[4]

[1] Epidemiology Institute of Public Health, University of Southern Denmark, J. B. Winsløws Vej 9B, 5000 Odense C. E-Mail: askytthe@health.sdu.dk
[2] University of Tampere, School of Public, Health Laboratory of Gerontology, University of Tampere, 33014 Tampere, Finland. E-Mail: antti.Hervonen@uta.fi
[3] Kong Carls Gate 30, 4010 Stavanger, Norway. E-Mail: celvin@c2i.net
[4] Epidemiology Institute of Public Health, University of Southern Denmark, J. B. Winsløws Vej 9B, 5000 Odense C. E-Mail: bjeune@health.sdu.dk

Abstract. The Nordic countries have a well-developed system of population registration that goes back several hundred years, making it possible to verify individuals with extreme ages. In this chapter, we briefly describe the history of population registration and procedures for registration of births and deaths in Denmark, Finland, Norway, and Sweden. Historically, the church has played a central part in the registration of births and deaths in all countries, and national population registers have emerged in all countries in the second half of the 20th century. Based on statistical reports from the national statistical offices, the movement in the numbers of extremely long-lived individuals, like centenarians and supercentenarians (aged 110 years and above) can be followed. However, in order to accurately describe this development, we must first verify the ages of extremely long-lived individuals. It is, therefore, imperative that we are able to identify the persons in question. For research purposes, identification of these very long-lived persons is possible from the population registers. We report basic data on the supercentenarians identified in the four Nordic countries since 1980, together with verification status. In addition, we provide an example that illustrates the importance of being able to identify the individuals.

1 Introduction

Humans reaching extreme old age have fascinated society for the last couple of centuries, and a number of men who lived several hundred years ago became famous for allegedly attaining very high ages. One

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example is the sailor Christian Drakenberg, who is said to have reached the age of 144/146 before dying in 1787. His life was so exceptional that a contemporary writer wrote a biography of him. Nobody at that time questioned his age, or that of other legendary figures with very long lives, but, about a century later, Thoms proposed that a number of criteria should be fulfilled before someone could claim to have attained an exceptionally high age (Thoms 1873). The legend of Drakenberg has not survived the rigorous examination of his life; information provided in his biography allowed claims about his age to be tested, and it was subsequently shown that several events of his life had been falsified (Ørberg 1972).

In order to study extreme old age, it is of vital importance that the ages of the persons studied are trustworthy. This means that tools and ways of validation must be available to the researcher. It is a question of collecting information needed to verify not only the age, but also the identity, of the person, and a key source for this information is the population registration and the registration of demographic events. Drakenberg is an example of a person whose alleged age could be checked through historical documents and registration of demographic events. The Nordic countries offer excellent options for checking and validating the extreme age of a person. In this chapter, we describe these options in Denmark, Finland, Norway, and Sweden; all countries where at least one person has reached the age of 110. No person from Iceland has yet reached the age of 110, and therefore we do not include Iceland in this chapter. In addition, we provide an overview of the increase in the number of centenarians and supercentenarians in these countries. Finally, basic information on the Nordic supercentenarians of the 20th century is presented.

2 Population registration

The population registration procedures in the Nordic countries share several features, as the development of the registration systems in each of these countries has more or less followed the same track. There are historical reasons for the parallel development in Sweden and Finland, since Finland was part of the Swedish kingdom until 1809, when Finland came under Russian control. However the central administration and administrative procedures from the time of Swedish sovereignty were maintained, even after 1917, when Finland proclaimed its independence.

Similarly, since the 15th century, the Danish king was also the king of Norway. This had a significant impact on Norwegian legislation, and Danish civil servants dominated the administration, both centrally and locally, in the following centuries. In 1814, Denmark was forced to relinquish its sovereignty over Norway, with Norway becoming a part of the Swedish-Norwegian Union. As was the case in Finland, the civil administration remained nearly unchanged from the Danish period. Norway gained independence in 1905.

There are two main traditions for civil administration, and, thereby, registration of the population and changes in the population (i.e, demographic events) in the Nordic area: The Swedish and the Danish. But there are also similarities: both traditions are centered around the church due to the importance of the church in even the most remote parts of the Nordic region at the time of the introduction of population registration.

