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Suicide mortality trends in the Nordic countries 1980–2009

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Background and aim: The Nordic countries provide a suitable setting for comparing trends in suicide mortality. The aim of this report is to compare suicide trends by age, gender, region and methods in Denmark, Finland, Iceland, Norway and Sweden 1980–2009. **Methods:** Suicide statistics 1980–2009 were analyzed for men and women aged 15 years and above and the age group 15–24 years. Regional suicide rates in 2009 were presented in maps. **Results:** The suicide rates across the Nordic countries declined from 25–50 per 100,000 in 1980 to 20–36 in 2009 for men and from 9–26 in 1980 to 8–11 in 2009 for women. The rates in Finland were consistently higher than those of the other countries. A significant increase of suicides in young women in Finland and Norway and a lack of a decline among young women in Sweden were noted. The male–female ratio of suicide converged to approximately 3:1 across the region during the study period. Rural areas in Finland, Norway and Sweden saw the highest suicide rates, whereas the rates in the capital regions of Denmark, Norway and Sweden were lower than the respective national rates. **Conclusions:** We hold that the overall decline of suicide rates in the Nordic countries reflects the socio-economic development and stability of the region, including the well-functioning healthcare. The increasing rates in Finland and Norway and the unchanged rate in Sweden of suicide in young women are an alarming trend break that calls for continued monitoring.

• *Nordic countries, Social factors, Suicide, Suicide in the young, Young women*

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Suicide is an important public health problem and one of the leading causes of death in young people around the world (1–3). In the five Nordic countries, Denmark, Finland, Iceland, Norway and Sweden, suicide is the second most common cause of death in the age group 15–24 years, except for Finnish women among whom it is the first (4).

In 2009, the populations of these countries were: Denmark, 5.5 million; Finland, 5.3 million; Iceland, 0.3 million; Norway, 4.8 million; and Sweden, 9.3 million (5). As part of their social welfare model, they have comparable, tax-funded healthcare systems that are accessible to all citizens and permanent residents. In all five countries, suicide has been targeted in national prevention action plans: Finland, 1991 (6), Norway, 1994 (7), Sweden, 1995/2008 (8, 9), Denmark, 1998 (10) and Iceland, 2003 (11). The well-regulated and transparent economic, social and political conditions of the Nordic region

provide a basis for a benchmarking exercise comparing trends in suicide mortality between its countries.

Aims

The first aim of this paper is to describe the trends in suicide rates among men and women in the Nordic countries 1980 to 2009 in the adult population (15 years and above) and in the age group 15–24 years. A second aim is to investigate the regional distribution of suicide and the patterns of suicide methods.

Methods

Annual figures of suicide 1980–2009 for both genders, ages 15 years and above and 15–24 years, were collected from the national cause-of-death registers in the five countries. In all of them, unnatural causes of death are determined by appointed medical doctors. There was

