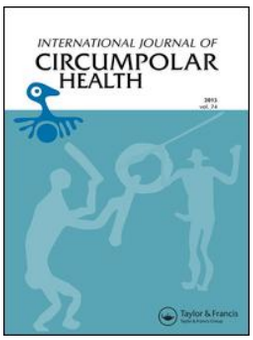

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ORIGINAL ARTICLE

Ethnicity, self-reported health, discrimination and socio-economic status: a study of Sami and non-Sami Norwegian populations

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ABSTRACT

Objectives. Investigate the association between ethnicity, social factors and self-reported health conditions of Sami and non-Sami Norwegian populations.
Study design. Cross-sectional questionnaire.
Methods. SAMINOR is a population-based study of health and living conditions that was conducted in 24 municipalities in northern Norway during 2003 and 2004. The present study included 12,265 individuals aged between 36 and 79, whose ethnicity was categorized as Sami (33.1%), Kven (7.8%) and Norwegian majority population (59.1%).
Results. Sami respondents reported inferior health conditions in comparison to the Norwegian majority population. The most unsatisfactory conditions were reported by Sami females living outside the defined Sami area (with greater integration and assimilation) ($p<0.05$). Females typically reported less favourable health conditions than did males. Health inequalities varied by age and were more apparent in persons aged in their mid-50s or above. Across ethnic groups, respondents with the highest education and household income were healthier than others. Furthermore, those reporting to have been frequently discriminated against were more likely to report poorer health than those who did not; the odds ratios (95% CI) was found to be 2.88 (1.92-4.32) for women and 1.61 (1.08-2.42) for men. When discrimination was included in the logistical model, the increased risk of poor self-reported health decreased to non-significance for Sami respondents. The estimated risk decreased further when the socio-economic status was taken into account.
Conclusions. The findings of this study suggest that self-reported ethnic discrimination combined with low socio-economic status contributes to inequalities in self-reported health when Sami and Norwegian majority population are compared.
(Int J Circumpolar Health 2010; 69(2):111-128)

Keywords: ethnic discrimination, socio-economic status, self-reported health, ethnicity, indigenous, Sami, SAMINOR

INTRODUCTION

International research suggests that there are several ways in which discrimination adversely affects the health of individuals (1). First, and perhaps most significantly, discrimination may affect well-being and physical health by creating ethnic divisions in socio-economic status (SES) and by restricting access to goods and services. Second, members of ethnic minorities often internalize the majority population's discriminatory ideologies and these may have health-related consequences (1). From 1850 to 1959 the Norwegian government made intense efforts to assimilate the Sami people by forcing them to adopt the Norwegian language and changing the basic value structure of their Indigenous culture and identity (2,3). Failure to comply with this process often led to stigmatization and discrimination of the Sami identity, language and culture (4). Today, the situation has changed, however. Sami society has experienced an ethnic and cultural revival in recent decades (5,6), and modern Sami history is marked by the fight to be recognized as an Indigenous people with a strong culture, let alone as human beings. The Alta Dispute (1979-1981), in which Sami activists organized opposition to the damming of the Alta River (gaining strong support nationally and internationally), was an event of great significance in promoting the Sami cause. The dispute was followed by a string of government reports and results began to materialize in the late 1980s in the form of important legislative changes. Further, the construction of new Sami institutions (i.e., the Sami Parliament) provided a strong feeling of belonging to a larger, international community and strengthened the position of the Sami people as an Indigenous minority in relation to the circumpolar nation-states (7). Thus, the Sami are on the road to cultural equality and are less socially disadvantaged when compared to other Indigenous peoples; this is apparent in measurements of education, health, research, arts and political power. For instance, young Sami individuals (females in particular) are increasingly better educated (8).

Despite recent developments, members of the Sami population are more likely to face ethnic discrimination and bullying in comparison to the Norwegian majority population (5). In a former study by Hansen et al. (5), Sami participants aged between 36 and 79 reported a significantly higher prevalence for both ethnic discrimination and bullying. Discrimination may act as a stressor that adversely affects health (11). The Sami population, having experienced colonization, could suffer from acculturative stress. Indigenous peoples have had to adapt to and, ultimately, have been assimilated by the dominant external colonizing power (11-13). Acculturative stress, hence, refers to coming to terms with the majority population, including the burden of dealing with two sets of cultural skills and references, identity issues, self-esteem and despair (11). Such experiences lead to disadvantages that may translate into health conditions. However, little is known about the impact of ethnic discrimination and bullying on health and ethnicity-based inequalities. Also, such conclusions would be based on studies performed abroad and would not necessarily apply to the Sami population (1,12-14).

Attempts have been made to explain ethnicity-related health inequalities through socio-economic status (SES), culture or genetics (15,16). Previous studies that take SES

into account tend to explain ethnicity-related health inequalities by cultural differences (16). In many cases, SES is regarded merely as a cofactor, and its role as a substantial variable in its own right is often neglected (17). A large body of evidence supports the argument that ethnic inequality in terms of health is largely a consequence of socio-economic differentials. While a growing number of studies suggest that measurements of SES are becoming increasingly accurate and may explain disparities, others argue that the relationship between ethnicity and health could be determined by lifetime disadvantages (15,16). Such studies have been conducted in Sweden (14), New Zealand (12,13), the United States (18,19), the United Kingdom (16), the Netherlands (20), Israel (21) and Canada (22).

Epidemiological research on the association between self-reported ethnic discrimination and health has only recently emerged (23). Despite the growth in the number of studies addressing ethnic discrimination and health, the causality as well as the manner in which ethnicity may be included in health research are still subject to considerable debate (15). Hence, the literature does not adequately address whether and how exposure to discrimination leads to increased risk of illness (24). Gaps in the literature include limitations related to measuring discrimination, research designs and insufficient knowledge about how the association between discrimination and health unfolds during the lifetime of an individual (24).

