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Iron status and prevalence of hereditary haemochromatosis in a multiethnic population in northern Norway

The SAMINOR study • The Sør-Varanger study • The Tromsø V study

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Tromsø 2008

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GIITOSAT

Buot daid jagiid go lean dutkan de lean oahppan ahte dieđa lea stuora ovttasbargu máŋgga olbmo gaskkas. Mun giittán buot dáid dutkanskihpáriiddán ja ustibiiddán. Álggos giittán iežan bagadalli *Eiliv Lund* gii lea movttiidahttán mu ja buktán buriid ja huksejeaddji rávvagiid. Giittán go son álohii lea leamaš olámuttos, maiddái maŋŋel go fárrejin Romssa-gávpogis Skáidái. Ollu giitu maiddái mu nuppi bagadallái, *Inger Marie Dahlii,* gii movttiidahtii mu dutkagoahtit. Giittán go son lea veahkehan mu nákkosgirjjiin ja go son hábme nu liekkus ja fátmmasteaddji bargobirrasa.

Giittán maiddái *Davvi-Norgga universitehtabuohcceviesu Medisiinna ossodaga* mii lea máksán munnje bálkká buot daid jagiid. Giitu go ossodat lea leamaš nu máškit mu iešguđetlágan gáibádusaid ektui mat gusket medisiinna spesialiseremii, hematologiijii ja nákkosgirjji čállimii. Giittán maiddái *Servodatmedisiinna instituhta* mii lea láhčán munnje buori oahppobirrasa ja dutkanveahki go dan lean dárbbašan.

Buot mu ustibat ja bargoustibat *Sámi dearvvašvuođadutkama guovddážis* ja *Várdobáiki sámi guovddážis*, dii lehpet erenoamáš olbmot, álohii buori movttas. Erenoamážit giittán *Marita Melhus* gii lea mu veahkehan iežas statistihkka- ja pedagogihkkačehppodagain go lean bargan daiguin iešguđet dearvvašvuođaiskkademiiin.

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Anán maid árvvus ekonomalaš veahki maid lean ožžon *Dearvvašvuođa ja veajuiduhttima EXTRA-foanddas Norgga hemokromatosesearvvi* čađa, *Davvi Dearvvašvuođa* dutkanruđain, ja *Seastinbáŋku 1 Davvi-Norgga dutkanfoanddas*. SAMINOR-prošeavtta lea Dearvvašvuođadepartemeanta ruhtadan.

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List of papers

The thesis is based on the following papers:

1. Broderstad A R, Melhus M, Lund E. Iron status in a multiethnic population (age 36-80 yr) in northern Norway: the SAMINOR study. *Eur J Haematol* 2007; 79: 447- 454.

2. Broderstad A R, Melhus M, Brustad M, Lund E. Traditional food patterns protect against iron deficiency in a multiethnic population in mid and northern Norway. The SAMINOR study (Submitted).

3. Broderstad A R, Smith-Sivertsen T, Dahl S. I M, Ingebretsen O C, Lund E. Serum level of iron in Sør-Varanger, Northern Norway – an iron mining municipality. *Int J Circumpolar Health* 2006; 65(5):432-442.

4. Broderstad A R, Smith-Sivertsen T, Dahl S. I M, Ingebretsen O C, Lund E. Low prevalence of hereditary Haemochromatosis in multiethnic populations in northern Norway (Submitted).

ABBREVIATIONS

CI	Confidence interval
ICD	International Classification of diseases
BMI	Body mass index
SAS	SAS statistical software package
MONICA	Multinational Monitoring of trends and determinants in cardiovascular disease. A WHO project including several countries
SAMINOR	A populationbased study of health and living conditions in areas with a mixed Sámi and Norwegian population
HFE gene	Mutation of the candidate gene for haemochromatosis

1. INTRODUCTION

Iron status is influenced by several factors such as nutritional factors and blood loss.

Iron deficiency is one of the most severe and important nutritional deficiencies in the world today, both in industrialised as well as developing countries [1-3]. In normal subjects the total daily loss of iron is balanced by an equivalent amount of iron absorbed from the diet. When this equilibrium is disturbed, due to lack of or too much iron, iron deficiency or overload are established. Iron deficiencies are caused by several factors as menstrual losses in fertile women, occult bleeding or a diet low in iron [4]. Iron deficiency affects several body functions even when anaemia has not developed [5]. Immune status and morbidity of all age groups are adversely affected by iron deficiency. On the other hand, iron overload can cause organ damage in severe cases [6]. Inheritance e.g. hereditary haemochromatosis thallasemia major and blood transfusion can cause severe iron accumulation.