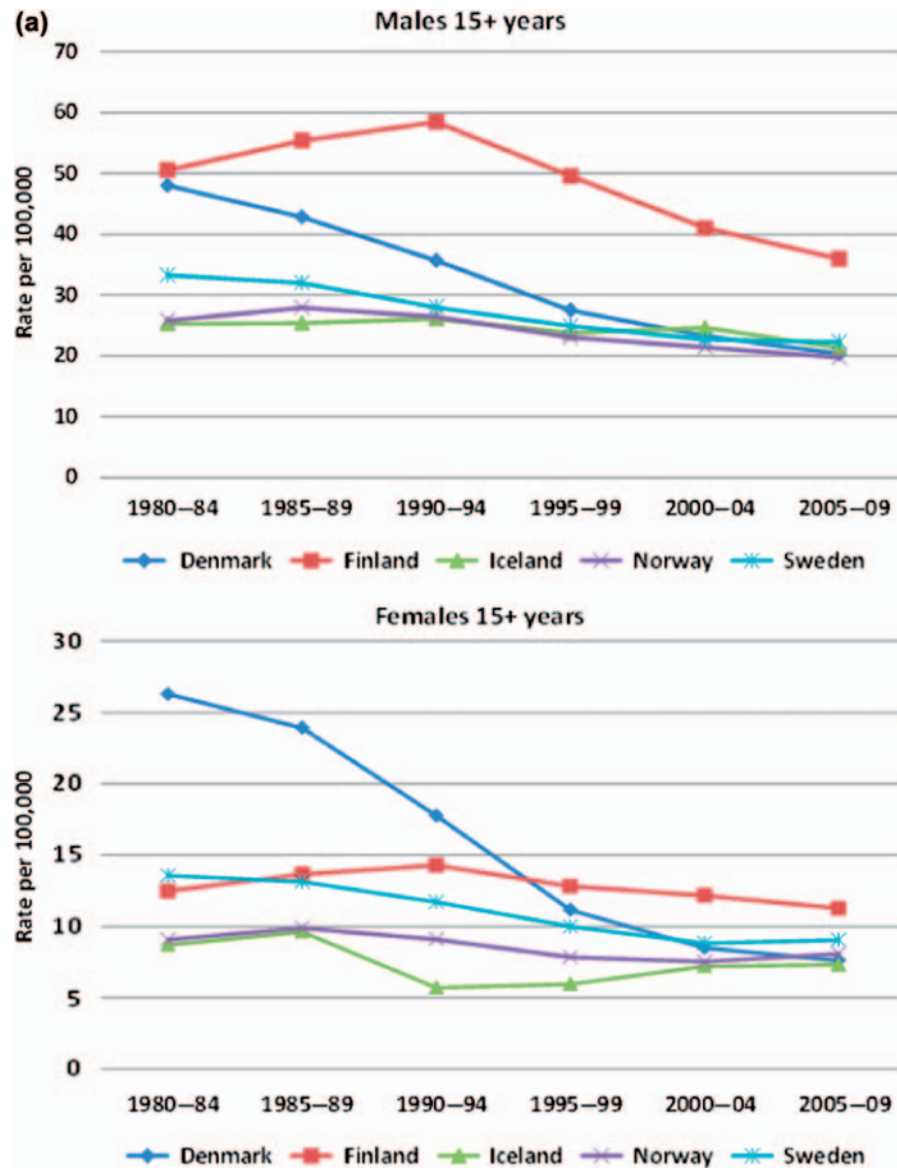


Fig. 1. (a) Suicide rates per 100,000 (5-year averages) in the Nordic countries during 1980–2009, ages 15 years and above; (b) suicide rates per 100,000 (5-year averages) in the Nordic countries during 1980–2009, ages 15–24 years.

no major change of the practice of ascertaining suicide during the examined period.

Causes of death were documented according to the 8th, 9th and 10th revisions of the *International Statistical Classification of Diseases and Related Health Problems* (ICD). In ICD-8 and ICD-9, “suicide” included suicide and self-inflicted injury (E950–E959). In ICD-10, suicide is defined as intentional lethal self-harm or a sequel thereof (X60–X84, Y87.0).

Based on the ICD-10 codes, the documented suicide methods for 2009 were divided into the following categories: poisoning (X60–X69), hanging (X70), firearms (X72–X74), drowning (X71), jumping from a high place (X80), moving object (X81–X82), the use of sharp objects (X78) and other methods (X75–X77, X79, X83–X84, Y87.0).

Suicide rates were calculated as the number of suicides divided by the mean population in the same age range in each year. Rates and percentile distributions were calculated separately for men and women. Regional suicide rates in the adult population of the five countries in 2009 were illustrated on maps retrieved from the Nordic Centre for Spatial Development (Nordregio). Five levels of suicide rates are applied (the levels for men were <20.0, 20.0–25.0, 25.0–30.0, 30.0–35.0 and >35.0 suicides per 100,000; the levels for women were <5.0, 5.0–7.5, 7.5–10.0, 10.0–12.5 and >12.5).

Trends in suicide rates over time were tested using univariate linear regression analysis by gender and country. Single calendar-year increments were the independent variable. *T*-tests and two-tailed *P*-values were applied to