Self-reported health (SRH) is a trusted indicator for morbidity (19). SRH is a subjective appraisal of health and a powerful predictor of survival, functional decline, future morbidity and subsequent use of health services (25), even when a variety of physical, sociodemographic and psychosocial health status indices are controlled for (26). A Norwegian study concluded that SRH is a highly important health indicator in population studies (27). These findings may be explained by a number of theories. One is that SRH may reveal health conditions that are undetectable by biomedicine or illnesses that are not typically part of medical examinations. Another theory is that SHR merely reflects lifestyle, where psychosocial and sociodemographic conditions (referred to as "the new morbidity") are known to be associated with adverse health implications (28). Several studies have shown that SRH varies by ethnicity (12,29,30); Indigenous peoples typically rate themselves in poorer health than respective majority populations (1,12,13,17). Immigrant groups living in Oslo, the capital of Norway, reported that they were in good health less frequently than the Norwegian majority population (31). Unfortunately, no studies have been conducted regarding the association between discrimination and self-reported health among the Sami population in Norway. However, in a recent systematic and international review of the association between self-reported racism/ethnic discrimination and health, 17 of 40 studies that measured self-reported health status found an association (23).

The main goals of this study are as follows: (1) identify the prevalence of poor self-reported health among Sami and non-Sami populations living in Norway; (2) investigate whether ethnicity is associated with poor self-reported health; and (3) determine if such an association could be explained by factors such as ethnic discrimination and socio-economic status.

MATERIAL AND METHODS

The SAMINOR study

This study is based on data from the population-based study of health and living conditions in areas with mixed Sami, Kven and Norwegian majority population (the SAMINOR study), for which data were collected during 2003 and 2004. Questions about ethnicity, experiences of ethnic discrimination/bullying, current health situation and sociodemographic characteristics were collected by means of three different questionnaires. The questionnaires were self-administered, but the respondents were reminded to fill out the questions about ethnicity during screening. The questionnaires were available both in the Norwegian and Sami languages. Further details on the collection process and methods have been published previously by Lund et al. (32).

Geographical area

The study included selected municipalities in Norway in which more than 5% of the population had reported to be of Sami descent in the 1970 Population Census (33) as well as some districts that had reported a lower percentage of ethnic Sami; the Census assumed self-reported Sami ethnicity to be under-reported because of the long history of intensive assimilative pressure (33). In all, 24 municipalities stretching from Trøndelag in central Norway to Finnmark in northern Norway were included in the survey.

The Administrative Area of the Sami Language

In 1990, Norway passed section 3 regarding the Sami language in the Sami Act (of 1987), making the Sami language an official language of Norway specific to the municipalities of Kautokeino, Karasjok, Kåfjord, Nesseby, Porsanger and Tana; today Tysfjord (2006), Snåsa (2008) and Lavangen (2009) have been incorporated. These municipalities are referred to as the Administrative Area of the Sami Language (9). The purpose of section 3 is to safeguard and develop the language, culture and way of life of the Sami people. Within the Administrative Area, the Sami population has the right to receive adequate instructions in Sami, to use the language in public transactions and to adopt the language within the public school system. Even outside these designated municipalities, individuals have the right to receive instruction in the Sami language (10).

Classification of ethnicity

The questionnaire asked participants about the language used at home by the participants, their parents and grandparents, with the available choices being "Sami, Norwegian, Kven or Other (to be specified)." Questions regarding the ethnic background of participants and their parents were linked with the same 4 response options. Additionally, participants were asked about self-perceived ethnicity. They were allowed to provide more than one response to every question contained in the questionnaire. Five categories of responses to questions about ethnicity were developed:

1. Sami I: Respondents, their parents as well as their maternal and paternal grandparents all use the Sami language in the home.
2. Sami II: Respondents report having at least two Sami-speaking grandparents.
3. Sami III: Sami language or ethnicity applies to respondents or at least one of their parents or grandparents.

4. Kven: Participants are descendants of Finnish-speaking immigrants from northern Finland and Sweden who settled in northern Norway in the 1700s and 1800s.
5. Norwegian majority population: Participants report having no Sami or Kven affiliation.

In this study, Kvens are defined as participants who report speaking the Kven language and whose ethnicity applies to themselves, one of their parents or one of their grandparents. Since we are particularly interested in the Sami population, participants with dual Sami and Kven backgrounds are defined as Sami. Immigrants, defined as being born abroad and not reporting Sami, Kven or Norwegian ethnicity or language (272 respondents) were excluded from the analysis. Further details on the categorization of ethnicity in the SAMINOR study have been published previously by Lund et al. (5,32).

Sample

People between 36 and 79 years of age living in the SAMINOR area (a total of 27,151 persons) were invited to participate in the SAMINOR study, of which 16,538 chose to participate and gave informed consent to medical research, resulting in a response rate of 60.9% (32). Our sample was further restricted to the 12,265 individuals who responded to questions about ethnicity and ethnic discrimination experiences, of which 127 respondents did not report their current health status. Thus, the study sample consisted of 12,138 individuals. The ethnic distribution was found to be Sami (33.1%), Kven (7.8%) and Norwegian majority population (59.1%).

Ethnic discrimination or bullying

On this topic, participants were asked: "Have you ever experienced bullying or discrimination on account of your ethnic (Sami, Kven, Russian, Tamil, Norwegian, etc.) background?" Response options were "Very often," "Sometimes," "Rarely" or "Never."