Homozygosis for the C282Y mutation of the candidate gene for haemochromatosis (the HFE gene) is a common genetic mutation, occurring in 0.3 to 0.7 % of white persons of northern European descent [7-10]. In 1995 a comprehensive health survey programme (HUNT) was conducted in Nord-Trøndelag, a county in the middle of Norway, incorporated a large screening for HH [11]. In total 65 717 (69.8%) people participated. The prevalence of hereditary haemochromatosis was 0.34% in women and 0.68% in men. Previous screening of haemochromatosis indicate that the grade of HH is increasing northward, and that hereditary haemochromatosis is most pronounced among people of north European affiliation [12]. It is even suggested that is a Viking disease [13].

In Norway iron has been added to food products since 1972. In 2002 this supplementation was removed because of concerns about iron overload in that part of the population with hereditary haemochromatosis. Recent data describing the iron status in a Norwegian

population has not been collected. In northern Norway iron measurement in a large population sample has not been performed.

The population in northern Norway consists mainly of a mixture of people of Sámi, Kven and Norwegian origin. There has been substantial interaction between the Sámi and non-Sámi population for several decades. Nutrition, socioeconomic development and general health status have a major influence on iron status [14-16]. These issues can lead to differences in iron levels among groups [17].

The main aims of this research were to evaluate the iron status in ethnically and geographic diverse populations in northern Norway and in addition investigate the prevalence of hereditary haemochromatosis and iron overload in the same populations.

2. AIMS OF THE THESIS

The basis for the present thesis is from three different population-studies, the Norwegian-Russian Health study, the SAMINOR study and the Tromsø V study.

The general aim of the thesis was to assess the iron levels in northern Norway and to decide the frequencies of iron deficiency and the prevalence of hereditary haemochromatosis.

The project aims were:

1. To examine the sex specific distribution of s-ferritin and transferrin saturation in three study populations in northern Norway.

2. To evaluate the iron status in an ethnically diverse population in northern Norway, with focus on geographic area and ethnicity.

3. To assess the prevalence of iron deficiency from a gender, ethnical and age perspective.

4. To investigate how lifestyle and food patterns influence on iron levels in these populations.

5. To investigate the prevalence of hereditary haemochromatosis and iron overload in multiethnic populations in northern Norway and to point out the efficacy of family screening.

3. BACKGROUND

3.1. The iron circle

The metabolism of iron has a crucial role in haemoglobin synthesis [18]. Iron is bound to a transport protein, transferrin. Iron moves from plasma to reed blood cells in the bone marrow which have the capacity to make haemoglobin. Mature red blood cells are delivered to the circulation. After 120 days the red blood cells are engulfed by macrophages, principally in the spleen and the iron is extracted from haemoglobin. Most of the iron is delivered to the plasma, where it becomes bound to transferrin, completing the cycle (Figure 1). In normal subjects, the iron content of the body tends to remain within relatively narrow limits. Losses of iron must be matched by the absorption of iron from food. Iron is removed from the body when cells from the gastrointestinal tract are lost. The total average daily loss of iron is about 1- 2 mg. These losses are balanced by an equivalent amount of iron absorbed from the diet. Dietary iron must be converted either to heme or ferrous iron in order to be absorbed. Iron is absorbed by the intestinal mucosal cells which also regulates this absorption. In plasma iron is bound to a transport protein, transferrin [18]. The two intracellular iron storage proteins are ferritin and hemosiderin