Population registration in Denmark can be dated back to the 16th century, when the first regular recordings of births, marriages, and deaths took place in some areas (Johansen 2002). Regular parish registers became the norm across Denmark as a result of a missive in 1645 from the Danish king to the Bishop of Zealand. Later, in 1683, the Danish Law of King Christian V included paragraphs of significance for population registration. The law stated that the duties of the vicar in a parish included keeping a book with the names of those who had been born, had died, or were married, along with the dates of these events. The duties were given a more explicit formulation in 1685 in an ecclesiastical law for Denmark and Norway. However, the guidelines for the exact content were rather vague, which resulted in a heterogeneous structure of the registers. From 1812, new and clearer instructions on the content of the parish registers resulted in a much more strict layout, with the introduction of separate sections for births, confirmations of baptism, marriages, and deaths. This basic structure of the parish registers has, with minor modifications, remained unchanged until today. One exception is that, until the end of the 19th century, the parish registers also included lists of migrations, although only a part of the population had to report their migration.

By 1924, a new municipal population registration system was established parallel to the parish registers. The purpose of the municipal population register was to register relevant demographic information, including the address of each inhabitant in the municipality and any changes in the population (births, deaths, migration, etc.), thereby keeping an updated list of all inhabitants in the municipality. The man-

ually kept population registers in the municipalities were replaced in 1968 by the National Civil Registration System (CRS), a computerized central population register comprising all persons who were alive as of April 2, 1968, or who were born after that date, and who had residence in Denmark. At the same time, the 10-digit personal identification number (PIN) was introduced, and the PIN is used in all public administration on the individual level. Despite the introduction of this system, the key institution for registration of demographic events in Denmark remains the vicar in the local parish. Every birth and death is to be reported to the local vicar, who then informs the CRS.

As a supplement to information collected by these constantly updated parish registers, national censuses have been used to enumerate the total population every five or 10 years since 1840, with a few earlier censuses having been conducted at irregular intervals since the first one was taken in 1769. The information collected in these early censuses was centered on households, and included data on address, name, age/date of birth, sex, marital status, occupation, relation within a household, and, since 1845, place of birth. Since 1971, the traditional paper-based census has been replaced by yearly computer-generated censuses based on the information available in the CRS.

In Norway, the earliest parish registers date from around 1640. The structure of the parish registers and the instructions on how to maintain them were mainly the same as in Denmark until the middle of the 19th century. Only minor changes were introduced subsequently; e.g., lists of vaccinations were added in 1820, and special lists for people who did not belong to the Norwegian Church were introduced in 1858. As in Denmark, it was the responsibility of the vicar to register all births and deaths in the parish, irrespective of the religious beliefs of the residents. There was also a requirement that migrations be registered, but not all residents followed the rules, so the lists are not complete. Until the beginning of the 20th century, the parish registers served as a kind of population register, but with a low degree of accuracy with respect to migration.

Although civil birth registration was introduced in 1916, it was still in the hands of the vicars of the parishes to keep and maintain the birth registers, and they had to report the data relating to births to the Norwegian Statistical Bureau. The Bureau received reports regularly from the vicars of the Norwegian State Church, but reports were often lacking from the heads of local religious communities that dissented from the State Church, especially as these were often located in very remote areas of Norway. The accuracy and reliability of the population

statistics must, therefore, be viewed cautiously until after the Second World War (Soltvedt, 2004).

Population registers were established locally on a voluntary basis in 1905 with the introduction of the Kristiania (now Oslo) population register, followed by the Bergen population register in 1911. Population registers were established in the most densely populated areas. However, only half of the population were registered in local population registers around 1940. From 1946, it became compulsory for each municipality to establish a population register. In 1964, the state took over the responsibility for population registration with the establishment of the national population register (DSP) under Statistics Norway. In 1991, DSP was transferred to the taxation department (Soltvedt, 2004).