Socio-economic status

The participants' levels of education were categorized according to how long they had spent in educational institutions (in years), with "Low" being defined as less than 10 years, "Medium" between 10 and 13 years and "High" as more than 13 years. Incomes (2003-2004) were categorized according to gross household income (in Norwegian crowns, NOK), with "Low income" defined as a household income of less than NOK 150,000, "Medium low income" between NOK 150,000 and 450,000, "Medium high income" as between NOK 451,000 and 600,000, and "High" defined as more than NOK 600,000.

Self-reported marital status

Choices were single, married or cohabiting.

Self-reported health

Self-reported health was measured using the following question: "What is your current state of health?" Available responses were "Poor," "Not very good," "Good," and "Very good." During our analysis, the variable was dichotomized into "poor/not very good" or "good/very good."

Ethics

Ethical approval was granted by the Regional Committee for Medical Research Ethics in northern Norway and from the Data Inspectorate.

Statistical analyses

SPSS statistical software for Windows version 15, SAS statistical software for Windows version 9.1 and AMOS for Windows version 7.0 were used for data processing and statistical analysis. The Cochrane Mantel Haenszel (34) test for categorical variables was used to test for differences between explanatory variables among ethnic groups (corrected for age). The prevalence of poor self-reported health by ethnicity for men and women were corrected for age using the WHO World Standard Population (35), by segmenting the following groups: 36-49, 50-64 and 65-79 years of age. The effect of ethnic discrimination on the prevalence of poor self-reported health was analysed by applying a logistic regression model (34). The results are presented as odds ratios (OR) with a 95% confidence interval (CI). Possible interactions were tested for; however, significant interactions were not established. One by one, explanatory variables were introduced to the main effect models. This was done in separate analyses for men and for women. Model improvement was measured as the difference in -2xlog likelihood and the degrees of freedom between the smaller model and the extended model.

Finally, variables were further examined using path analyses, a special case of structural equation modelling (SEM). Considering the theory and results of previous research, variables were treated as either predictor or mediator variables. Socio-economic status and ethnic discrimination were treated as hypothesized mediators. In total, 14 paths between ethnicity and poor self-reported health were tested. In Structural Equation Modelling (SEM), the absolute value of path coefficients may be interpreted as representing effect values. Path coefficients are standardized regression weights indicating the degree to which predictor and predicted variables relate to each other after controlling for effects of other variables. Similarly to correlation coefficients, path coefficients range from -1 to +1 (36). Model fit was assessed with the root mean square error of approximation (RMSEA), the comparative fit index (CFI) and the Tucker-Lewis index (TLI) (37), which are better than typical chi-square goodness-of-fit measures for large samples (38-39). Generally, a RMSEA value of less than 0.05 indicates a good fit between the model and observed data; a RMSEA value of less than 0.08 indicates an adequate fit (37,40). The model is better when CFI and TLI approach 1.0 (37).

RESULTS

Table I (men) and Table II (women) show characteristics of the study sample of participants 36 to 79 years of age according to ethnicity. About 4 in 10 men and 1 in 3 women who were classified as Sami I reported having experienced ethnic discrimination "Often" or "Sometimes." This group had the highest percentage of individuals with a household income of NOK 150,000 or less and education less than 10 years for both men and women. However, the percentage of Sami I women with more than 13 years of education was similar to the Norwegian group. The Sami II, Sami III and Kven categories reported income and education levels similar to the Norwegian majority population. The frequency of marriage or cohabiting was highest among the Norwegian majority population and lowest in the Sami I group. People categorized

as Sami I mainly lived within the Administrative Area of the Sami Language (80%), while the Norwegian majority population typically lived outside the Administrative Area (90%) (Table I and Table II).

Sami and Kven participants reported poorer health than the Norwegian majority population (Table III and Table IV). Women generally reported having inferior health to men. Outside the Administrative Area, the Sami women reported the poorest health; of these, those with the worst health were subjects reporting Sami as the language spoken at home for the three past generations (Sami I). Within the Administrative Area, Kvens had the lowest score in terms of health status. Participants who were frequently discriminated against, poorly educated, financially less well-off and single reported the greatest health deficiencies. The findings suggest a significant association between rates of discrimination and poor self-reported health. In the ANOVA F-test for the trend gave the following figures for men: F=15.7, df=3 and p=0.001. For women, the corresponding figures were F=15.3, df=3 and p=0.001.

Fig. 1 shows that the ethnic pattern of reporting poor health varies by age group. It suggests relatively small absolute differences from the age 36 to 50 years, with large differences beginning to emerge at the age of 51 to 55 years and becoming prominent in participants aged 56 to 60 years and above. Although we only found significant differences between the ethnic groups in the ages 56-60 (Sami III<Norwegian majority population; p=0.03) and 66-70 (Sami I<Norwegian majority population; p<0.01).

Logistic regression was used to investigate the association between ethnicity and poor self-reported health, and to determine whether ethnic discrimination or socio-economic status could explain such an association. Table V and Table VI show the step-by-step inclusion of explanatory variables for men and women, respectively. Age-adjusted odds ratio (OR 95%=CI) estimates indicated an elevated risk of poor self-reported health for the Sami groups in comparison to the Norwegian majority population group, in the case of both men and women. When ethnic discrimination was included in the model, the estimates were no longer significant for any of the ethnicity categories. The decrease in the odds ratio estimate of poor self-reported health was most significant for individuals classified as Sami I, with the values for males decreasing from OR=1.23 (1.03-1.48) to OR=0.89 (0.73-1.10) and for women from OR=1.24 (1.04-1.47) to OR=0.99 (0.82-1.21). The inclusion of education and household income decreased the estimate even further - independently of ethnicity and gender - for example, the odds ratio estimate for males belonging to the Sami I group dropped to 0.79 (0.64-0.99). After controlling for SES, ethnic discrimination was still found to be significant. Respondents who reported discrimination as happening "Often" were more likely to report adverse health conditions than those who did not report ethnic discrimination at all; the estimates were adjusted to OR=2.88 (1.92-4.32) and OR=1.61 (1.08-2.42) for females and males, respectively. The odds were 46% higher for females and 96% higher for males, for participants who reported experiencing ethnic discrimination "Sometimes" (Table V and Table VI). These tests were performed separately according to the Administrative Area of Sami Language, with a distinction between