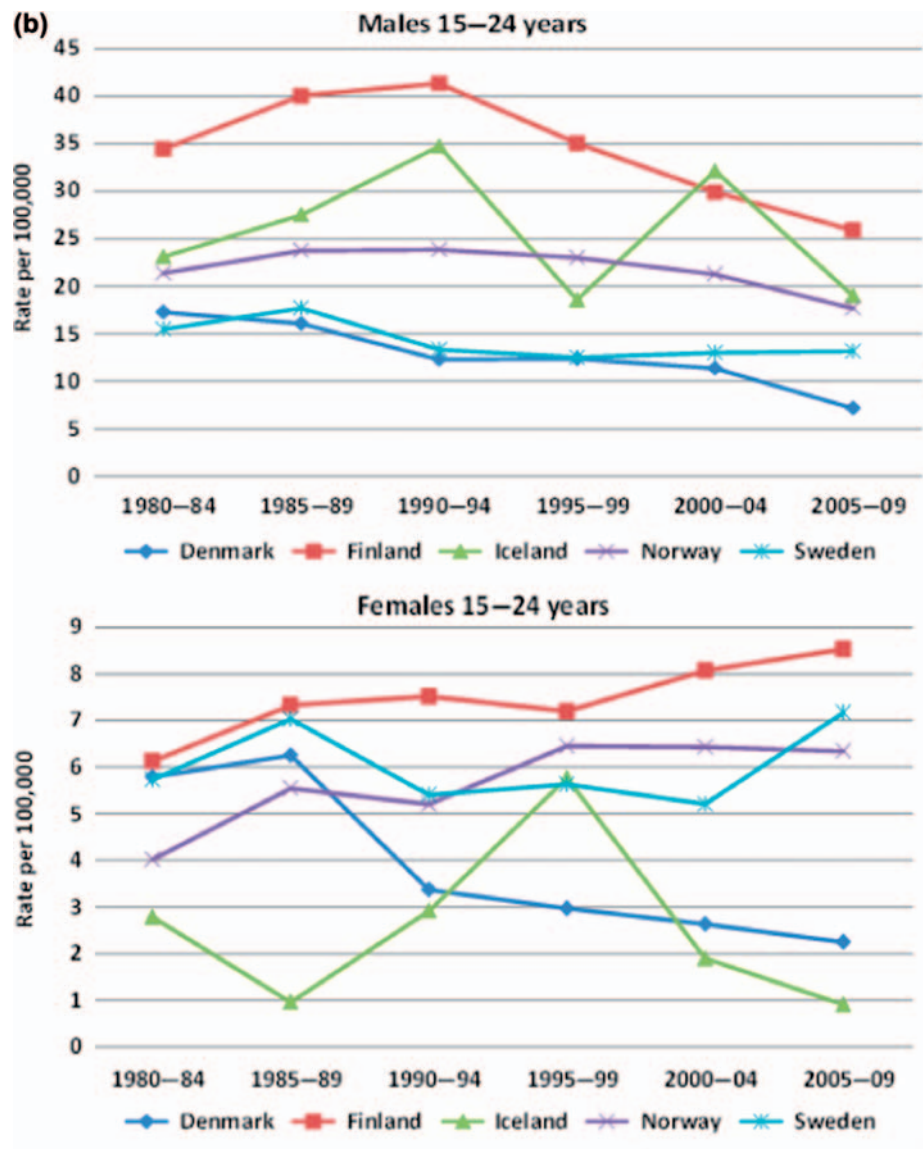


Fig. 1. (Continued)

assess statistical significance. The significance level was set at 0.05.

Results

The changes in the suicide rate in the adult and young population in each of the Nordic countries are illustrated in Figures 1a and 1b. Crude annual suicide rates for each country are found in Tables 1a and 1b. Across the Nordic region, the suicide rates in the youngest age group deviated from the overall, declining trend: a significant decline in the suicide rate was noted for both men and women (all age groups) in all countries except Iceland and for young women in Finland, Norway and Sweden (Table 2); the suicide rates in Iceland were the lowest of the five countries for all groups except young men. The

Finnish suicide rates were the highest in the Nordic region during most of the study period. In all countries, the male rate was markedly higher than the female rate.

Men, 15 years and above

In 2005–09, the suicide rates for men in Denmark, Norway, Iceland and Sweden converged to a common annual level of about 20 suicides per 100,000 inhabitants. The most dramatic decline of the male suicide rate occurred in Denmark. From 1980 to 2009, it dropped from nearly 50 to about 20 per 100,000.

After rising to a peak of more than 60 suicides per 100,000 in the early 1990s (Table 1a), the male suicide rate in Finland started to fall and continued to do so during the rest of the study period. In 2005–09, it had reached a level of approximately 35. Despite this significant

Table 1a. Suicide rates per 100,000 by gender in Nordic countries 1980–2009, ages 15 years and above.

Year	Denmark		Finland		Iceland		Norway		Sweden	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1980	52.5	28.0	52.9	13.2	12.2	9.7	23.5	8.4	34.3	13.8
1981	49.2	26.6	49.2	11.9	10.3	4.4	24.7	8.3	30.5	12.9
1982	46.6	26.1	48.6	13.0	12.7	6.0	26.3	9.4	34.3	13.6
1983	46.2	25.0	50.1	12.1	27.6	5.9	26.8	10.2	33.5	13.2
1984	45.4	25.8	51.9	12.3	30.7	5.9	27.7	9.0	33.5	14.3
1985	43.5	25.1	50.9	11.9	20.6	5.8	26.2	9.2	30.6	13.9
1986	43.8	24.1	53.9	13.8	20.5	9.9	25.2	9.4	32.9	12.1
1987	44.3	24.1	55.8	14.4	17.8	11.4	29.3	9.4	31.7	13.1
1988	40.6	22.8	58.1	14.1	23.9	4.0	30.3	11.3	32.1	13.8
1989	41.9	23.5	58.2	14.1	12.6	4.8	28.6	10.2	32.6	12.7
1990	39.0	19.6	61.7	15.2	27.4	3.9	28.8	9.8	29.4	12.5
1991	36.3	18.0	61.1	14.4	22.4	6.2	29.3	10.0	29.7	12.3
1992	35.2	18.1	58.9	13.9	17.6	3.8	26.2	9.4	26.9	11.5
1993	35.5	18.6	56.0	13.6	14.4	5.3	26.1	7.8	27.4	11.5
1994	32.1	14.5	54.5	14.3	15.7	3.0	21.8	8.4	26.4	10.7
1995	29.5	13.6	54.1	14.4	16.4	3.7	23.5	7.6	26.8	11.3
1996	29.7	11.8	48.1	13.0	20.8	3.7	22.2	7.0	24.6	10.3
1997	26.2	11.6	51.5	13.0	19.1	5.2	22.2	8.1	24.1	9.2
1998	25.6	9.8	47.4	12.2	16.8	5.1	22.7	8.2	24.8	9.4
1999	26.3	9.0	46.8	11.5	17.3	5.8	24.6	8.4	24.2	9.7
2000	25.0	8.8	42.7	13.2	30.6	5.7	23.0	7.2	22.5	8.8
2001	23.7	9.9	45.2	12.3	19.6	5.6	23.2	7.5	23.2	9.7
2002	23.5	8.3	39.7	12.3	13.2	6.3	20.3	7.2	23.8	8.4
2003	22.4	6.9	39.0	11.7	14.5	4.2	20.6	6.7	21.3	8.8
2004	21.7	8.5	38.7	11.3	13.0	6.9	19.9	9.0	22.7	8.4
2005	21.1	7.8	34.4	12.0	22.1	8.4	19.6	9.2	22.5	10.0
2006	21.8	7.9	37.8	11.5	19.6	9.1	21.2	7.4	22.0	9.9
2007	18.3	8.0	35.1	10.8	25.5	6.3	17.9	7.8	21.2	8.4
2008	19.0	8.1	37.2	10.1	22.2	9.6	18.3	8.2	22.5	8.0
2009	21.4	6.3	35.2	11.9	23.7	6.0	21.5	7.9	23.1	8.9

