European Journal of Epidemiology (2006) 21:707–713
DOI 10.1007/s10654-006-9052-7

PSYCHIATRIC EPIDEMIOLOGY

Suicide among Indigenous Sami in Arctic Norway, 1970–1998

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Accepted in revised form 23 August 2006

Abstract. Suicide mortality was examined between 1970 and 1998 in a cohort of 19,801 persons categorized as indigenous Sami in Arctic Norway. Standardized mortality ratios (SMR) were calculated using the suicide rates of the rural population of Arctic Norway as reference. There was a significant moderate increased risk for suicide among indigenous Sami (SMR = 1.27, 95% Confidence interval (CI): 1.02–1.56). In the study period, 89 suicides occurred in the cohort (70 men and 19 women) with increased suicide mortality both for indigenous Sami males (SMR = 1.27; 95% CI: 0.99–1.61) and females (SMR = 1.27; 95% CI: 0.77–1.99). Significant increased suicide mortality was found for young Sami aged 15–24 for both males (SMR = 1.82; 95% CI: 1.13–2.78) and females (SMR = 3.17; 95% CI: 1.17–6.91). Significant increased suicide mortality was found for indigenous Sami males residing in Sami core area (SMR = 1.54; 95% CI: 1.04–2.20) and for indigenous Sami males not belonging to semi-nomadic reindeer herding (SMR = 1.30; 95% CI: 1.00–1.65). Clusters of suicides in Sami core area may explain the increased suicide mortality found in subgroups among indigenous Sami.

Key words: Cause of death, Cluster, Indigenous Sami, Suicide

Abbreviations CI = Confidence interval; SMR = Standardized mortality ratio

Introduction

Suicide has become a serious problem among several indigenous people in the Arctic (for example, the Inuits in Greenland [1]) and the Arctic parts of Canada [2], as well as among Alaskan natives in the US [3]. In Greenland, the suicide rates were as high as 100 per 100,000 in 1990–95, and the rates among young males aged 15–24 were even higher [4]. Suicidal behavior among indigenous people is most commonly explained by the importance of cultural factors [5] such as the undermining and breakdown of traditional cultural structures and acculturation as a consequence of colonization and modernization. For many indigenous people, a forced acculturation process has caused acculturative stress and psychopathology such as depression, suicide and alcohol abuse [6]. In contrast, suicide rates have been found to be negatively associated with integration of traditional culture in several Native American tribes [7] and degree of self-government among Native Canadian bands [8].

The Sami people is an indigenous group residing in the arctic part of Scandinavia. In Norway, the indigenous Sami (hereafter called Sami) are an ethnic minority mainly residing in northern Norway which, like other arctic areas, is sparsely populated. The Sami population is estimated to be about 100,000 individuals living in northern Fenno Scandinavia, including the Russian Kola Peninsula. The majority (70%) of Sami live in Norway, where they are formally considered an indigenous people with their own culture and native language. During the last three decades, a process of integration and increased ethnic revival has gradually replaced a history of forced assimilation and colonization. The outcome of the acculturation and the ethnic revitalization processes has varied in different regions inhabited by Sami, such as the highland of the northernmost county Finnmark which is considered as the Sami core area, and the coast. The assimilation process had the greatest impact on the coastal communities where the Sami became a minority, and many Sami lost their Sami identity and their language [9]. In this area, prejudice and ethnic conflicts about for instance land rights and teaching in the Sami language are still present, as well as little structural and practical support for the Sami culture. In the highland communities, however, the majority of the population is Sami and Sami speaking, several Sami institutions are resided here such as the Sami parliament, Sami research centres and broad casting, and education in the indigenous language is possible from compulsory school to

college level. There is a well-organized indigenous oriented health and social service of high professional level run by Sami medical doctors, social workers, nurses, etc. The strengthening of the Sami culture in this area has taken place particularly during the last three decades.

In general, the socio-economic status in most Sami areas is at the lowest national level with regard to income, educational level and employment. Generally, there are more use of social well-fare and disability benefits, more single-parent families, and a higher rate of people belonging to the primary industries like fishing and reindeer herding than elsewhere. However, the status within the Sami communities varies considerably with municipalities in the Sami core area showing the most advantaged situation. In this area the proportion of college and university graduated females aged 25–40 years is on the highest national level.