Table I. Distribution of the explanatory variables by ethnicity (men, n=5,925).[1]

Variable	Sami I (675) %	Sami II (929) %	Sami III (424) %	Kven (484) %	Norwegian majority population (3413) %	p-value
Age						
36-57	59.1	67.2	57.5	55.2	60.1	
58-79	40.9	32.8	42.5	44.8	39.9	<0.001
Ethnic discriminated against						
Often	9.8	4.3	2.8	1.2	0.5	
Sometimes	28.4	16.5	12.0	6.6	3.0	
Seldom	28.7	23.3	24.1	15.5	9.7	
Never	33.0	56.0	61.1	76.7	86.7	<0.001[a]
Level of education						
Low	60.0	49.0	51.5	52.6	46.0	
Medium	17.6	22.5	16.6	18.7	21.4	
High	22.4	28.5	31.9	28.6	32.6	<0.001[a]
Marital status						
Married/Cohabiting	69.6	72.2	77.4	80.0	81.8	
Single	30.4	27.8	22.6	20.0	18.2	<0.001[a]
Household income						
Low	17.7	8.8	8.7	8.5	6.3	
Medium low	58.2	57.3	58.3	52.6	56.4	
Medium high	15.8	22.8	20.1	23.9	24.4	
High	8.3	11.1	12.9	15.0	12.9	<0.001[a]
The Administrative Area						
Within	78.1	45.2	31.6	25.6	9.7	
Outside	21.9	54.8	68.4	74.4	90.3	<0.001

[1]Subgroups might not total 5,925 due to missing values.
[a]Cohran-Mantel-Haenszel test, adjusted for age.

Table II. Distribution of the explanatory variables by ethnicity (women, n=6,340).[1]

Variable	Sami I (685) %	Sami II (927) %	Sami III (430) %	Kven (473) %	Norwegian majority population (3825) %	p-value
Age						
36-57	65.0	71.2	66.5	52.9	64.6	
58-79	35.0	28.8	33.5	47.1	35.4	<0.001
Ethnic discriminated against						
Often	7.9	4.3	2.3	1.5	0.6	
Sometimes	26.0	12.5	7.4	5.5	2.9	
Seldom	25.5	17.7	15.6	8.7	5.4	
Never	40.6	65.5	74.7	84.4	91.2	<0.001[a]
Level of education						
Low	51.6	46.9	43.6	49.2	44.6	
Medium	13.4	19.0	17.1	19.0	19.3	
High	34.9	34.1	39.3	31.8	36.1	<0.004[a]
Marital status						
Married/Cohabiting	69.3	74.1	73.5	71.9	78.7	
Single	30.7	25.9	26.5	28.1	21.3	<0.001[a]
Household income						
Low	18.0	11.9	11.1	14.3	10.1	
Medium low	57.3	56.6	59.6	55.0	53.9	
Medium high	15.3	21.4	19.9	20.1	23.6	
High	9.4	10.0	9.3	10.5	12.4	<0.001[a]
The Administrative Area						
Within	81.9	45.5	35.1	27.5	11.4	
Outside	18.1	54.5	64.9	72.5	88.6	<0.001

[1]Subgroups might not total 6,340 due to missing values.
[a]Cohran-Mantel-Haenszel test, adjusted for age.

Table III. Prevalence of poor self-reported health (SRH) status by ethnicity, adjusted for age[a] (men).

Variable	Sami I (675) %	Sami II (929) %	Sami III (424) %	Kven (484) %	Norwegian majority population (3413) %	p-value
Overall	29.2	31.4	28.8	29.4	25.7	0.0003
Ethnic discriminated against						
Often	37.9	37.7	38.7	87.8	42.3	
Sometimes	35.6	38.0	38.6	50.6	37.5	
Seldom	26.9	29.4	25.3	28.0	32.1	
Never	23.5)	29.4	27.2	27.1	24.6	<0.001
Level of education						
Low	37.0	35.7	32.4	33.9	31.2	
Medium	29.6	27.5	26.4	18.9	26.9	
High	15.6	22.7	23.4	19.8	16.1	<0.001
Marital status						
Married/Cohabiting	26.7	30.7	27.2	27.3	24.1	
Single	33.8	36.0	28.2	39.0	32.4	<0.001
Household income						
Low	47.1	46.6	33.3	45.4	45.8	
Medium low	28.8	35.6	31.6	31.8	29.3	
Medium high	19.0	19.0	18.5	33.0	19.3	
High	24.0	21.2	27.6	17.0	11.3	<0.001
The Administrative Area						
Within	29.2	31.0	29.0	31.9	27.0	
Outside	34.2	31.9	28.3	28.6	25.7	<0.001

[a] Age adjusted for WHO World Standard.

Table IV. Prevalence of poor self-reported health (SRH) status by ethnicity, adjusted for age[a] (women).