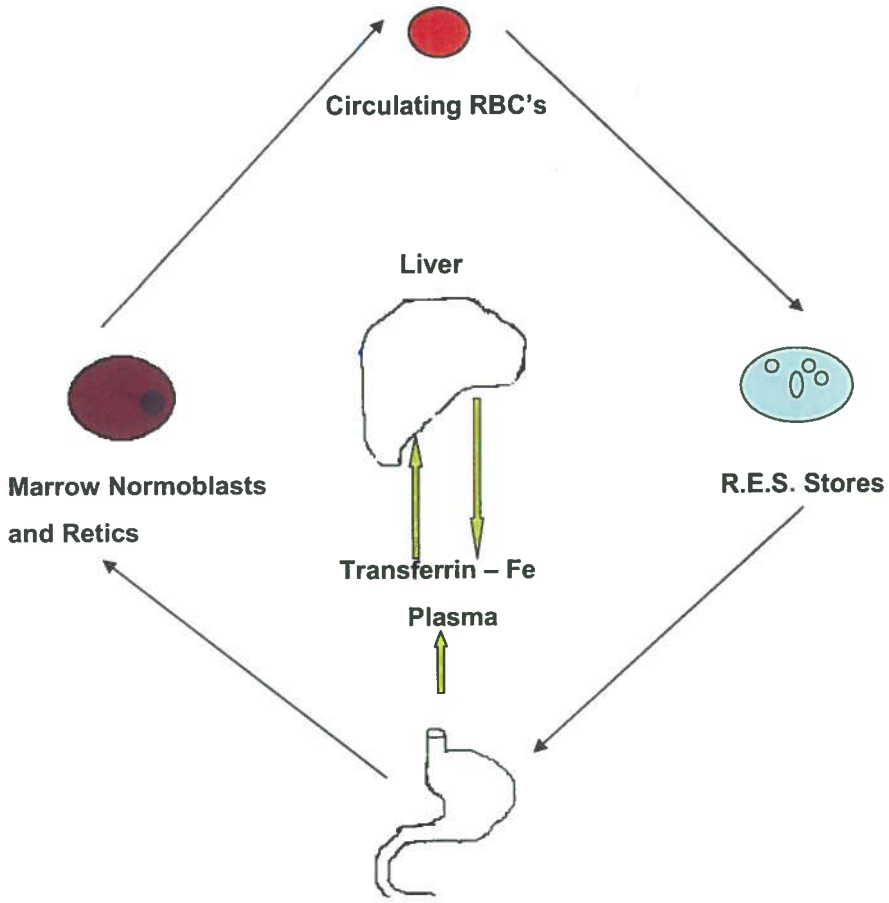

Figure 1. The iron circle.

From Wintrobe's Clinical Hematology

Lee GR, Foerster J, Lukens J, Paraskevas F, Greer JP, Rodgers GM.

3.2. Ferritin

The s-ferritin level is the most specific biochemical test that correlates with relative total body iron stores. S-ferritin has been used as key parameter in several epidemiological studies where iron status has been measured [19-21]. A low s-ferritin level reflects depleted iron stores, while a high s-ferritin can reflect iron overload. S-apoferritin is a part of measured s-ferritin, and is an acute-phase reactant protein elevated in infectious, inflammatory and malignant diseases. S-ferritin can be elevated in diseases associated with hepatocyte destruction such as in alcoholic liver damage [16].

3.3. Transferrin and transferrin saturation

We also used transferrin saturation as a measure of iron status when prevalence of high iron stores was calculated, because elevated s-ferritin levels fluctuate more than transferrin saturation in acute diseases. Transferrin saturation is an early indicator of iron transport, both with absent or elevated body iron stores. A large number of diseases are associated with low transferrin saturation.

3.4. Iron status and health

Iron status can be considered as a continuum from iron deficiency with anaemia, to iron deficiency with no anaemia, to normal iron status varying amounts of stored iron and finally to iron overload. Iron deficiency and iron deficiency anaemia are among the most severe and important nutritional deficiencies in the world today [1, 22-23]. Iron deficiency affects all age groups in a population and the functional consequences are manifold. It affects cognitive performance and growth of children, immune status and morbidity of all age groups and the use of energy sources by muscles and thus the physical capacity in the affected individuals [22]. Iron deficiency is most pronounced among fertile women. Low iron levels during

pregnancy increase both perinatal risks for mothers and infant mortality. Iron overload, however, can lead to progressive organ damage such as liver cirrhosis, cardiomyopathy, arthritis and hypogonadotropic hypogonadism [24-25].

3.5. Iron deficiency

S-ferritin < 15 µg/l is considered to be due to depleted iron stores according to the WHO [22]. As a definition of iron deficiency the WHO use transferrin saturation < 16 %. The best indicator for detecting iron deficiency is s-ferritin when measured in the absence of infection [22]. However, transferrin saturation is less reliable as an indicator of iron deficiency because of intra- and inter-day variability in serum iron. In previous studies regarding iron status in free living populations iron depletion has been defined as < 13 µg/l [19-20]. This is used as cut off in the SAMINOR study (paper II – III).

3.6. Iron overload and hereditary haemochromatosis

Iron overload is defined as s-ferritin > 200 µg/l for women and 250 µg/l for men, according to the haemochromatosis action programme by the Norwegian Society of Haematology [26]. Severerly increased s-ferritin is defined as > 1000 µg/l in both genders. Several conditions can result in iron overload such as thallasemia major and repeated blood transfusions leading to iron accumulation. The most common cause, however, in industrial countries is inheritance e.g. hereditary haemochromatosis. The definition of hereditary haemochromatosis by the Norwegian Society of Haematology is as follows:

Clinical haemochromatosis; Disease (proven damage of organs) caused by pathological iron accumulation.