The Sami areas are characterized by a younger population with approximately 60% of the population being younger than 39 years of age [10]. According to the relatively few studies on the health situation in the Sami population, there is no evidence of a more disadvantaged health status. Compared to the majority population studies have shown less alcohol use among Sami adults and adolescents [11, 12], similar rates of mental health problems, smoking and sexual risk taking behavior for adolescents [12, 13], equal or lower rates for infectious and cardiovascular diseases [14–17]. This picture differs with that for several other indigenous groups worldwide.

Semi-nomadic reindeer herding is one of the traditional Sami core occupations. Although reindeer herding has undergone radical changes during the last decades due, in part, to increased motorization and socio-economic pressure, reindeer herding is still an important way of living and a significant symbol of Sami culture.

In the 1980s, the suicide rate among young males was particularly high in some areas in Arctic Norway where the majority of the population was Sami. The suicides were assumed to reflect mental health problems in Sami areas arising from identity problems and cultural change [18]. However, studies among Sami adolescents on mental health and suicidal behavior showed only weak or no associations to ethnocultural factors [Kvernmo and Rosenvinge, submitted; 19]. There are few epidemiological studies of the Sami people in Norway, and the suicide mortality among Sami in Arctic Norway has never before been explored in a systematic way.

The purpose of this study was to examine the suicide mortality among Sami in Arctic Norway during the last three decades, 1970–1998. Another purpose was to investigate the suicide mortality between subgroups according to age, gender, cultural context, and traditional Sami core management.

Materials and method

Study cohort

In connection with the national census in 1970, a survey of Sami ancestry was performed in preselected census tracts in the three northernmost counties of Norway: Nordland, Troms and Finnmark. The study was carried out by Statistics Norway in cooperation with Sami organizations [9]. Established knowledge and pilot studies on Sami inhabitation were used to identify the areas. The selected census tracts covered 6.1% of the population in Nordland, 22.9% in Troms and 89.7% in Finnmark.

Our cohort included 19,801 persons with Sami ethnic ancestry, 10,573 men and 9228 women. The cohort included 890 people from Nordland, 4847 from Troms and 14,064 people from Finnmark. Information about date of birth, sex, residence and occupation was supplied by the regular census. People living in the same household were identified. Parents were allowed to answer on behalf of their children.

Procedure

Since there is no registration of ethnicity in the national population register in Norway, we used the national census from 1970 to define the Sami cohort. Information on vital status and cause of death of the subjects identified as Sami in the census where obtained through record linkage with the Norwegian Causes of Death Register and were compared to the expected number of deaths in a control population residing in rural Arctic Norway. The follow up of suicide incidence took place from the beginning of November, 1970 (date of census) until the end of 1998. The follow-up included 471,028 person years, 245,408 for men and 225,620 for women. Altogether, 5955 deaths and 172 emigrations were observed in the cohort. The study obtained consent from the Regional Medical Ethical Committee and The Norwegian Data Inspectorate.

Measures

Ethnicity

In selected areas, the census forms were supplemented with four questions about Sami ancestry: (1) Was Sami (Lappish) the first language spoken by the person? (Yes/no). (2) Was Sami (Lappish) the first language spoken by one of the person's parents? (Yes/no/don't know). (3) Was Sami (Lappish) the first language spoken by one of the person's grandparents? (Yes/no/don't know?). (4) Does the person consider himself or herself a Sami (Lapp)? (Yes/no/uncertain/don't want to answer).

Sami ethnic ancestry was categorized on the basis of these four inclusion questions. If the person

answered positively on one of the four questions he/she was categorized as Sami. The first three questions were considered to be of an objective character and the last question to be more subjective.

Ethnic context

The Sami population was divided into three groups regarding ethnic context. Ethnic contexts were classified according to the density of Sami within the municipality of residence [9] and grouped into three categories: (1) Southern area, low density (< 25%), (2) Coastal area, medium density (25–60%) and (3) Sami core area, high density (> 60%) of Sami.

Reindeer herding

If at least one person in the household participated in semi-nomadic reindeer herding, all the persons in the household were categorized as belonging to reindeer herding household.