Variable	Sami I (685) %	Sami II (927) %	Sami III (430) %	Kven (473) %	Norwegian majority population (3825) %	p-value
Overall	35.4	32.9	35.1	34.4	30.5	0.004
Ethnic discriminated against						
Often	53.5	73.1	45.4	55.7	33.3	
Sometimes	33.9	33.2	47.7	41.1	46.6	
Seldom	32.3	35.7	28.1	45.4	39.4	
Never	34.6	29.8	32.1	32.2	29.4	<0.001
Level of education						
Low	40.3	38.6	46.3	45.8	36.4	
Medium	46.1	27.2	28.8	32.1	30.7	
High	28.0	18.7	27.8	25.0	22.1	0.003
Marital status						
Married/Cohabiting	32.9	32.0	34.7	34.3	30.3	
Single	41.6	33.8	38.6	38.3	32.3	<0.001
Household income						
Low	50.3	53.5	55.9	64.1	47.6	
Medium low	33.2	32.6	39.1	34.4	32.5	
Medium high	22.5	26.9	17.3	27.8	20.1	
High	21.7	21.9	11.9	14.4	23.5	<0.001
The Administrative Area						
Within	33.7	29.3	31.4	38.4	30.2	
Outside	46.7	35.9	37.0	32.6	30.6	<0.001

[a] Age adjusted for WHO World Standard.

Table V. The risk (odds ratios with 95% confidence intervals) of poor self-reported health status by stepwise inclusion of the explanatory variables by logistic regression in men (Norwegian majority as reference group).

Model Variable	Level	Age + ethnicity	+ Marital status	+ Ethnic discrimination	+ Education	+ Household income
Ethnicity	Sami I	1.23 (1.03-1.48)	1.17 (0.97-1.41)	0.89 (0.73-1.10)	0.84 (0.68-1.04)	0.79 (0.64-0-99)
	Sami II	1.35 (1.15-1.59)	1.32 (1.12-1.55)	1.15 (0.97-1.36)	1.10 (0.93-1.32)	1.08 (0.90-1.29)
	Sami III	1.18 (0.95-1.48)	1.17 (0.93-1.47)	1.06 (0.84-1.33)	1.06 (0.83-1.34)	1.07 (0.84-1.37)
	Kven	1.17 (0.95-1.44)	1.17 (0.95-1.45)	1.12 (0.90-1.39)	1.08 (0.87-1.35)	1.10 (0.88-1.38)
	Norwegian majority	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Marital status	Single		1.43 (1.25-1.64)	1.43 (1.24-1.64)	1.41 (1.22-1.62)	1.09 (0.93-1.28)
	Married/ Co-habiting couple		1 (ref)	1 (ref)	1 (ref)	1 (ref)
Ethnic discriminated against	Often			2.00 (1.39-2.88)	1.84 (1.25-2.69)	1.61 (1.08-2.42)
	Sometimes			1.85 (1.50-2.27)	1.91 (1.54-2.37)	1.96 (1.57-2.44)
	Seldom			1.23 (1.04-1.45)	1.29 (1.09-1.54)	1.28 (1.07-1.54)
	Never			1 (ref)	1 (ref)	1 (ref)
Level of education	High				0.45 (0.39-0.53)	0.55 (0.47-0.65)
	Medium				0.71 (0.60-0.83)	0.77 (0.65-0.91)
	Low				1 (ref)	1 (ref)
Household income	Low					1.49 (1.19-1.86)
	Medium low					1 (ref)
	Medium high					0.64 (0.54-0.76)
	High					0.45 (0.35-0.58)
Model improvement	- 2xlog likelihood		26.0	41.1	103.8	69.5
	Degrees of freedom		1	3	2	3
	p value		<0.001	<0.001	<0.001	<0.001
Included in analysis	Cases	5,871	5,801	5,801	5,598	5,391

living inside or outside the Administrative Areas (data not shown). The most significant decrease in risk after inclusion of ethnic discrimination was found in Sami I women living outside the Administrative Area; the odds ratio estimate dropped from OR=1.69 (1.16-2.45) to OR=1.15 (0.77-1.72).

Structural equation modelling (SEM) was used to further analyse the association between ethnicity and poor self-reported health. The path model used was based on the most significant variables in the logistic regression analyses. In contrast to logistic regression, SEM provides the opportunity to explore direct and indirect pathways between ethnicity and self-reported health. Analysing men and women separately gave no gender-specific associations. What follows is an example of an analysis of males belonging to the classifications Sami I and Norwegian majority population. The initial model revealed a relatively satisfactory level of fit, χ^2(df=1, n=5,925)=3.165, p=0.075 (CFI=1.00; TLI=0.99; RMSEA=0.02). The variables included in the model explained 8% of the

Table VI. The risk (odds ratios with 95% confidence intervals) of poor self-reported health status by stepwise inclusion of the explanatory variables by logistic regression in women (Norwegian majority as reference group).

Variable	Level	Model Age + ethnicity	+ Marital status	+ Ethnic discrimination	+ Education	+ Household income
Ethnicity	Sami I	1.24 (1.04-1.47)	1.24 (1.04-1.49)	0.99 (0.82-1.21)	0.97 (0.80-1.19)	0.90 (0.73-1.12)
	Sami II	1.13 (0.97-1.33)	1.14 (0.97-1.33)	1.02 (0.86-1.20)	0.97 (0.82-1.15)	0.94 (0.79-1.14)
	Sami III	1.23 (1.02-1.57)	1.30 (1.05-1.61)	1.22 (0.98-1.52)	1.23 (0.99-1.54)	1.22 (0.97-1.55)
	Kven	1.18 (0.96-1.45)	1.18 (0.96-1.45)	1.14 (0.93-1.41)	1.19 (0.97-1.27)	1.17 (0.93-1.47)
	Norwegian majority	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Marital status	Single		1.08 (0.95-1.23)	1.06 (0.93-1.20)	1.11 (0.97-1.27)	0.87 (0.74-1.02)
	Married/ Cohabiting couple		1 (ref)	1 (ref)	1 (ref)	1 (ref)
Ethnic discriminated against	Often			2.99 (2.07-4.32)	2.98 (2.03-4.36)	2.88 (1.92-4.32)
	Sometimes			1.43 (1.15-1.78)	1.54 (1.22-1.93)	1.46 (1.15-1.85)
	Seldom			1.34 (1.11-1.62)	1.43 (1.18-1.74)	1.41 (1.15-1.73)
	Never			1 (ref)	1 (ref)	1 (ref)
Level of education	High				0.48 (0.41-0.55)	0.56 (0.48-0.66)
	Medium				0.77 (0.66-0.91)	0.82 (0.69-0.97)
	Low				1 (ref)	1 (ref)
Household income	Low					1.59 (1.30-1.95)
	Medium low					1 (ref)
	Medium high					0.73 (0.62-0.87)
	High					0.56 (0.45-0.71)
Model improvement	- 2xlog likelihood		1.30	44.6	39.4	51.2
	Degrees of freedom		1	3	3	3
	p value		0.25	<0.001	<0.001	<0.001
Included in analysis	Cases	6,267	6,158	6,158	5,859	5,426