In Sweden (and Finland), the introduction of population registration took place at almost the same time as in Denmark and Norway, and followed more or less the same track, with one important addition. From 1686, it was compulsory for each parish to keep registers on births, deaths, migrations, marriages, and divorces. In addition to these traditional registers, a special register was introduced to keep track of literacy, understanding of the Bible, and other matters of interest to the clergy. This special register, the "Husförhörslängden," became a population register that contained information on all persons living in the parish, including names and dates of birth. It was centered on the households, and all demographic events related to members of a household were registered. Thus, the Husförhörslängden could be used to ascertain the actual population of a parish at any given time, provided the vicars were making the required updates (Lundström 1995). The parish registers formed the bases for the compilation of population statistics when the Swedish statistical office was established in 1749. As the interest in population matters increased during the 18th and 19th centuries, the quality of the registers gradually improved; and, from 1860, strict quality controls were carried out by Statistics Sweden, the agency that compiled the population statistics based on copies of all parish registers. The church remained responsible for the basic collection of demographic data until 1991, when the local tax offices took over the task. A computerized central population register was introduced in 1967 based on the 10-digit personal identification number, which had been in use since 1947 in Sweden.

The existence of the central population registers in the Nordic countries makes it possible to follow individuals from day to day, and, with the additional data that is often stored in the registers about relatives and historical data, the validation of extreme ages is possible. Diffi-

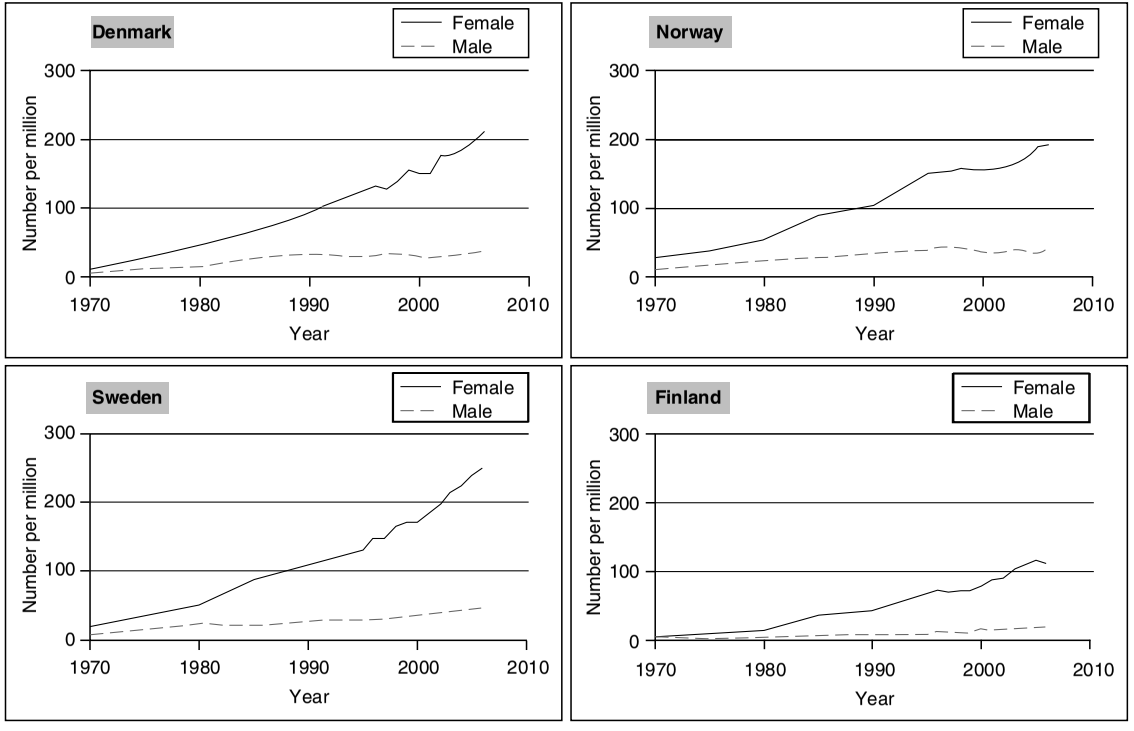
culties may arise, however, from different laws in the Nordic countries regarding the protection of privacy. The national statistical offices may publish tables of the age structure of the population, but the validation of the highest ages depends on the ability to identify the person in question. Identification is possible in Denmark, Finland, and Sweden, but not in Norway, where researchers must rely on newspaper notices that name the person.

3 Emergence of supercentenarians in the Nordic countries

Although several claims for reaching the age of 110 or more in the 18th and 19th centuries have been published, we will restrict this discussion to the 20th century, since the earlier claims cannot be verified using the criteria commonly accepted among researchers.