Suicide registration

Cause of death of the subjects identified as Sami in the census where obtained through record linkage with the Norwegian Causes of Death Register. Cases of suicide were identified by the International Classification of Diseases (ICD-10) code (X60-X84, Y87.0). Recoding from ICD-8 and ICD-9 was done accordingly.

Statistics

The mortality of suicide in the cohort was compared with that of the rural population within the same three counties in Arctic Norway, weighted according to the number of Sami in each. Gender, 5-year calendar periods and 5-year age groups were used for computing reference rates. Expected values were computed by multiplying the person years in the cohort by the reference rates. Standardized Mortality Ratios (SMRs) were computed by taking the ratio of observed to expected cases of suicide. For these estimates, the 95% confidence intervals (95% CI) were computed, based on the assumption that observed suicides/cases follow the Poisson distribution.

Results

In the study period 1970–1998, a total of 89 suicides occurred in the Sami cohort. There was a moderate significant increased risk for suicide among Sami (SMR = 1.27, 95% CI = 1.02–1.56), showing

Table 1. Distribution of suicide mortality for 19,801 people of Sami ancestry, 1970–1998

Variables	Men				Women			
	O	E	SMR	95% CI	O	E	SMR	95% CI
Suicide	70	55.1	1.27	0.99–1.61	19	14.9	1.27	0.77–1.99
County								
Finnmark	59	39.2	1.50	1.14–1.94	17	11.0	1.55	0.90–2.48
Troms	10	13.5	0.74	0.36–1.37	0	3.3	0.00	0.00–1.11
Nordland	1	2.4	0.42	0.01–2.35	2	0.6	3.17	0.38–11.46
Cultural context								
Sami core area	30	19.5	1.54	1.04–2.20	7	5.3	1.31	0.53–2.70
Coastal area	38	30.7	1.24	0.88–1.70	10	8.3	1.21	0.58–2.23
Southern area	2	4.9	0.41	0.05–1.48	2	1.3	1.51	0.18–5.46
Reindeer herding								
No	64	49.4	1.30	1.00–1.65	18	13.4	1.34	0.80–2.12
Yes	6	5.7	1.06	0.39–2.30	1	1.5	0.66	0.02–3.68
Age								
0–14	0	0.2	0.00	0.00–20.14	0	0.0	0.00	
15–24	21	11.6	1.82	1.13–2.78	6	1.9	3.17	1.17–6.91
25–34	17	12.6	1.35	0.79–2.17	5	2.7	1.83	0.59–4.27
35–44	12	8.6	1.40	0.72–2.44	3	2.7	1.13	0.23–3.30
45–54	13	9.0	1.45	0.77–2.48	2	2.8	0.72	0.09–2.61
55–64	5	6.2	0.81	0.26–1.89	3	2.2	1.36	0.28–3.99
65–	2	7.0	0.29	0.03–1.03	0	2.7	0.00	0.00–1.39
Time period								
1970–80	16	13.7	1.17	0.67–1.90	4	3.5	1.14	0.31–2.92
1981–90	36	26.4	1.36	0.95–1.89	10	5.2	1.92	0.92–3.54
1991–98	18	15.0	1.20	0.71–1.90	5	6.2	0.81	0.26–1.88

Notes: Observed number of suicides (O), expected number of suicides according to a regional reference population (E), standardized mortality ratios (SMR) and 95% confidence interval (CI).

increased suicide mortality for both genders (Table 1). The mortality rate between 1970 and 1998 for Sami men and women was 28.5 and 8.4 suicides per 100,000 person years, respectively.

Significant increased suicide mortality was found for Sami males and females aged 15–24 years (SMR = 1.82, 95% CI = 1.13–2.78 and SMR = 3.17, 95% CI = 1.17–6.91, respectively). About 30% of the suicides in the study cohort occurred in the 15–24 years age group with a male/female ratio of 3.5:1. The suicide rates in 15–24 years olds were 53.2 per 100,000 person years for males and 16.0 for females (Figure 1). As can be seen from Figure 1, suicide rates among Sami males showed two striking peaks, at age 15–24 and at age 45–54. Among Sami females the suicide rates were highest at age 15–24 and at age 55–64. For both genders, there was a marked fall in the oldest age groups.