variance in self-reported health (Fig. 2). Fourteen direct paths were tested in the structural model; the only non-significant path was the direct path from discrimination to household income. Ethnicity affects poor self-reported health through a direct path and 3 indirect paths: ethnic discrimination, education and household income. Ethnicity was significantly associated with inferior health conditions in the indirect path of discrimination ($p<0.001$) (as previously disclosed in Table V and Table VI). The path between education and household income suggested that tertiary-educated respondents had higher household incomes ($p<0.001$) and that there was a significant inverse relation between both education and household income and poor health ($p<0.001$), which suggests that higher socio-economic status contributes to better self-reported health. Reporting of inferior health conditions increased with age, as shown by the positive significant path ($p<0.001$) between age and health. The direct paths from age to the variables of discrimination, education and house-

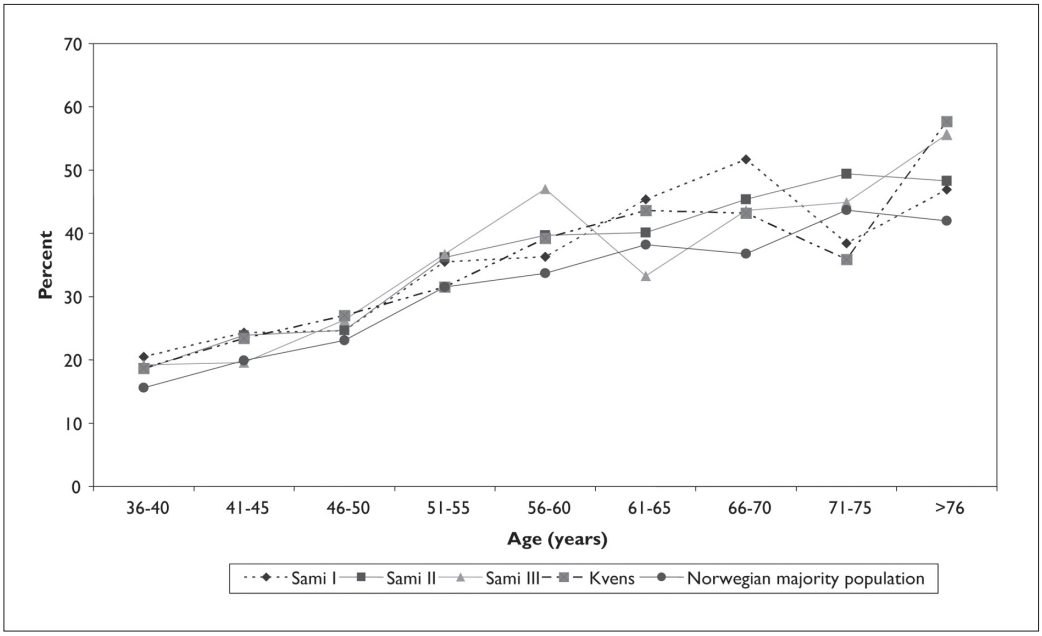

Figure 1. Poor self-reported health by ethnic group and age.

hold income show that respondents in higher age brackets reported lower levels of education, household income and discrimination compared to younger respondents ($p<0.001$) (Fig. 2). Similar analyses were conducted for the remaining Sami groups and Kvens, as opposed to the Norwegian majority population (data not shown). These groups, however, were on par with the Norwegian majority population in terms of socio-economic status and were less discriminated against in comparison to the Sami I-classified participants. Thus, the indirect paths between ethnicity and health conditions via discrimination were weaker, yet still significant (Sami II and Kven; $p<0.01$ and Sami III; $p<0.05$).

DISCUSSION

This study has found Sami ethnicity to be associated with poorer self-reported health status when compared to the Norwegian majority population; it has also found that frequent experiences of ethnic discrimination appear to at least partially explain inequalities in self-reported health between the Sami and the general Norwegian population. Lower socio-economic status could not fully explain inferior health reports given by Sami participants. Socio-economic conditions could only partially explain the association between ethnicity and negative health conditions, which is in accordance with a Swedish study (14). Ethnic discrimination is an important variable related to health inequalities as measured by poor self-reported health. This variable acts as a mediator on the path between ethnicity