Biochemical haemochromatosis; Biochemical signs of increased iron stores without illness (prove damage of organs).

The terms "disease", "patients" and " haemochromatosis" should not be used on individuals that only have been proven to have an HFE mutation, because many of these individuals will never become sick [26].

The inheritance pattern for hereditary haemochromatosis is autonomic-recessive. Homozygosity for C282Y mutation of the HFE gene is especially associated with increased body iron levels. Two other common mutations have also been identified, namely H63D and S65C. The extent to which the mutations lead to a phenotype is variable, and its presence is not always associated with iron overload and clinical disease [7, 26].

3.7. The Sámi and Kven

Ethnicity in epidemiological research is used increasingly as a key variable to compare populations in terms of health and risks for disease.

The Sámi

The Norwegian government has ratified the Sámi as the indigenous people in Norway [27]. The Sámi live in the northern regions of Fennoscandia in what today comprises the northern area of Norway, Sweden, Finland and Russia's Kola Peninsula. The size of the Sámi population has been reckoned to be approximately 75,000, but estimates vary in accordance with criteria used like

genetic heritage, mother tongue and the personal sense of ethinicity. Moreover, it is difficult to operate with some minimum- or maximum numbers due to the fact that there exists no exact overview over the total number of the Sami people. One main reason is the source of error in the reporting of earlier censuses where lack of reporting of Sámi criterions was a consequence of Norway's previous assimilation policy. Despite persistent attempts at assimilation, the Sámi people have kept their culture, language and also life-style to a great extent. This indigenous group has its own culture as well as different subcultures within the

Sámi population, with many traditions for each subgroup. Occupations are now changing from different primary trades towards service professions. In northern Norway there has been a substantial interaction between the Sámi and non-Sámi population for several decades. Sámi language is mainly spoken by persons with Sámi affiliation. However, different subgroups within the Sámi population have gone through stronger linguistic and cultural assimilation than others and have lost their native tongue, especially in the coastal areas [28].

The Kven

The Kvens are a people that emigrated from northern part of Finland in the 18th century and settled in small societies in northern Norway due to poverty and famine in their native country. Kvens speak their own language which is an old Finnish language. The Kven people are not indigenous as the Sámi. The Kvens have also gone through strong linguistic and cultural assimilation in the same way as the Sámi and many have lost their mother tongue.

3.8 Food clusters

Information concerning consumption of different foods, both modern and traditional, was obtained through questionnaires with a food frequency design (paper III). The food questionnaire has been described in detail by Brustad et al. [29]. Based on factor and cluster analyses from 56 different food variables, Brustad et al. defined five different dietary patterns; "reindeer", "fish", "average", "fruit and vegetables", and "westernized, traditional marine". The reindeer pattern was characterised by the most frequent consumption of reindeer meat and other reindeer products, in addition to elk meat and cured/salted fish. The use of boiled (non-filtered) coffee was also frequent in this cluster. The second pattern was named "fish" because it consisted of subjects with frequent use of all marine food items in the questionnaire. Pattern three was labelled "average" and characterised by average intakes of most food items, except whole milk, and processed fish (smoked or cured/salted), which were

significantly higher in this group. In addition, this pattern showed a high intake of both boiled (non-filtered) and "other" coffee, as well as sausages, pork, and mutton. The fourth pattern was labelled "fruits and vegetables" due to the frequent intake of these items in addition to water, tea, pasta, and chicken. The last pattern was named "western, traditional marine". This was dominated by westernised products such as hamburgers, pizza, sausages, casseroles, pork, and beef. This pattern also had the highest frequency of the traditional food fish liver and hard roe, in addition to whale meat and filtered coffee. These dietary patterns are used to assess the effect of food habits on iron stores.

4. SUBJECTS AND METHODS

4.1 Data sources and study population

Three different population surveys form the basis used in the subprojects. The SAMINOR study was designed to study health and living conditions in areas with a mixed Sámi and Norwegian population. It was carried out in 2004-2004. The Norwegian –Russian health Study, 1994, aimed to investigate exposure and possible adverse health effects of the environmental pollution generated by the refining of nickel ore in the border area of Norway and Russia. Only data and blood from the Sør-Varanger municipality was used in screening for iron levels and hereditary haemochromatosis. The Tromsø study was a cardio-vascular screening study. In addition, hospital records from the Kirkenes hospital and University Hospital in Tromsø were used. Table 1 lists the different data sources.