Through the second half of the 20th century, the number of centenarians increased tremendously in all industrialized countries. The centenarian age group is the fastest growing segment of the population (Kannisto 1997). In Figure 1, the number of centenarians per million inhabitants in the four Nordic countries is shown for the last 30 years. An almost exponential increase is observed for women in most countries: the figure reported in 2000 of about 150 centenarian women per million women is five to ten times that of 1970. For men, however, the increase has been slower than for women. The sex ratio among centenarians has actually increased during the 30-year period, from about three women to each man in 1970, to about five women for each man in 2000.

The increasing number of centenarians also improves the chances of reaching remarkably high ages, such as 105 and 110 years. This is illustrated by Figure 2, which shows the number of people reaching the age of 105 in the Nordic countries since 1940. But the actual number of people reaching age 105 is rather low compared to the number of centenarians; in the period shown, fewer than 75 individuals reached age 105 in any year in the four Nordic countries taken together. Kannisto (1997) has calculated the chances of surviving from age 100 to age 110 in different periods for male and female centenarians, respectively; based on data from the most recent period (1980-1990), it has been estimated that fewer than one out of 1,000 male centenarians will reach age 110, while about 2.1 out of 1,000 female centenarians will celebrate their 110th birthdays.



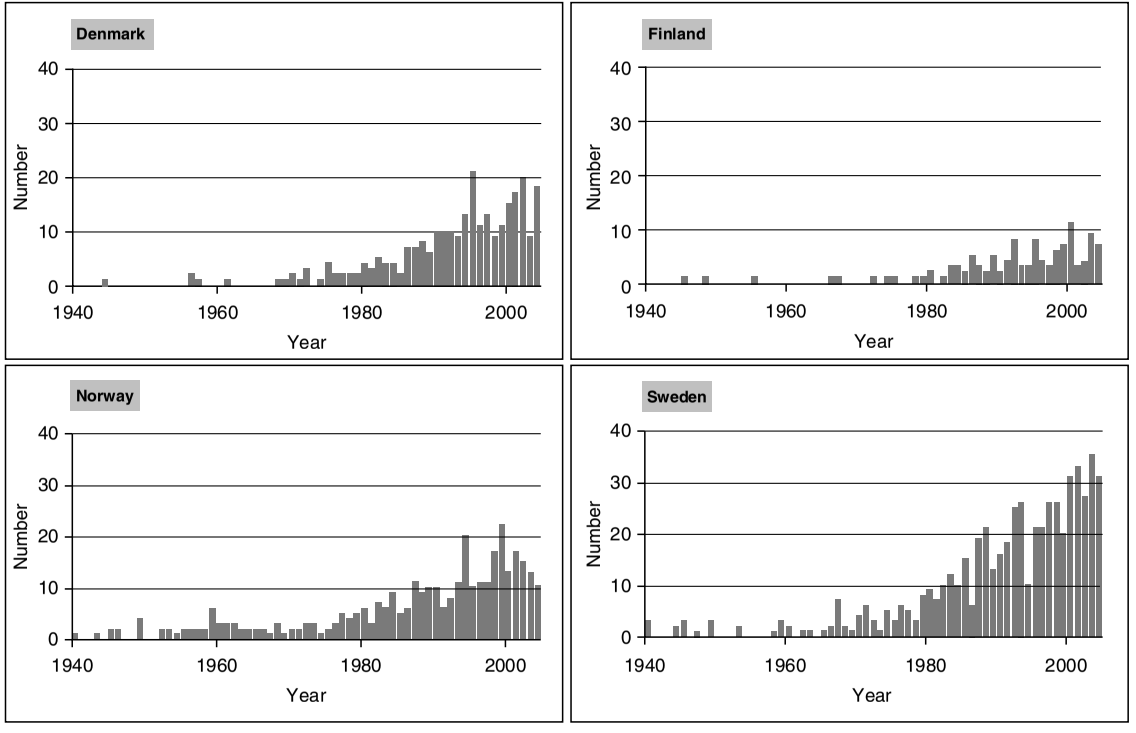
Source: National statistical offices

Fig. 1. Number of centenarians per million inhabitants in each of the four Nordic countries

