Deaths from suicide in Finland from 2016 to 2023

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DEATHS FROM SUICIDE IN FINLAND FROM 2016 TO 2023

ABSTRACT

Objectives: *Suicides have been recorded in Finland since 1751, which forms the longest uninterrupted time series on this topic in the world. Suicide mortality has been decreasing in Finland since 1990. The first nationwide suicide prevention project was conducted from 1986 to 1996, during which the age-standardized suicide mortality rate was decreased by 5.3%. The second national suicide prevention programme was started in 2020.* ***Materials and methods:*** *As part of the monitoring of the programme, we analysed the deaths from suicide in Finland from 2016 to 2023 using the database kept by the Forensic Medicine Unit of the Finnish Institute for Health and Welfare.* ***Results:*** *There were 6132 deaths from suicide, of which 4602 among men and 1530 among women. Two-thirds (62%) of the individuals were between 30 to 69 years of age. The greatest proportion of suicides by month occurred on the days of May. Suicide mortality by year was at its highest in 2017 and at its lowest in 2020. In the districts corresponding to the six wellbeing services counties, where a development project for suicide prevention work was conducted as part of the second national suicide prevention programme, the suicide mortality rate on average was subsequently reduced to equal that in the rest of the country.*

KEYWORDS: FORENSIC MEDICINE, PUBLIC HEALTH, SUICIDE

INTRODUCTION

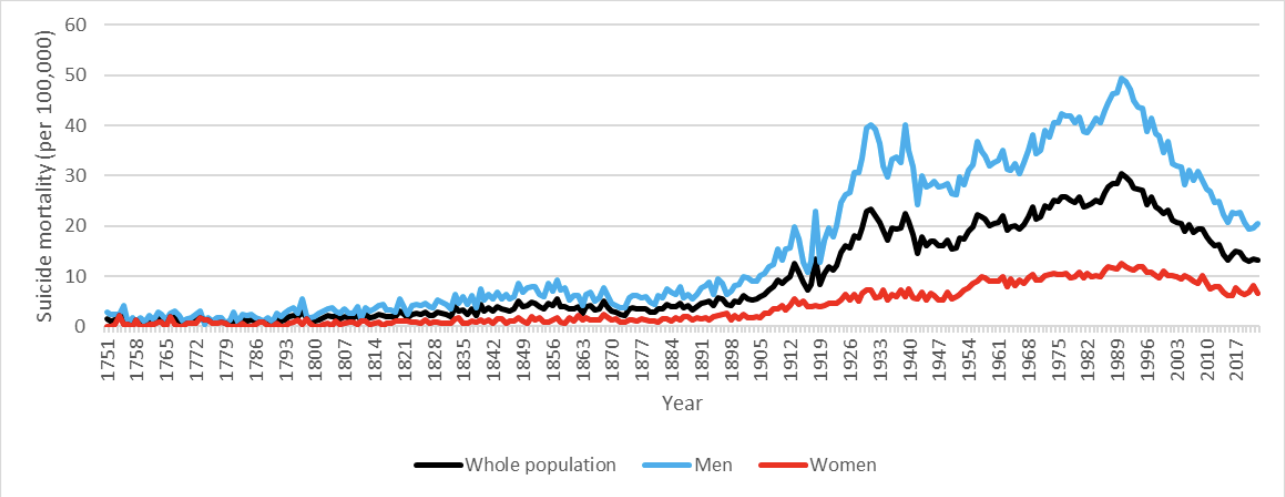
Suicides have been recorded in Finland since 1751, which forms the longest uninterrupted time series on this topic in the world (*Figure 1)*. Suicide mortality has been decreasing in Finland since 1990 (1). Well-developed community mental healthcare with the prominence of outpatient services has been associated with relatively low suicide rates within Finland (2). However, the national suicide mortality is still higher in Finland than the average of that in the European Union (3), but already lower than, e.g. that in Sweden (4). On the other hand, the first nationwide suicide prevention programme was in effect in Finland from 1986 to 1996 (5), and there is a new one currently in effect from 2020 to 2030 (6). The decreasing trend in suicide mortality coincides with these two programmes. Further, in the districts corresponding to the six wellbeing services counties (Etelä-Savo, Kainuu, Keski-Suomi, Kymenlaakso, Lappi and Satakunta), a development project for suicide prevention work was conducted at grass-roots level from January 2021 to June 2023. These development projects were part of the National Mental Health Strategy and Programme for Suicide Prevention 2020–2030.