4.1.1. The SAMINOR study

A cross-sectional population based study of health and living conditions in areas with a mixed Sámi and non-Sámi population, the SAMINOR study, was carried out in Mid- and Northern Norway in 2003-2004 (Figure 2). The study intended to cover the population in all municipalities in Norway where more than 5-10 percent of the population reported themselves as Sámi in the 1970 Census [30], based on the definition of Sámi as a person with at least one grandparent with Sámi as spoken language in their homes.

In addition, some selected districts were included from municipalities with an overall lower proportion of subjects with Sámi ethnicity. The SAMINOR study was the responsibility of the Centre for Sámi Health Research, Institute of Community Medicine at the University of Tromsø, in collaboration with the National Screening Program for Cardiovascular Diseases, SHUS, now incorporated into the National Institute of Public Health [31]. The material was collected from January 2003 till April 2004

Paper	Study design N	Tool	Measurement	Study population	Ethnic affiliation
1	Cross-sectional N=14873	Questionnaire		northern Norway (rural)	Sámi , Kven, Norwegian
		Blood sample	S-ferritin and transferrin saturation		
2	Cross-sectional N=14630	Questionnaire		northern Norway (rural)	Sámi , Kven, Norwegian
		Blood sample	S-ferritin and transferrin saturation		
3	Cross-sectional N= 3344	Questionnaire		Sør-Varanger (northern Norway, urban and rural)	Sámi , Kven, Norwegian
		Blood sample	S-ferritin and transferrin saturation		
		Hospital record	Acute diseases		
4	Cross-sectional N=3344 Sør-Varanger N= 7965 Tromsø	Questionnaire		Tromsø (northern Norway, urban)	Sámi , Kven, Norwegian
		Blood sample	S-ferritin and transferrin saturation		
		Hospital record	Hereditary hemochromatosis		

Table 1. Data sources.

Inhabitants aged 30 years and from 36 to 79 years were invited to participate in 2001. The eligible population consisted of 27987 individuals, of whom 16640 participated, corresponding to a response rate of 61.3%. Participants aged 30 years were excluded in the analyses, due to small sample size and low participation rate. In total 16 538 men and women aged 36-79 years participated in the SAMINOR study and gave informed consent to medical research, a response rate of 61 %. Participation rates at the coast and in inland areas were 59.6 % and 65.5 %, respectively. More women than men participated in the survey, 65.6 % versus 56.6 %, respectively. Information about ethnicity and iron status, s-ferritin and transferrin saturation, were available from 14630 persons.

4.1.2. The Sør-Varanger study

The Sør-Varanger municipality in Finnmark County is situated in the north-eastern part of Norway, north of the Artic Circle at the 70th parallel, close to the common border between Norway and Russia (Figure 2). In 1994, about 9800 people lived in Sør-Varanger, half of them in the administrative centre of Kirkenes. With exception of Kirkenes, Bjørnevatn and Sandnes, the population is spread among small settlements. The city of Kirkenes was established in the late 19th century because of the iron ore mining and steel mill industry but the mine was closed in 1997. The Sør-Varanger study collected information about different diseases, smoking habits and social conditions from questionnaires [32-34]. Information about occupation, diet, length of residency and ethnicity were also collected in this screening. Because the original study did not include iron measurements, the questionnaire did not contain questions about vitamin C or iron consumption. Participants were invited according to the year of birth, hence there was a random sample of participants each day.