Every year, the national statistical offices in Scandinavia publish the number of people alive as of January 1 for each single age. These tables can be found online (for links, see the end of the chapter). From these statistics, it is possible to calculate the population dynamics based on the extinct cohort method (Vincent 1951). One assumption for using the method is that there is no migration for the cohorts under study, and this is normally the case in studies of centenarian populations. However, the increasing migration, especially of people from countries with fragmentary or no population registration systems, poses new problems when using the yearly published data from the statistical offices in the study of supercentenarian, and centenarian, demography. For example, two female immigrants from countries with less rigorous systems of population registration were registered as supercentenarians in the Swedish data, one in 1998, and the other in 2001. Another immigrant case from Finland is Andrei Kuznetsov ("Father Akaki"), who was born in Poland and died at the age of 110 years and 106 days in 1984. Such cases will be extremely hard to validate, and, until proven, they will not appear on the list of supercentenarians.

In rare cases, irregularities can be resolved, as an example drawn from official data released by Statistics Norway demonstrates. According to the data for January 1, 1987, a 111-year old-man had turned up out of nowhere. Normally, such a person would have appeared in the data from the year before, but as one year younger. In this case, however, there was no mention of a man in the previous year who was one or two years younger. The data point for this 111-year-old man would have been treated as an error in the statistics, had it not been possible to check this special case. The man in question turned out to be a Norwegian-born emigrant, Herman Smith-Johannsen, who had lived in Canada for many years. For some reason, he traveled to Norway to visit relatives at the end of 1986, and the Norwegian civil authorities registered his visit. Since he was in the country on January 1, 1987, he ended up in the population statistics as the oldest man ever in Norway! Apparently, supercentenarians travel just like other people! Smith-Johannsen died shortly after January 1, 1987, at the age of 111.

Supercentenarians did not emerge in the Nordic countries until the 1980s, based on verified cases (see discussion that follows). Table 1 lists the numbers of supercentenarians in the Nordic countries as of January 1 of each year since 1984. A more accurate picture can be obtained by taking into account the actual dates of birth and death of individual supercentenarians. This is done in Figure 3, which shows in detail the numbers of supercentenarians in Denmark, Finland, Norway,



Source: Kannisto Thatcher Database

Fig. 2. Number of persons reaching age 105 years each year since 1940 in the Nordic countries

and Sweden since 1984. The first supercentenarian to be registered, in October 1984, was a Norwegian-born woman living in Sweden (see Table 2). During most of the 1980s, one (and for short periods, two) supercentenarian was alive, but from 1990 to 1992 no supercentenarian was living in the Nordic countries. With the exception of two periods of a couple of weeks' duration, at least one person aged 110 has been living in one of the Nordic countries since January 1997.

Table 1. Number of living supercentenarians in the Nordic countries as of January 1 of each year since 1984. Each letter represents one supercentenarian. D = Denmark, F = Finland, N = Norway, S = Sweden

January 1, Year	Number	January 1, Year	Number
1984		1997	NN
1985	S	1998	FNN
1986	S	1999	FNSS
1987	NN	2000	DFNS
1988	N	2001	NS
1989	FNN	2002	S
1990		2003	NSS
1991		2004	N
1992		2005	F
1993	S	2006	S
1994	S	2007	F
1995	D	2008	S
1996	DN		

Note: An additional two Norwegian, three Swedish and one Finnish supercentenarians died within the same year they turned 110 years.

A list of all known supercentenarians who were born, lived, and died in the Nordic countries since 1950 is given in Table 2. Age verification has been performed on three different levels, which are defined as follows. Level A corresponds to the highest level, which requires full official documentation of birth registration (transcription of birth registration), death registration (either death certificate or other official death registration), knowledge of family members (siblings, parents), and at least one registration at a time other than birth and death. Level B corresponds to the medium level, which requires documentation of birth registration (transcription of birth registration) and death registration (either death certificate or other official death registration). Finally, level C corresponds to the lowest level, which is used when