Here, the aim of this study was to present the recent distribution of deaths from suicide among individuals living in Finland. To this end, these data were derived from the national database on the cause of death investigations, and their analysis is presented as follows.

METHODS

The material consisted of all deaths from suicide (ICD-10 codes: X60–X84, Y870), verified by the official cause of death investigations including forensic autopsy with analysis of forensic toxicology samples, between 1 January 2016 and 31 December 2023 in Finland. The data were obtained from the Forensic Medicine Unit of the Finnish Institute

Figure 1. Data on the official statistics kept by Statistics Finland on suicide mortality in Finland from 1751 to 2022



for Health and Welfare, the legal authority in charge of forensic medicine guiding and monitoring the cause of death investigations in Finland. The date of death and the sex of the deceased were included in the data. According to the official census by Statistics Finland, the number of people living in Finland remained largely constant from 2016 to 2023, increasing by 1.40% from 2,790,970 to 2,830,134 for women, and by 2.29% from 2,712,327 to 2,774,424 for men.

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation, as well as with the Declaration of Helsinki as adopted by the World Medical Association in 1964 and amended thereafter. All procedures involving human subjects were approved by the institutional review board (IRB 00007085) of the Finnish Institute for Health and Welfare (FWA 00014588).

STATISTICAL ANALYSIS

Descriptive data were presented as absolute values (n), relative values (%) and basic statistics (mean, 95% confidence interval for mean). Linear trends were calculated as forecasts by using the method of the first-order linear least squares. Mann-Whitney U test was calculated for suicide mortality rates from the six districts, corresponding to the current wellbeing services counties, where a development project for suicide prevention work was conducted at grass-roots level from January 2021 to June 2023 (Etelä-Savo, Kainuu, Keski-Suomi, Kymenlaakso, Lappi and Satakunta) vs. the rest of the country where there was no such development project. Analyses were calculated using the SURVO MM, version 3.58 (Survo Systems Oy, Espoo, Finland), the Excel for Microsoft 365 (Microsoft Corporation, Redmond, WA, USA), and the IBM SPSS Statistics, version 29 (International Business Machines Corporation, Armonk, NY; USA).

RESULTS

There were 6132 deaths from suicide in Finland from 2016 to 2023, of which, 4602 among men and 1530 among women, yielding the ratio of 3.01 by gender (*Table 1*). Prediction, which is based on the current data from 2016 to 2023 and follows a linear trend, suggests that the number of suicides among men decreases further and will be approximately 456 by 2030 (*Figure 2*), whereas among women there is no change for the better by 2030 (*Figure 3*).

Two-thirds (62%) of the individuals were between 30 to 69 years of age (*Table 2*). Every fifth (19%) of those who died from suicide were aged 18 to 29 years, and minors comprised 2% of the total number of deaths from suicide in Finland from 2016 to 2023.

Each year from 2016 to 2023, concerning the method for suicide, the most common one was hanging (36.5%), followed by poisoning (21.1%) and shooting (15.7%) (*Table 3*). The greatest proportion of suicides by month occurred on the days of May (*Table 4*), and fluctuation in the monthly number of suicides as a function of time over the period of 2016 to 2023 appeared to increase.

During the study period of 2016 to 2023, the yearly suicide mortality per 100,000 inhabitants in Finland was at its highest in 2017 and at its lowest in 2020. Data on suicide mortality by wellbeing services county is delivered in *Table 5*. The suicide mortality rate on average from 2016 to 2019 for the six districts with a development project for suicide prevention compared to the rest of the country was significantly higher (18.5 vs. 13.1; $p<0.001$), after which the rates differed in 2020 ($p=0.020$), but from 2021 onward there was no difference (*Table 6*).