decline, the Finnish male suicide rate remained almost twice as high as that of the other countries for a majority of years.

Similar to the Finnish trend, the suicide rate for men in Norway went up to a range of 23–30 suicides per 100,000 until 1988. After this peak, the rate gradually declined to approximately 20 per 100,000 in 2005–09. The downward trend of the male suicide rate in Sweden during the study period was not as pronounced as that in Denmark and Finland. It started from a lower level in 1980 and without the increase prior to 1990 seen in Finland and Norway.

Iceland had the lowest and most stable male suicide rate during the study period. The relative dramatic annual fluctuations of the Icelandic rates (e.g., a male rate of 10.3 in 1981 and 30.6 in 2000) reflect the small population and low numbers of actual cases and are concealed in the 5-year averages in Figures 1a and b.

Women, 15 years and above

Like the trend for men, the decline of the female suicide 1980–2009 rate was most prominent in Denmark. Although the initial female suicide rate in Denmark was twice as high

as that of the other countries 1980–84, from 2000 and onward it was between 6 and 9 per 100,000, that is, within the same range as that seen in Norway, Iceland and Sweden.

A moderate decline occurred among women (all age groups) in Finland, Norway and Sweden during the study period, albeit that the female rate in Finland remained slightly higher than that in the other countries (> 10 vs. 6–9 per 100,000 during 1995–2009).

Young people, 15–24 years

Suicide rates in the age group 15–24 years are seen in Figure 1b. As in the population at large, the decline of the suicide rate during the study period was significant for young men in Denmark, Finland, Norway and Sweden but not in Iceland. Again, the rates were higher in Finland than in the other Nordic countries. The suicide rate for young men in Finland decreased from above 40 per 100,000 in 1990–94 to approximately 25 in 2005–09. The rate for young men in Norway dropped in the last two decades from 24 in 1990–94 to approximately 18 in 2005–09. The decline of the suicide rate in young men in Denmark started earlier. It fell from

Table 1b. Suicide rates per 100,000 by gender in Nordic countries 1980–2009, ages 15–24 years.