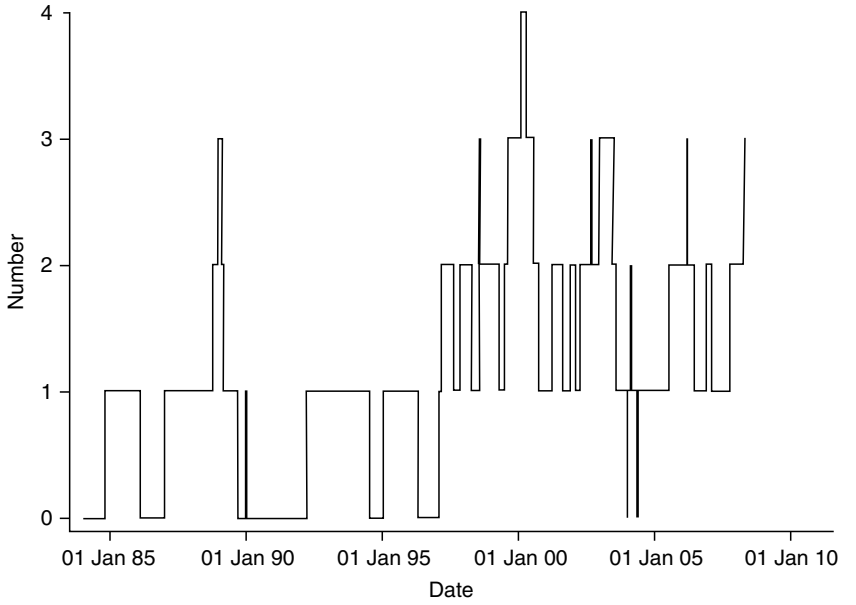


Fig. 3. Emergence of Nordic supercentenarians based on dates. Only supercentenarians with known dates of birth and death are included

the date of birth and date of death are known from the media but are not documented, and the existence of a person with the given age is consistent with data from the national statistical offices.

In addition to the supercentenarians mentioned in Table 2, a Norwegian man aged 111 years appeared on the official list from Statistics Norway on January 1, 1999, but not on the list for the following year, indicating his death in 1999. Similarly, a woman aged 110 years was on the list on January 1, 2001. However, both these cases appear to be false. A possible explanation is a failure to report migration to the population register, and a subsequent lack of follow-up from the population register. The woman mentioned above was born on November 2, 1890, in Denmark, and lived for a time in Oslo. She was registered as having immigrated to Norway from Denmark on July 1, 1974. According to the last entry in the population register, she moved to an unknown location on October 17, 2001. Since she came from Denmark in 1974, it was possible to find her entry in the Danish population register in 1974, when she moved to Oslo. Additional entries were also found: she was married to a Danish man in 1967, and had an address in Denmark from August 1973, but there was no mention of her departure for Norway in

Table 2. Supercentenarians in the Nordic countries as of February 18, 2008. When the country of birth differs from the country of death, the same person may be listed in both countries. Males are indicated by an asterisk. Level corresponds to the verification level (see text)

Name	Date of birth	Date of death	Age (days)	Level
Denmark				
Anne Cathrine Matthiesen	November 26, 1884	March 19, 1996	111 (114)	A
Karen Marie Jespersen	May 5, 1889	August 4, 2000	111 (91)	A
Johanne Svensson	January 24, 1892	May 29, 2003 (S)	111 (125)	B
Finland				
Fanny Matilda Nyström	September 30, 1878	August 31, 1989	110 (335)	B
Lempi Maria Rothovius	October 2, 1887	June 17, 2000	112 (259)	B
Hilda Häkkinen	March 18, 1894	December 31, 2005	111 (288)	C
Anna Hagman	December 27, 1895	April 18, 2006	110 (112)	C
Elsa Tilkanen	September 26, 1896	December 5, 2006	110 (70)	C
Aarne Armas Arvonen*	August 4, 1897			C
Norway				
Wilhelmine Sande	October 24, 1874	January 21, 1986 (S)	111 (89)	C
Maren Bolette Torp	December 21, 1876	February 20, 1989	112 (61)	C
Kristianna Ullaland	December 2, 1878	January 26, 1989	110 (55)	C
Åsne Hustveit	December 2, 1879	December 7, 1989	110 (5)	C
Laura Hansine Svehaug	December 19, 1886	March 6, 1998	111 (107)	C
Karen Svisdal	December 16, 1889	February 23, 2000	110 (59)	C
Olav Hovatn*	October 23, 1892	April 26, 2003	110 (185)	B
Harriet Holm	November 13, 1893	December 22, 2003	110 (39)	C
Borghild Marie Nilsen	December 2, 1893	March 3, 2004	110 (92)	C
Sweden				
Wilhelmine Sande	October 24, 1874 (N)	January 21, 1986	111 (89)	C
Hulda Beata Johansson	February 24, 1882	June 9, 1994	112 (105)	C
Ellen Johansson	January 23, 1887	July 6, 1997	110 (164)	C
Hilda Grahn	June 10, 1888	June 24, 1998	110 (14)	C
Teresia Lindahl	June 10, 1888	March 2, 1999	110 (265)	C
Elsa Moberg	June 30, 1889	November 27, 2001	112 (143)	C
Hanna Erikson	February 26, 1891	June 26, 2001	110 (120)	C
Jenny Karlsson	October 17, 1891	July 13, 2002	110 (269)	C
Johanne Svensson	January 24, 1892 (DK)	May 29, 2003	111 (125)	B
Anders Engberg*	July 1, 1892	November 6, 2003	111 (128)	C
Astrid Elin Zachrison	May 15, 1895			C
Hulda Carlsson	February 2, 1898			C