Table 1. Number (n) of deaths from suicide by gender in Finland from 2016 to 2023

	2016	2017	2018	2019	2020	2021	2022	2023	Total
Men	622	613	615	559	539	527	569	558	4602
Women	170	213	191	183	183	220	177	193	1530
Total	792	826	806	742	722	747	746	751	6132

Figure 2. Linear trend for suicides among men in Finland as predicted from 2016 to 2030

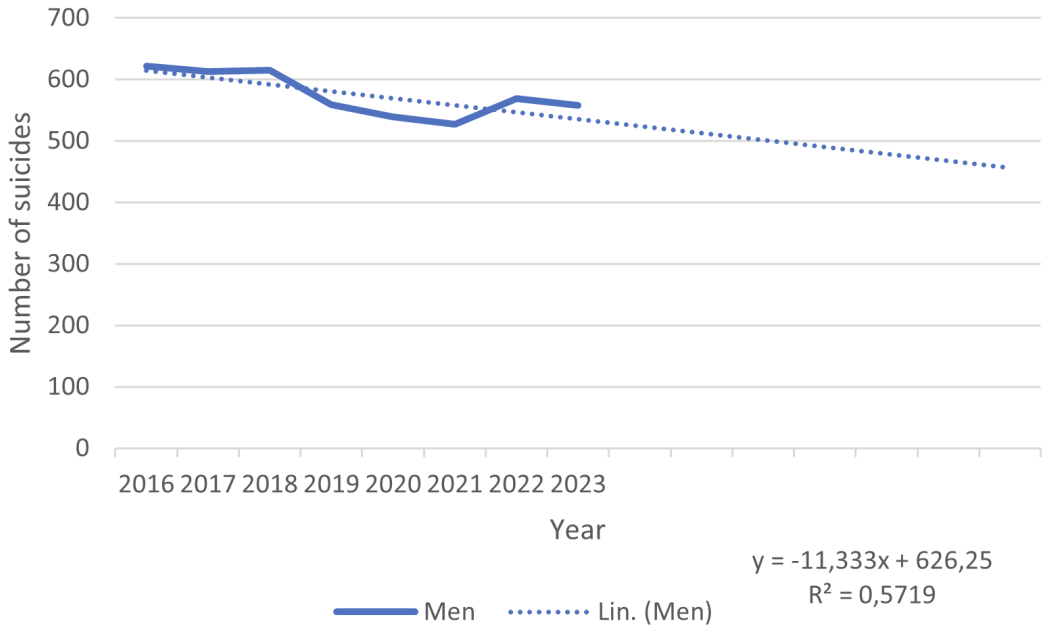


Figure 3. Linear trend for suicides among women in Finland as predicted from 2016 to 2030