Year	Denmark		Finland		Iceland		Norway		Sweden	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1980	16.4	7.8	37.5	9.1	6.4	3.6	20.4	3.3	16.8	5.8
1981	17.2	5.0	32.2	4.6	12.9	3.6	20.3	3.3	14.2	4.1
1982	21.2	6.8	29.9	5.4	9.7	0.0	19.2	4.9	13.9	6.4
1983	15.4	5.2	35.0	6.8	22.6	0.0	21.5	3.5	16.0	6.2
1984	16.1	4.1	37.5	4.7	38.8	0.0	25.5	5.1	16.3	6.2
1985	17.0	8.0	37.3	6.2	22.8	0.0	22.0	7.6	14.2	7.5
1986	16.6	5.2	35.1	8.9	19.7	3.7	20.6	3.8	19.5	7.9
1987	16.5	8.3	37.9	7.6	16.4	0.0	23.7	3.7	16.8	5.5
1988	15.7	5.5	39.6	7.5	26.3	0.0	26.7	6.5	18.1	5.9
1989	14.5	4.2	50.4	6.5	19.9	0.0	25.8	6.2	19.8	8.3
1990	14.0	4.0	50.9	11.0	33.5	3.8	22.0	6.2	14.6	5.2
1991	11.9	3.5	42.2	7.3	43.5	7.5	27.1	4.4	16.9	5.0
1992	12.4	3.3	35.2	8.3	13.3	0.0	27.9	5.1	10.0	6.7
1993	13.3	2.3	33.0	3.2	16.6	0.0	21.6	5.9	12.0	6.6
1994	9.9	3.7	45.5	7.8	16.6	3.7	20.5	4.3	13.1	3.5
1995	13.1	2.3	36.6	8.4	13.3	0.0	22.4	5.5	13.5	5.3
1996	13.0	2.4	33.9	6.8	20.0	3.7	20.9	5.6	12.0	4.5
1997	13.1	5.1	39.1	7.0	10.1	3.8	20.0	4.6	11.6	6.5
1998	10.2	2.8	29.5	7.9	16.9	3.8	23.6	7.7	10.7	5.5
1999	12.3	2.2	36.3	5.9	16.7	7.5	28.2	8.9	14.8	6.3
2000	12.4	2.9	31.1	8.1	46.1	7.4	25.2	5.2	12.0	5.2
2001	12.4	2.4	27.7	6.8	26.0	0.0	22.1	7.6	11.2	3.6
2002	13.2	2.0	29.1	7.2	9.7	0.0	17.7	5.7	14.6	4.5
2003	7.9	2.0	28.6	8.5	16.0	0.0	20.8	6.3	11.0	6.7
2004	10.9	3.8	33.1	9.7	15.9	3.6	20.5	7.4	16.2	6.0
2005	6.9	2.4	20.4	10.3	15.2	0.0	17.4	7.3	11.9	6.6
2006	7.8	3.0	32.2	5.9	30.0	0.0	23.2	6.4	12.5	9.2
2007	4.7	2.0	26.5	9.6	35.1	5.1	15.9	4.9	11.4	6.1
2008	9.2	2.6	24.1	8.1	18.8	0.0	15.6	7.2	15.5	6.8
2009	7.1	1.2	26.4	8.7	9.2	0.0	16.2	6.0	14.4	7.2

approximately 17 per 100,000 in 1980–84 to 7 in 2005–09. In Sweden and Iceland, the suicide rates for young men were relatively stable: it was above 15 in Sweden until 1985–89, with a significant decline to below 15 in 2000–09, and to between 20 and 30 in Iceland without any significant change over time.

In young women, a steady decline of suicides was documented in Denmark, from a rate of approximately 6 per 100,000 in 1980–84 to 2 in 2005–09. However, the rates for young women in Finland, Norway and Sweden rose from 6.1, 4.0 and 5.7 in 1980–84 to 8.5, 6.4 and 7.2, respectively, in 2005–09—a statistically significant trend in

Table 2. Regression trend by calendar year 1980–2009, ages 15 years and above and 15–24 years.

	Age 15+ years				Age 15–24 years			
	B	(df)	t-stat	P-value	B	(df)	t-stat	P-value
Males								
Denmark	−1.17	(1)	−28.25	<0.0001	−0.37	(1)	−16.94	<0.0001
Finland	−0.71	(1)	−6.02	<0.0001	−0.44	(1)	−4.62	<0.0001
Iceland	−0.15	(1)	−1.01	0.323	−0.16	(1)	−0.82	0.419
Norway	−0.30	(1)	−6.24	<0.0001	−0.14	(1)	−2.80	0.009
Sweden	−0.48	(1)	−15.31	<0.0001	−0.15	(1)	−4.28	0.000
Females								
Denmark	−0.83	(1)	−20.59	<0.0001	−0.18	(1)	−10.47	<0.0001
Finland	−0.07	(1)	−3.14	0.004	0.06	(1)	3.10	0.004
Iceland	−0.09	(1)	−1.66	0.109	−0.02	(1)	−0.50	0.618
Norway	−0.07	(1)	−3.66	0.001	0.09	(1)	6.39	<0.0001
Sweden	−0.21	(1)	−13.45	<0.0001	0.01	(1)	0.62	0.539