Sami males residing in Finnmark County had a significantly increased mortality by suicide (SMR = 1.50, 95% CI = 1.14–1.94). With respect to cultural context, there was a significant increase in suicide mortality among Sami males residing in Sami core area (SMR = 1.54, 95% CI = 1.04–2.20). Across gender, Sami belonging to semi-nomadic reindeer herding household did not have significant increased suicide mortality compared to the reference population. Sami males not belonging to semi-nomadic reindeer herding household had a significantly increased mortality of suicide. A corresponding significant result was not found among Sami women.

No significant changes in male and female rates were observed over time periods during the study period. For both males and females, a higher relative risk of suicide was observed from 1981 to 1990 compared to the reference population. The estimated suicide rates for the time periods 1970–80, 1981–90, 1991 and 1998 were 15.9, 42,0 and 30.4 per 100,000 person years for Sami males and 4.8, 12.6 and 8.8 per 100,000 person years for Sami females, respectively (Figure 2).

Firearm (41%) and hanging (37%) were the two most common methods of suicide used by Sami males (Table 2). Among Sami females, hanging accounted for the highest proportion of deaths by suicide (53%), followed by intoxication (26%) and drowning (21%) (Table 2).

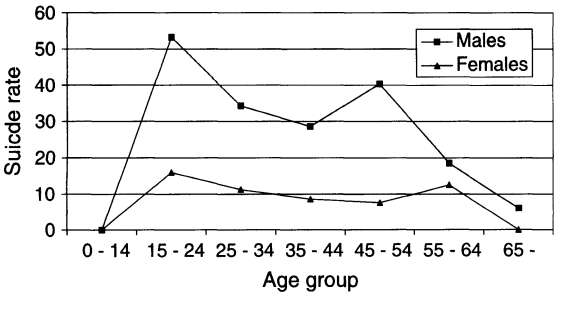

Figure 1. Suicide rates per 100,000 person years in Sami by age group and gender, 1970–98.

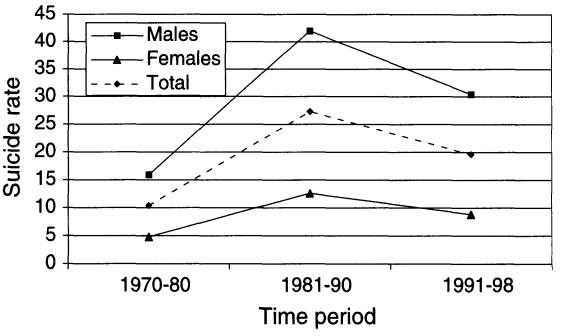

Figure 2. Suicide rates per 100,000 person years in Sami by time periods and gender.

Discussion

The main finding in this study is that of a significant moderate increased suicide risk among indigenous Sami in Arctic Norway compared to the reference population. Although great variation in prevalence of suicidal behavior is found between and within different indigenous groups [5], our finding corresponds with other research that generally reports higher suicide rates among indigenous groups than among majority populations [1–4]. On the other hand, our finding is inconsistent with results from a study among Sami adolescents and their non-Sami peers in Arctic Norway, which reports no ethnic differences in prevalence of self-reported suicide attempts [Silviken and Kvernmo, submitted]. Although there was found no ethnic differences in this study, suicidal behavior among indigenous Sami adolescents seemed to be related to cultural factors. Among Sami adolescents' risk factors diverging from traditional Sami cultural norms were associated with suicide attempts, such as alcohol intoxication, single-parent home and paternal overprotection.

The significant increase in suicide mortality among Sami males aged 15–24 years old, is consistent with findings among other indigenous groups [3, 5, 20] and

Table 2. Distribution of methods of suicide used by 89 persons of Sami ancestry, 1970–1998