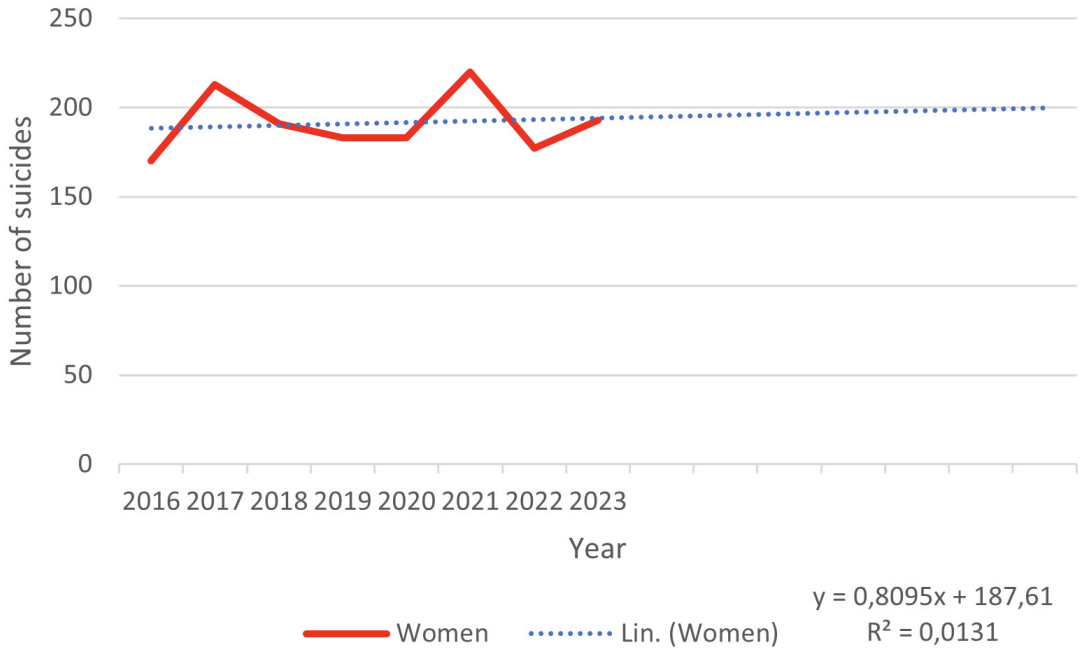


Table 2. Number (n) of deaths from suicide by age-group for men and women in Finland from 2016 to 2023

	2016	2017	2018	2019	2020	2021	2022	2023	Total
Men									
10–17y	6	17	12	9	15	4	4	13	80
18–29y	113	118	113	120	90	84	112	101	851
30–39y	103	102	106	100	95	88	93	90	777
40–49y	102	96	86	77	103	81	94	83	722
50–59y	115	93	89	80	81	99	96	94	747
60–69y	89	93	97	64	64	74	70	77	628
70–79y	62	65	67	71	52	47	58	56	478
80–89y	30	22	39	34	33	38	37	37	270
90–99y	2	7	6	4	6	12	5	7	49
Total	622	613	615	559	539	527	569	558	4602

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	2016	2017	2018	2019	2020	2021	2022	2023	Total
Women									
10–17y	8	7	7	8	10	11	9	10	70
18–29y	45	40	41	38	40	34	28	50	316
30–39y	14	33	24	27	27	38	29	28	220
40–49y	17	29	22	27	25	33	32	21	206
50–59y	35	39	38	31	31	39	27	25	265
60–69y	28	30	31	26	29	30	26	30	230
70–79y	15	26	19	14	10	24	17	19	144
80–89y	8	8	8	10	11	9	9	7	70
90–99y	0	1	1	2	0	2	0	3	9
Total	170	213	191	183	183	220	177	193	1530

Table 3. Proportion (%) of deaths from suicide by method (ICD-10 codes) in Finland from 2016 to 2023

	2016	2017	2018	2019	2020	2021	2022	2023	Total
Hanging (X70)	35.7	33.2	38.6	37.1	36.4	37.3	37.0	36.9	36.5
Poisoning (X69)	20.2	22.1	19.7	22.1	19.4	22.4	20.8	22.1	21.1
Shooting or exploding (X74–X75)	16.3	15.8	16.5	15.6	14.9	15.0	14.3	17.3	15.7
Hit by a vehicle (X81)	7.6	7.4	6.6	6.6	5.8	4.3	6.0	7.2	6.5
Jumping from a high place (X80)	5.7	8.4	6.2	4.4	5.7	7.9	7.4	5.7	6.4
Drowning (X71)	5.6	5.1	4.3	3.8	4.6	5.1	4.3	3.2	4.5
Cutting with a sharp object (X78)	2.4	3.2	3.3	3.4	4.7	2.9	5.0	3.3	3.5
Crashing of motor vehicle (X82)	3.7	2.9	2.5	4.2	5.6	3.7	2.9	2.3	3.4
Burning (X76)	2.0	1.3	1.1	1.3	1.0	0.7	1.3	0.9	1.2
Other (X84)	0.9	0.7	1.1	1.5	1.9	0.7	0.9	1.1	1.1
Total	100	100	100	100	100	100	100	100	100

Key to the ICD-10 codes: X69 Intentional self-poisoning or by exposure to chemicals or noxious substances; X70 Intentional self-harm by hanging, strangulation or suffocation; X71 Intentional self-harm by drowning or submersion; X74 Intentional self-harm by firearm discharge; X75 Intentional self-harm by explosive material; X76 Intentional self-harm by smoke, fire or flames; X78 Intentional self-harm by sharp object; X80 Intentional self-harm by jumping from a high place; X81 Intentional self-harm by jumping or lying before moving object; X82 Intentional self-harm by crashing of motor vehicle; X84 Intentional self-harm by other specified or by unspecified means