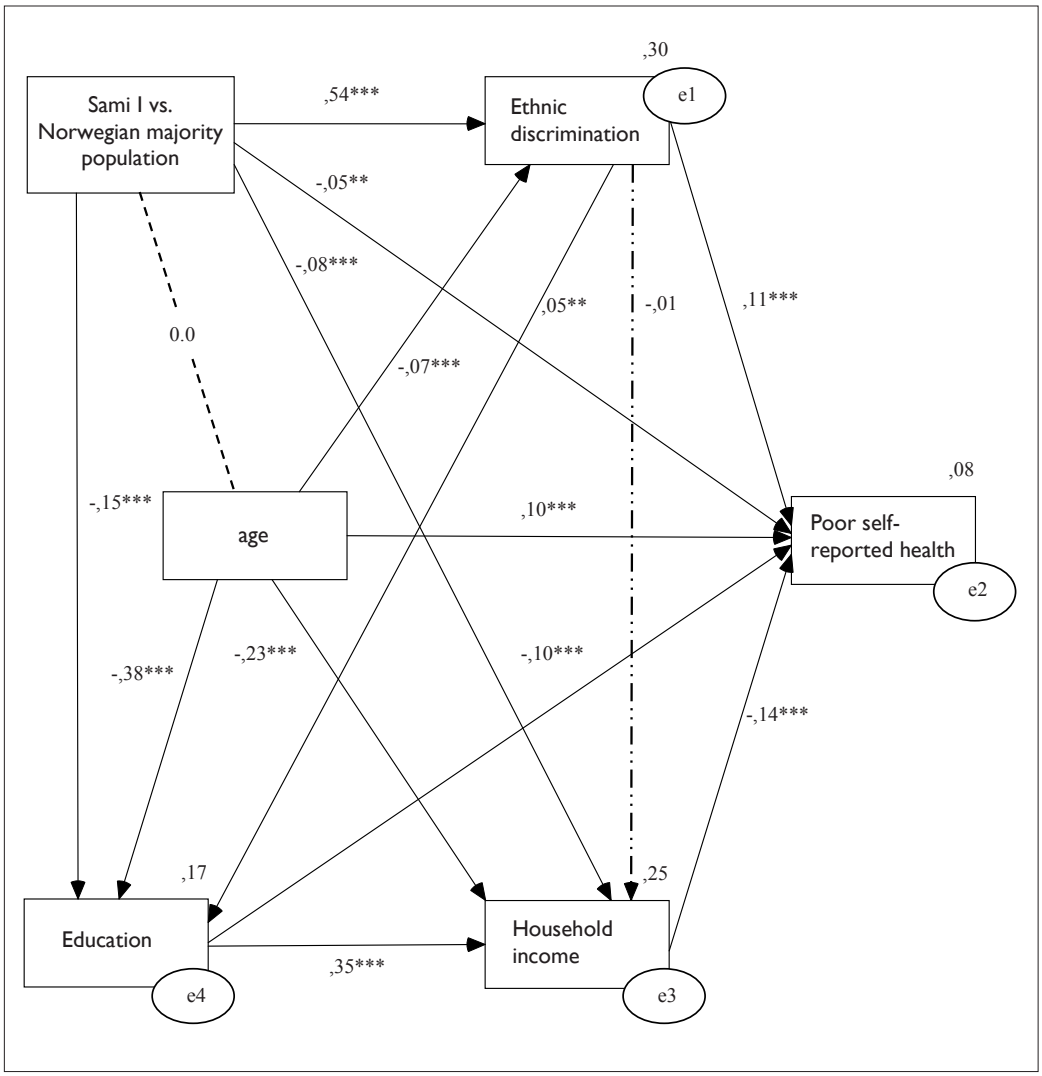

Figure 2. Path model of the effect of ethnicity on poor self-reported health of Sami I in men (Norwegian majority population as reference) χ^2 (df=1, n=5,925)=3.165, p=0.075 (CFI=1.00; TLI=0.99; RMSEA=0.02).

Straight single-headed arrows indicate significant standardized path coefficients, at *** =p<0.001 or **=p<.01. Dashed (---) arrows mean that the regression weights were restricted as zero. Dashed (- ·· -) arrows indicates non-significant standardized path coefficients.e1, e2, e3 and e4 indicate unmeasured errors associated with each of the variables in the model. Ethnicity shows significant effects through the variables; education, household income and discrimination on poor self-reported health, at p<0.001. The variables was coded as follows: ethnicity (0="Norwegian majority population" and 1="Sami I"), ethnic discrimination (0="never," 1="rarely," 2="sometimes" and 3="very often"), age (36-79 years), education (0-23 years), household income (0="less than 150,000NOK," 1="between 150,000 and 300,000 NOK," 2="301,000-450,000 NOK," 3="451,000-600,000 NOK," 4="601,000-750,000 NOK," and 5="more than 750,000 NOK"), and poor self-reported health (1="very good/good" and 2="poor/not so good").

and poor self-reported health. Also, ethnic discrimination varies based on ethnic affiliation. Suggestions that inferior health conditions lead to increased discrimination exposure and other alternative explanations were less persuasive (12). The connection between socio-economic status and discrimination is not a simple one: The fact that we have made the distinction between socio-economic status and discrimination as independent variables does not imply that we regard socio-economic status as separate from discrimination. For example, the socio-economic disadvantage for the Sami populations could be a consequence of the long history of forced assimilation (institutional discrimination) that has produced the current levels of disadvantage (12-14,16,24). Nevertheless, we should remember that family income and level of education as measures of socio-economic status represent only 2 aspects of the standard of living. Other aspects of social life, such as small-scale fishing or hunting, are not incorporated into this study's models (32).

Despite the Sami ethnic revival, which has gradually replaced the history of forced assimilation and colonization of the Sami population in Norway (4,6,41,42), the outcome of the process has varied according to the different regions inhabited by the Sami people (43). The assimilation process has had the greatest impact on coastal communities (44), in which the Sami were the minority and many partially or completely lost their identity and language. In these areas discrimination and ethnicity-based conflicts surrounding land rights and adoption of the Sami language in the public school system (45) are still present, and there are fewer or less-efficient structural and practical support systems in place for the Sami culture as compared to those within the Administrative Area. Within the Administrative Area, the majority of the population is proficient in the Sami language and culture and there are several well-established Sami institutions, including professional Indigenous health and social service networks run by the Norwegian majority population and Sami medical doctors, social workers and nurses (43). Thus, the distinction between different areas populated by the Sami people may partly explain the increased prevalence of poor self-reported health in Sami individuals (especially Sami I women) living outside the Administrative Area. The same argument may help explain why Kvens reported the greatest prevalence of poor self-reported health within the Sami Administrative Area. Inside the Administrative Area, Kvens are a minority group and the Kven culture and identity lacks the support provided the Sami population as Kven institutions have not yet been established.