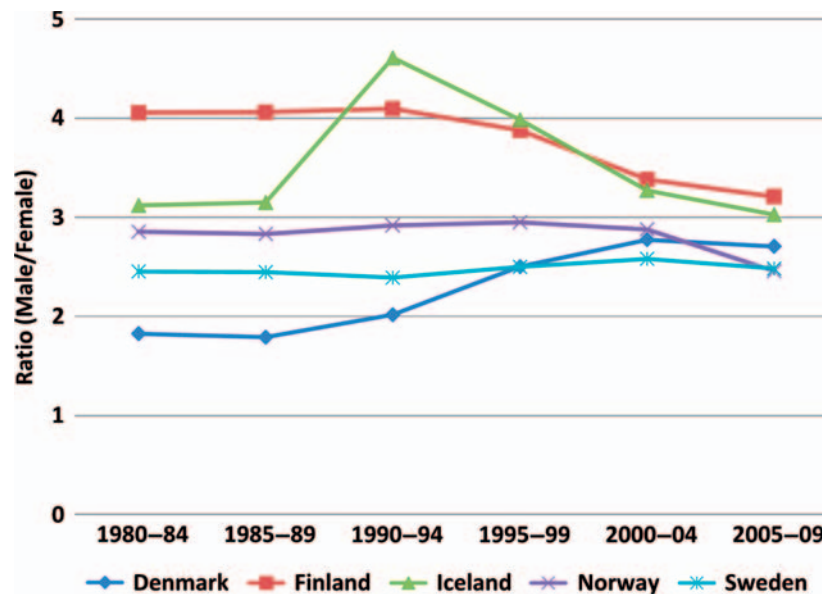


Fig. 2. Ratio (5-year averages) of suicide rates between males and females in the Nordic countries during 1980–2009, ages 15 years and above.

Finland and Norway but not in Sweden. With a notable peak of about 5.5 in 1995–99, the female suicide rate in Iceland stayed at a level of 1–2 per 100,000 and was the lowest over time in the Nordic countries.

The gender ratio

In all five countries, across all age groups, the male suicide rate was higher than the female rate over time (Fig. 2). In Finland, the gender ratio was steadily above 4 male per 1 female suicide until 1990–94, after which the ratio gradually decreased to just above 3. In Iceland, too, the gender ratio went down from its highest level, 4.5, in 1990–94 to 3 in 2005–09. The change in Norway was from about 3 during most of the study period to less than 2.5 in 2005–09. Sweden's gender ratio was around 2.5 during the entire study period. Denmark had the lowest initial ratio, below 2 between 1980 and 1990–94, when a gradual increase started; the Danish gender ratio appears to have stabilized at approximately 2.5. Thus, since 1990, the Nordic countries have seen converging ratios of male and female suicide rates, with a current range of 2.5–3.2.

The geographic distribution of suicide rates

Regional overall suicide rates within the five countries are illustrated in Figure 3.

Regional differences were pronounced in Norway, Sweden and Finland. The highest annual rates for men (>35 per 100,000) were found in northern and eastern Finland, in the adjoining Finnmark county in the north of Norway and in two delimited central regions, Buskerud and Telemark in Norway and Värmland in Sweden.

For women, the highest rates (>12.5 per 100,000) were found in northern and eastern Finland, in Satakunta

and Pirkanmaa regions in western and central Finland, and in eastern Uusimaa in the south of Finland. (The mortality rates for women in the Åland archipelago in Finland, which were high in 2009, vary dramatically from year to year due to the small number of inhabitants of this area, and conclusions cannot be drawn from the figures from 1 year only.) High female suicide rates were also documented in two separate areas in Vest-Agder and Vestfold in southern Norway and in Gästrikland and Hälsingland counties on the northern east coast of Sweden.

The distribution of suicide rates was more even across Denmark and Iceland: 20–25 per 100,000 men in Denmark and lower than 20 per 100,000 in Iceland. The rates for Danish and Icelandic women were 5–7.5 and lower than 5, respectively.

With regard to rural versus urban rates, it is notable that the current suicide rates in the capital regions of Copenhagen, Oslo and Stockholm are lower than the respective national rates in Denmark, Norway and Sweden.

Suicide methods

Categories of suicide methods used by men and women (15 years and older) during 2009 are listed as rates and percentages in Table 3. Self-poisoning and hanging were the most frequent methods and accounted for more than two-thirds of all suicides in the five Nordic countries.

Hanging was the most common method for men, while self-poisoning was the method most commonly used by women in all countries except Norway, where hanging accounted for approximately 40% of female as well as male suicides.