Table 4. Proportion (%) of deaths from suicide by month in Finland from 2016 to 2023

	2016	2017	2018	2019	2020	2021	2022	2023	Total
January	7.6	9.6	7.1	8.6	6.6	7.8	8.8	8.8	8.1
February	8.6	6.2	8.7	7.5	8.4	7.0	6.6	5.2	7.3
March	8.1	8.4	7.8	8.2	9.1	8.0	7.4	9.1	8.3
April	9.6	9.0	7.7	8.4	8.2	8.3	9.7	8.5	8.7
May	8.7	9.9	7.8	7.8	7.9	9.1	11.0	10.7	9.1
June	8.6	8.8	8.4	9.4	9.4	8.2	8.4	8.5	8.7
July	8.5	9.4	9.1	7.1	10.4	9.4	9.1	8.4	8.9
August	8.6	8.5	9.3	7.7	7.3	10.2	9.1	8.1	8.6
September	8.5	6.5	9.1	10.0	9.0	7.4	7.0	7.7	8.1
October	8.1	8.8	8.8	9.0	7.5	10.3	9.8	8.3	8.8
November	8.2	7.9	7.3	8.0	7.1	6.8	7.5	9.2	7.7
December	7.1	7.0	8.9	8.2	9.0	7.6	5.6	7.6	7.6
Total	100	100	100	100	100	100	100	100	100

Table 5. Suicide mortality (per 100,000 inhabitants) by wellbeing services county in Finland from 2016 to 2023

	2016	2017	2018	2019	2020	2021	2022	2023
01 Itä-Uusimaa	11.336	14.409	13.366	7.171	9.160	9.084	12.125	10.102
02 Keski-Uusimaa	12.841	10.712	14.721	15.188	14.549	13.871	14.272	10.222
03 Länsi-Uusimaa	11.609	9.988	13.138	9.995	11.818	9.814	11.720	9.092
04 Vantaa and Kerava	10.594	11.602	11.346	10.350	12.394	9.767	13.547	11.903
05 Varsinais-Suomi	13.879	14.026	13.582	12.726	13.502	13.858	12.975	13.855
06 Satakunta	17.588	17.695	15.552	18.454	10.677	11.667	17.407	10.390
07 Kanta-Häme	16.688	14.474	12.838	14.626	15.242	15.862	19.465	15.925
08 Pirkanmaa	13.291	10.888	14.111	12.118	12.814	12.702	14.268	13.536
09 Päijät-Häme	14.383	16.823	15.430	13.087	13.121	18.038	11.245	16.628
10 Kymenlaakso	14.640	17.784	16.804	15.202	15.969	11.153	10.659	12.606
11 Etelä-Karjala	12.260	17.711	9.320	14.089	14.182	17.446	13.562	16.778
12 Etelä-Savo	23.501	17.288	18.319	23.080	17.332	18.225	9.199	17.704
13 Pohjois-Savo	13.449	20.670	22.762	16.064	10.070	14.495	20.187	15.714
14 Pohjois-Karjala	10.143	15.020	22.951	12.161	15.287	12.249	9.844	17.866
15 Keski-Suomi	17.889	19.359	16.101	14.291	15.773	11.002	12.113	18.297
16 Etelä-Pohjanmaa	13.227	13.805	11.836	12.422	13.011	14.080	7.339	11.546
17 Pohjanmaa	13.580	16.452	7.378	10.800	12.513	10.225	14.179	14.076
18 Keski-Pohjanmaa	10.141	4.362	10.228	10.270	8.825	16.197	8.849	13.287
19 Pohjois-Pohjanmaa	15.809	17.482	16.013	16.472	13.774	16.602	14.884	13.391
20 Kainuu	26.737	27.042	12.318	19.362	13.954	26.665	17.016	14.252
21 Lappi	19.977	19.529	15.124	19.192	14.717	15.865	10.808	11.354
90 Helsinki	11.808	14.768	12.654	10.094	10.504	12.909	11.445	10.823
91 Ahvenanmaa	10.269	6.782	16.785	6.693	3.319	3.296	13.176	9.823
Total	14.391	14.982	14.607	13.429	13.047	13.464	13.408	13.401

Key to the colour code: The values on the lightblue background indicate lower rates compared to the nationwide average