The finding that the health conditions of participants who were frequently discriminated against were compounded in comparison to participants who were not highlights that ethnic discrimination must be viewed from a health perspective. It is necessary as well to understand the situation from a gender perspective because females who were frequently discriminated against reported having health inferior to men in comparable situations.

The interpretations of the result of poor self-reported health in different age groups are quite complex. Although the disparities between different groups are more prominent in the older age groups, there appear to be no clear-cut trends. For instance, in the age groups 61-65 and 66-70 of the Sami I population, higher prevalence of poor health was reported as compared to the age groups 56-60 and 71-75. This may due to the fact that the sample size in each age

group became smaller when we divided them into nine age groups.

The social democratic hegemony of post-war Norway has not given much attention to social health inequalities. The belief in a society without social classes in which everyone would be equal was strong up until 1990, but then evidence demonstrating significant social health inequalities emerged (46). For example, one study concluded that the social democratic Scandinavian countries Sweden and Norway "have larger relative inequalities in health than most other (European) countries" (47, p. 1655). These conclusions have been criticized, however (48). The recently enhanced awareness of social health inequalities has resulted in an increased focus on research, with contributions from several disciplines, including epidemiology, social sciences and economics (49), whereas differences in self-reported health were explained previously by factors such as age, district of residence and regional and socio-economic status (50). Several Norwegian studies indicate a strong association between self-reported health and social class, with those respondents in the lowest socio-economic class more frequently reporting experiencing poorer health (51-53). Also, geographic differences in self-reported health have been established, exemplified by the inferior self-reported health conditions of females living in northern Norway as compared to their southern counterparts (53). Additionally, national health surveys have revealed that Finnmark, the country's northernmost county and home to the majority of the Norwegian Sami population, has the lowest life expectancy in Norway (54). Today, the Norwegian government has acknowledged that Norwegian society is stratified, with the most socio-economically privileged individuals enjoying better health (55). Overall however, the health situation in Norway is generally satisfactory; life expectancy is among the highest in the world. This is related to the reduced rates of mortality from cardiovascular diseases and low infant mortality (56). In the national health and living conditions survey of 2005, 4 out of 5 Norwegians rated their health as "good" and there were no significant differences relating to gender (50), whereas in the case of the Sami population, living and health conditions, in general, were not considered to be that much different than ethnic Norwegians (57). Although, previous and recent studies have shown divergent results regarding cardiovascular mortality in the Sami populations (58). However, Brustad et al. suggest that the risk of mortality in Arctic Norway has moved towards a more homogeneous pattern across ethnic divides (57). Thus, the nation is faced with the challenge of ensuring that the health and social services provided to the Sami population is of the same quality as the services granted to the Norwegian population in general (59). To ensure equal health care for the Sami population, it is important to study social factors that may influence health conditions. However, in the *National Strategy to Reduce Social Inequalities in Health* (55), one of the priorities is to reduce social inequalities which contribute to inequalities in health, and ethnic discrimination is pointed out as a potential risk factor that may contribute to inequalities in health between the Sami and majority population (55,60).

Because the SAMINOR study (32) has a cross-sectional design, causality must be handled with caution. On the one hand, this study meets several of the Brandford Hill criteria, including consistency, plausibility and dose-response (61). On the other hand, the study is not suitable for distinguishing between

different sociological theories about why ethnic inequalities occur; the results simply show that there is a strong association between discrimination and self-reported health.

Reporting on one's own current health and experience of discrimination is inherently subjective, with the same issues of validity that apply to any self-reported exposure (18). However, self-reported health is widely used in epidemiological studies (14,21,25-27,29), and it is a significant independent predictor of all causes of mortality. However, cultural differences between ethnic groups, such as the Sami and the Norwegian majority population, may indicate that individuals belonging to different cultures perceive their physical and psychological health differently (62). Nevertheless, self-reported health may reflect an individual's general perception of his/her quality of life, and studies have found a strong association between self-reported health in different ethnic groups and the total mortality of these ethnic groups (30). This relationship seems to be universal rather than culturally determined (63). Data on self-reported experiences of discrimination is also subjective, and participants' interpretations and responses to the objective experiences may vary; as such, the data may not necessarily be representative of the group as a whole. Since the question regarding ethnic discrimination was not specifically validated for use in Sami and non-Sami populations, the extent to which they lead to wrongly classifying the discrimination experiences or whether the experiences were different for the Sami, Kvens and Norwegian majority population groups cannot be identified. Further qualitative surveys are needed to gain more insight into these issues.

Epidemiological studies on the association between ethnic discrimination and health have only recently emerged as a body of research, and further research on the topic is necessary. According to Ahmed et al. (1, p. 326), "Racial (ethnic) discrimination exerts deleterious effects on health through multiple mechanisms." To expose self-reported ethnic discrimination as a risk factor and to determine how it affects the health of populations, more precise methodological approaches and greater conceptual clarity will be needed.

Conclusions

Sami participants, in particular Sami women living outside the Administrative Area of the Sami Language, gave inferior health reports in comparison to the Norwegian majority population. This study has revealed that social factors such as ethnic discrimination may contribute to ethnic inequalities in self-reported health. The finding directs awareness to ethnic discrimination as being central to understanding the role of social health inequalities among the Sami population.

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