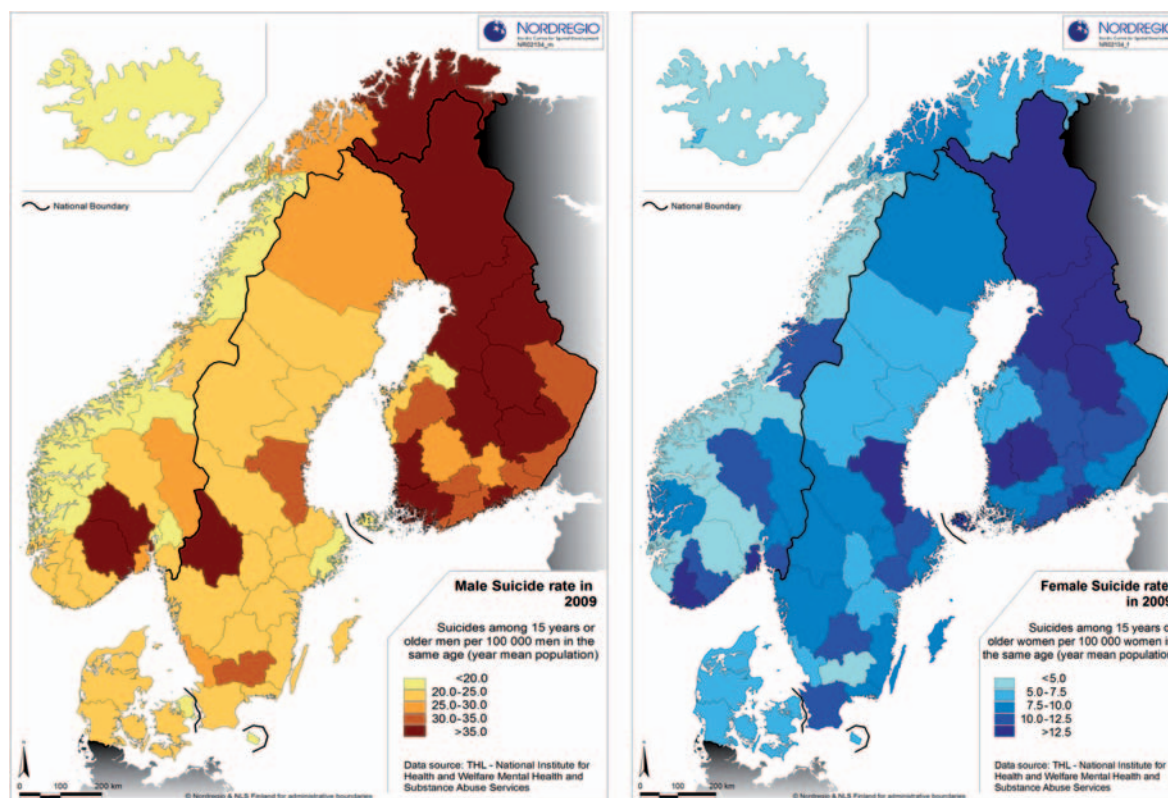


Fig. 3. Regional distribution of suicide rates per 100,000 for males and females in the Nordic countries in 2009, ages 15 years and above.

The use of firearms was the third leading method for men in all countries. It accounted for approximately 23% of all male suicides in Norway and Finland.

Discussion

Suicide trends in the adult population

Declining suicide rates in men and women, all ages, were seen in Denmark, Finland, Norway and Sweden. Were the rates of the youngest age group (15–24 years) to be removed from the overall trend, the decline would be even starker. The range of the annual suicide rate for men decreased from 25–50 per 100,000 in 1980 to 20–36 in 2009. The corresponding decline of the suicide rates for women was from 9–26 to 8–11. Iceland had the lowest suicide rates for all ages and both genders during the study period. The fluctuations of the Icelandic rates, which are noticeable even in the 5-year averages of Figures 1a and b, were not statistically significant.

In 1980–84, Denmark and Finland had the highest suicide rates in the Nordic region. The decline of the combined rate in Denmark and the male rate in Finland during the study period is notable. The only known comparable development in the history of the documentation of suicide rates in the Nordic countries occurred in Denmark and Sweden during the First World War

(12–14). The overall downward trend of the Nordic suicide rate appears to have flattened out in the last decade.

The Finnish suicide rates remain higher than those in the other Nordic countries. In a nationwide psychological autopsy study, Henriksson et al. (15) showed that more than 90% of suicides in Finland are linked to a mental disorder, mainly depressive disorder (59%) and alcohol dependence or abuse (43%). That more than one in three male suicide victims in Finland were given a diagnosis of alcoholism reaffirms that alcohol problems are a major determinant of suicide, there as elsewhere (16, 17). However, a general socio-economic factor most likely overlaps with the impact of alcohol: suicide among Finnish male unskilled workers is 2.3 times more frequent than it is among non-manual, white-collar employees, whose suicide rate does not differ significantly from the overall Nordic male suicide rate (18).

Representing different trends in suicide rates during the study period, the national ratios of male and female suicide rates converged to a range of 2.5–3.2. The declining male suicide rate in Finland during the last two decades explains the narrowing gender ratio there, while the sharp decline of the female suicide rate in Denmark is reflected in a widened ratio.

Table 3. Rates and percentages of suicide methods per 100,000 for men and women, ages 15 years and above.