Table 6. Suicide mortality rates on average (with their 95% confidence intervals) by implementation of a development project for suicide prevention work in wellbeing services counties in Finland before the national Suicide Prevention Programme for 2016–2019 and for each year thereafter

	2016–2019	2020	2021	2022	2023
Development project	18.451 (16.249–20.654)	14.737 (12.325–17.149)	15.763 (9.369–22.157)	12.867 (9.203–16.531)	14.101 (10.647–17.555)
No development project	13.060 (11.855–14.264)	12.005 (10.480–13.530)	12.970 (11.064–14.876)	13.123 (11.451–14.794)	13.210 (11.812–14.608)

DISCUSSION

The main finding was that after the current nationwide programme for suicide prevention was started, the suicide mortality rates in the six districts, corresponding to the current wellbeing services counties, with a development project for suicide prevention were equal to the rest of the country. Earlier, from 2016 to 2019, their suicide mortality rates had been significantly higher than those in the rest of the country.

Another key finding was that if the projections for suicide rates were to realize and follow a linear trend from 2016 to 2030, the number of deaths from suicide would be reduced by 13% as calculated from the reference of 2019. Earlier, during the first national Suicide Prevention Project 1986–1996 the suicide mortality was reduced by 5.3% from 25.9 in 1985 to 24.6 in 1996, whereas the start of the current Programme for Suicide Prevention 2020–2030 was preceded by the suicide mortality rate of 13.6 in 2019. If a change in the age-standardized suicide mortality rate for Finland produced by the second suicide prevention programme were to be equal to the change observed from the first suicide prevention project, it would end up at 12.9 by 2030. These findings raise a question about the efficacy of national suicide prevention programmes, not only concerning Finland, but at large as well. The current evidence on their impact is mixed (7), where earlier education of physicians as well as restricting access to lethal means were found to prevent suicides (8), but later none of the individual components adopted in national suicide prevention programmes was related to a change in suicide mortality (9).

We know from the earlier reports that the COVID-19 pandemic had negative mental health outcomes in populations, with Finland as no exception. However, among men living in Finland, suicide incidence declined significantly from 14.4 in 2016 to 13.1 in 2020, and there was a declining tendency in suicide rates for every consecutive month during the COVID-19 pandemic period (10). In contrast, there were more than expected suicides among women, aged 20 to 39 years, living in Finland over the first nine months of the COVID-19 pandemic (11), which concerned women of 30 to 39 years of age specifically (12). During the subsequent year 2021, the nationwide suicide mortality rate increased to 13.5, after which it was reduced to 13.4 in 2022 and remained at 13.4 in 2023.

It is of note that the distributions by gender, method, month as well as by region are like those for deaths from suicide decades earlier (13), but the suicide mortality is currently less. Further, fluctuation in the monthly number of suicides as a function of time resembles the finding for the period of 1979 to 1999, in that the seasonal effect was pronounced when the number of suicides was relatively low (14). However, the current projection for deaths from suicide among women is not favourable in terms of suicide prevention. It urges the understanding of up-to-date changes in the balance between their protective and risk factors, that originate from 1955 to 1959, when their suicide mortality took a turn for the worse (15).

To improve suicide prevention, monitoring of suicidal behaviours is needed. To this end, there is the task force for building a platform for a national database which covers suicide deaths (the Finnish Medico-Legal Information System kept by the Forensic Medicine Unit of the Finnish Institute for Health and Welfare), suicide attempts (the Care Register for Health Care kept by the Health and Social Services Data and Information Management Unit of the Finnish Institute for Health and Welfare) as well as out-of-hospital emergency medical service due to suicidal behaviour (the Patient Data Repository kept by the Social Insurance Institution of Finland) in relation to age, gender and residential area.

This information is already being collected routinely, but each at a different pace and without information exchange, which slows down proactive suicide prevention measures.

Currently, the National Mental Health Strategy and Programme for Suicide Prevention is running. However, the nationwide suicide mortality rate was reduced by 2.1% from 2019 to 2023. This clearly demonstrates that suicide prevention work takes time and needs long-term action. Furthermore, innovative measures are urgently needed for effective suicide prevention strategies as well.

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