July 1974. However, she was registered as dead in Copenhagen on May 8, 1975, and her death was verified by an entry in the death register in the church book with data consistent with those from Norway. Similar problems have been found among a small, but significant, number of cases of supposed centenarians from Norway.

Another very special case that we have chosen not to include in the list due to incomplete verification is a woman from Finland, Maria Andersson, who died in 1946 at the age of 117 years. According to available information, she was born on December 24, 1828, in the town of Viipuri, Finland, and died on August 24, 1946. She was known and celebrated as the oldest inhabitant of Helsinki in the years 1930-1946. Her exceptionally high age also demands an exceptionally high level of verification in order to be accepted, requiring birth and death registra-

tion and very good information about her family. Unfortunately, the archives that included birth registrations in Viipuri were lost during World War II, so no formal verification of her birth is possible. The evidence for her having been born in 1828 is a note in the family Bible that her mother kept. Currently, we are searching for additional data to support or reject her as the oldest person from the Nordic countries.

Since 1984, 28 Nordic supercentenarians have emerged. The women dominate the list, with only three men appearing alongside 25 women. A further four known supercentenarians are of Nordic origin. Two Norwegian-born women reached 110 years of age in the United States in 2003 and 2004; the two remaining supercentenarians are males, and one has been mentioned above. The other man is the Danish-born Chris Mortensen, who also appears to be the oldest man ever in the world (Wilmoth et al., 1996). Although he emigrated to the U.S. in the beginning of the 20th century and lived there until his death in 1998, his age is extremely well-documented. This was partly due to the existing parish records in Denmark, which documented his birth and his family relationships, but the ability to conduct personal interviews with Mortensen gave an unusual and important opportunity to obtain evidence for Mortensen's age and identity. During these interviews, Mortensen talked about his family and incidents from his childhood and youth, which could subsequently be verified in Denmark (Skytthe et al., 1999).

The oldest Nordic woman is the Swedish supercentenarian Astrid Zachrison, who is still alive as of February 18, 2008, at the age of 112 years and 279 days. The oldest persons from Finland and Norway are Lempi Maria Rothovius, who reached the age of 112 years and 259 days, and Maren Bolette Torp, who died at the age of 112 years and 61 days. Only three men have reached 110 years of age, and Anders Engberg from Sweden is the oldest man, having died at the age of 111 years and 128 days. Only three supercentenarians are alive as of February 18, 2008, two in Sweden and one in Finland.

Although the population registration systems are well established and can be regarded as highly reliable in the Nordic countries, verification at the highest level has not yet been attained for all supercentenarians. However, all the supercentenarians listed in Table 2 are credible to the extent that they correspond to the numbers given by official statistics, and they have been submitted to the IDL database. Work is in progress verifying all persons to at least level B, but this is a time-consuming process, and not all information may be available publicly.

Links to the national statistical offices

Denmark:	`www.dst.dk`
	`www.statistikbanken.dk`
Finland:	`www.stat.fi`
Norway:	`www.ssb.no`
Sweden:	`www.scb.se`

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