Category	Denmark		Finland		Iceland		Norway		Sweden	
	Rate	%	Rate	%	Rate	%	Rate	%	Rate	%
Males										
Poisoning (X60–X69)	3.7	17.3	7.4	21.0	6.3	27.6	3.2	14.7	4.3	18.8
Hanging (X70)	10.3	48.2	11.7	33.2	9.4	41.4	8.5	39.3	10.9	47.1
Drowning (X71)	1.1	5.0	1.6	4.6	0.8	3.4	1.6	7.3	0.8	3.6
Firearms (X72–X74)	2.9	13.7	8.0	22.9	3.1	13.8	5.0	23.2	3.3	14.4
Sharp object (X78)	1.0	4.4	0.7	2.1	2.4	10.3	0.7	3.4	0.5	2.0
Jumping from a high place (X80)	0.7	3.4	2.2	6.2	0.8	3.4	0.8	3.8	1.1	4.9
Moving object (X81–X82)	1.1	5.0	2.6	7.5	0	0.0	0.7	3.1	1.5	6.3
Other methods	0.6	3.0	0.9	2.5	0.0	0.0	1.1	5.3	0.7	2.9
Total	21.4	100.0	35.2	100.0	22.7	100.0	21.5	100.0	23.1	100.0
Females										
Poisoning (X60–X69)	2.7	43.1	6.8	56.8	2.4	42.9	2.9	37.0	4.0	44.9
Hanging (X70)	2.0	32.0	2.5	21.2	1.6	28.6	3.3	41.8	2.4	26.6
Drowning (X71)	0.7	10.5	0.7	6.2	1.6	28.6	0.8	10.3	0.8	8.6
Firearms (X72–X74)	0.0	0.6	0.3	2.6	0	0.0	0.1	0.6	0.1	1.4
Sharp object (X78)	0.2	2.7	0.1	0.7	0	0.0	0.1	1.3	0.1	1.1
Jumping from a high place (X80)	0.4	6.2	0.4	3.7	0	0.0	0.3	3.2	0.6	6.6
Moving object (X81–X82)	0.2	3.5	1.0	8.1	0	0.0	0.2	2.6	0.8	9.1
Other methods	0.1	1.4	0.1	0.7	0.0	0.0	0.3	3.2	0.2	1.7
Total	6.3	100.0	11.9	100.0	5.6	100.0	7.8	100.0	8.9	100.0

Suicide rates in young people, 15–24 years

The upward trend of the suicide rate among young women in Finland and Norway over the last 30 years and the unchanged level in young women in Sweden and in young men in Iceland stand in contrast to the general decline of the suicide rate in the Nordic countries. It is also notable that the suicide rate of Icelandic young men is the only instance of Iceland not showing lower rates than those in the other Nordic countries. Together with current reports of increasing numbers of *attempted suicide* among the young (19, 20) and with the known association between attempted and completed suicide, particularly in the socially disadvantaged (21), these observations call for continued monitoring of vulnerable young people.

Suicide methods

In all five countries, violent methods such as hanging and the use of firearms were more common among men than among women. The lethality of hanging and firearms may partly explain the higher male suicide rate. Conversely, suicide attempts by poisoning may be less likely to have fatal outcomes in developed societies due to lower dosages after the introduction of blister packaging (22) and to a high likelihood of being rescued by accessible emergency care (23). A recent study indicates that the increase in suicides among young women in Finland is linked to a switch to more violent and lethal methods (24).

The relatively high incidence of firearm suicides in Finland and Norway, about 23% for both men and women, may be linked to household ownership of weapons in these

countries. However, the ownership rate of weapons is not higher in Norway than in Sweden (25), where the documented annual rate of suicides by firearms for men is about 14.4% (and 1.4% for women). It is conceivable that this is explained by varying safety precautions for storing weapons: when legislation and education about the safe storage of firearms were implemented in Norway, the proportion of firearm suicide decreased by 57% (26). A similar trend was seen in Iceland, where, following new legislation concerning the storage of weapons, suicides by firearms decreased from 20.9% in 1980–84 to 11.1% in 2009 (data available from authors on request).

Regional differences

The high suicide rates of certain rural parts of the Scandinavian peninsula and Finland attest to earlier findings on the association of male suicide with a high availability of suicide means, a low utilization rate of mental healthcare, a shortage of such facilities and social isolation (27, 28). However, it has also been shown that rural residence is associated with suicide, only when adjusting for socio-economic characteristics and psychiatric status (29).

An explanation of the noted lower suicide rates of Copenhagen, Oslo and Stockholm, compared with the respective national rates, may be the influx to these cities of immigrant groups from Muslim countries that report low suicide rates. A comparable shift of suicide rates, moving from top to bottom of the hierarchy of regional rates, was reported in other metropolitan areas of the Western world with similar demographic changes (30).

Conclusions

In addition to confirming an overall decline of suicide rates in the Nordic countries 1980–2009, we noted differences in trends and levels of suicide rates between countries, regions within countries, genders, age groups and suicide methods.

It is possible that the converging suicide rates in the Nordic region, but also the consistently high rates in Finland, are accounted for by variations in stages or positions in a fundamentally common social process or by a “cohort effect” (31). The impact of socio-economic factors on vulnerable groups needs to be better understood in the context of suicide prevention. The psychosocial impact of migration and cultural factors on mental health and suicide is a relevant perspective in future studies.

The rise of the suicide rate among young women, aged 15–24 years, in Finland and Norway and the lack of a significant decline of suicide rates in this group in Sweden warrant continued monitoring.

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