	Men	Women	Total
Method	*n*, (%)	*n*, (%)	*n*, (%)
Intoxication	9 (13%)	5 (26%)	14 (16%)
Hanging/strangulation	26 (37%)	10 (53%)	36 (40%)
Drowning	2 (3%)	4 (21%)	6 (7%)
Firearm	29 (41%)	0	29 (33%)
Cutting	2 (3%)	0	2 (2%)
Jumping	1 (1%)	0	1 (1%)
Other, not reg.	1 (1%)	0	1 (1%)
Total	70 (100%)	19 (100%)	89 (100%)

with the trend seen among young males in Norway during the study period [21]. Although the finding that indigenous Sami females aged 15–24 years also had a significant increase in suicide mortality is consistent with findings among other indigenous adolescents [22], the finding was surprising due to the lack of attention paid to female suicides in the Sami society. However, the finding is in accordance with results from the study among Sami adolescents in Arctic Norway [Silviken and Kvernmo, submitted], that report a higher lifetime prevalence of suicide attempts among Sami females compared to their majority counterparts. Although the suicide rates among adolescents and young adults aged 15–24 years in Arctic Norway are, in general, high (in 1994, males 37/100,000 and females 6/100,000 [23], respectively), the rates found among young Sami in the study period are even higher. In contrast to the national population's suicide rates, which indicate minor differences between age groups among adults [24], the age specific rates among Sami indicate a more variable pattern, especially among males. This pattern is more consistent with findings among other indigenous populations where suicide rates peak at age 15–24 and then decrease with age [25].

The finding that Sami males residing in Sami core area had a significant increase in suicide mortality indicates within group variation with respect to cultural context and gender. This finding is unexpected, due to the fact that structural and practical support for the Sami culture and degree of self-government are high in the Sami core area when compared to the other two cultural contexts. Based on the documented negative consequences of cultural assimilation [26] and low degree of self-government [8], we expected to find significant increased suicide mortality in the low and medium density cultural contexts. According to The North Norwegian Youth Study from the mid nineties, Sami adolescents in the Sami core area reported the strongest ethnic identity, separation attitudes, but at the same time also favored integration more than peers in the other areas [27]. The study also revealed that ethnocultural factors did not have any impact on mental health in young Sami males in this context at this time [19]. The suicides in young males in this area mainly took place a decade before The North Norwegian Youth Study and at the beginning of a strong cultural revival period and in an older cohort who possibly did not benefit from the positive socio cultural development in their area. Crossing and mismatching expectations from both the indigenous Sami and the dominant Norwegian societies may possibly have created stress and psychological maladjustment for vulnerable young indigenous males without the necessary bicultural competence and coping strategies. These cultural factors can have accumulated other risk factors well-known for suicidal behavior, such as alcohol misuse, depression, loss of significant others etc.

The Sami core area has generally had a high rate of suicide during the last three decades, especially at the end of the 1980s. During a 12-month period, eight persons committed suicide in the study cohort. This outbreak of suicides took place mainly in two neighboring villages in the Sami core area having a total population of approximately 6000 inhabitants. This outbreak was probably triggered by mechanisms other than ethnicity per se; for example, by imitation and contagion. Due to the small numbers of inhabitants in the Sami communities and the interconnectedness of the population, any suicide might serve as a role model for others and may, through contagion, influence already vulnerable inhabitants. A study from Japan found that after controlling for structural conditions, proximity to high suicide rates increases the risk of suicide [28]. Clustering of suicides is one of the common features concerning suicide among indigenous people, and has been reported in several Native American communities in both the US and Canada [29, 30] and among indigenous in Australia [5]. Generally, clustering of suicides is more common among adolescents and young adults [31]. Clustering has, therefore, been proposed to occur to a greater extent among indigenous people due to their generally high proportion of young people in the populations [20]. Since there is a higher proportion of young people in the Sami population [9], this may be a plausible factor explaining the outbreaks of suicide among Sami in Sami core area. Accordingly, these outbreaks of suicide may have contributed to the increased suicide mortality found among Sami males in Sami core area and across gender among young Sami aged 15–24 years old.

There was almost no increased suicide mortality among Sami males and a lower risk among Sami females belonging to reindeer herding household. This finding is consistent with a study from Sweden [32], which showed no significant increased risk of suicide among reindeer herding Sami males. Our finding may indicate that a traditional way of living with a strong ethnic group membership such as reindeer herding, acts as a protective factor against suicide among Sami in Norway. This finding may be due to the significance of reindeer herding as a traditional, culturally significant occupation among the Sami in Norway. Today, Sami in Norway who are involved in reindeer herding have high status within the Sami culture. They occupy a unique cultural position and have a strong ethnic identity [33].

Suicide mortality among Sami in Arctic Norway has followed the same time patterns as in the non-Sami reference population in the study period. In the time period 1981–90, there was an increase in suicide mortality among Sami males and females. This peak corresponds with the clusters of suicide in Sami core area and also with the general suicide rates in Norway which increased in the period 1970–1989 [34]. In 1988, the suicide mortality rate was at the highest

level ever in Norway with a rate of 16.8/100,000, compared to 12.4/100,000 in the year 1998 [24].

The finding that Sami males relatively often use violent methods such as firearms is consistent with findings among other indigenous males [20], and is a common feature concerning suicide among indigenous peoples [5]. Firearms are reported to be responsible for over 50% of all suicides among Native Americans [20]. However, compared to the national rates among Norwegian males (33%, 1976–98) [24], the use of firearms among Sami males is not exceptionally high. One factor that possibly influences the extensive use of firearms among Sami in Arctic Norway, and in Norway, in general, is the widespread ownership of firearms due to traditional and modern hunting/labor and leisure time activities. The finding that about half of the Sami females used a violent method (hanging) is inconsistent with the general opinion that women tend to use less violent methods [35], however consistent with findings among other indigenous females [22]. Although hanging has increased among young females (10–24 years) in Norway during the period 1973–1994 [21], the high frequency found among Sami females exceeds the general national frequency for females (27%, 1976–98) [24]. Due to the small number of suicides among Sami females in this study, further research will be required to determine whether this pattern is representative for Sami females in Arctic Norway. One of the worrying aspects of the high frequency of suicide by hanging is that, in contrast to suicide by firearms, little can be done to reduce the frequency by limiting access to the implements used [36].

Our cohort did not include all people of Sami origin in North Norway, and even some Sami who were living in the census wards did not participate. In the areas covered by the study, some Sami, for example, may have disapproved of the questions about ethnic background because they perceived them to be controversial. Others may not have answered all the questions because of lack of knowledge about their ethnic ancestry. Underreporting of Sami origin is therefore possible [9]. In computing the local reference rates, we were not able to exclude the Sami people, so our estimates of the relative risks for Sami people could well be slightly biased towards unity. We presume that those categorized as Sami in this study, in one or another way, have an affiliation to Sami culture, in contrast to those who did not report Sami affiliation.

In Norway, there has been an official register for suicides since 1826 [34], and the official suicide statistics in Norway are considered to have sufficient reliability and validity on a national level [37]. However, the significance given to the outbreaks of suicide in this article must be viewed with caution. The suicide outbreaks referred to have not been analyzed statistically to distinguish significant elevations from random fluctuations within a larger study period. Assumptions about suicide outbreaks are based on data from the Norwegian Causes of Death Register and simple statistical comparisons. However, several factors indicate that a cluster of suicides, in fact, took place in Sami core area during the 1980s. During a period of 12 months, eight males in the study cohort from Sami core area committed suicide. The victims were living in physical proximity to one another, they had knowledge of one another, and some of them were even close friends. The cluster accounted for about 27% of the completed suicides among males in Sami core area during the study period 1970–1998. Aggregation of suicide statistics among indigenous people may lead to misleading interpretations if clustering of suicides with respect to time, group and locality is not taken into consideration [5].

Conclusion

There was a significant moderate increased suicide risk among indigenous Sami in Arctic Norway compared to the reference population during the study period 1970–1998. Several common features concerning suicide among indigenous people have been identified. The outbreaks of suicide in Sami core area is one factor that may have contributed to the increased suicide mortality found in subgroups among indigenous Sami. Future studies are necessary to explore the relationship between suicide and ethno cultural factors, such as ethnic identity, acculturation and cultural change, but also the pattern of general risk and protective factors. Suicide prevention among indigenous Sami in Arctic Norway requires data derived from specific target communities, so that local trends and population characteristics can be identified, and appropriate strategies devised from both the Norwegian and the Sami society.

Acknowledgements

This project has been financed with the aid of EXTRA funds from the Norwegian Foundation for Health and Rehabilitation. The authors want to thank Bjarte Aagnes, Cancer Registry of Norway, for his computational assistance.

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