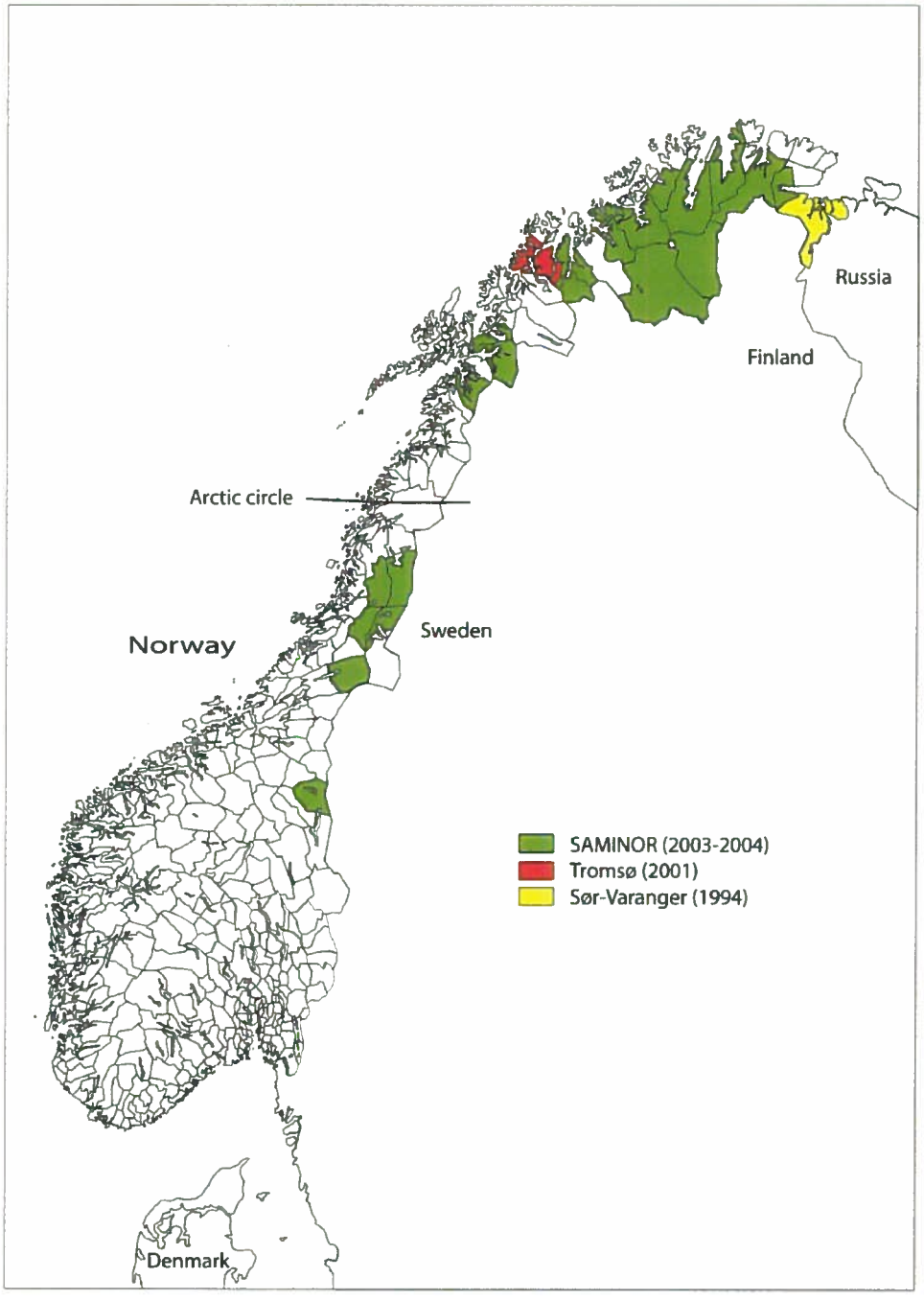

Figure 2. Map of the study area.

All adults between 18 and 69 years of age were invited to participate (n=6822) in 1994. In total 3671 people participated corresponding to a participation rate of 60 %. Participation was higher among women (67.5 %) than men (52.2 %), and increased with increasing age. The study collected blood samples that were refrigerated. In the year of 2000, blood samples were thawed and analysed from a total of 3344 participants (61.4%), between the ages 25 - 69 years at participation. The response rate for participants in the age range between 30 – 69 years was 66.8 %. Participants younger than 25 year were not included in the present study. Iron status was measured in 1787 women and 1557 men. The survey was a cooperative effort between, the Institute of Community Medicine, the University of Tromsø and The national Health Screening Service.

4.1.3. The Tromsø V study

The municipality of Tromsø is situated at the west coast at sea level in northern Norway at the same latitude as Sør-Varanger (Figure 2). In 2001 the Tromsø city had about 60 000 inhabitants. The population is multiethnic with Norwegian, Sámi, Kven and foreign affiliations. Since 1974, the Institute of Community medicine, University of Tromsø, has conducted repeated health surveys with regular intervals, in cooperation with the National Health Screening Service.

The Tromsø V study in 2001 was a population-based, prospective study of birth cohorts. The subset consisted of those who attended a more extended examination of the 1994 – 95 survey, Tromsø IV, (all men born 1925 – 39, all women born 1925 – 44 and 5 – 10% random selection of the other age groups). In addition, all inhabitants born 1971, 1961, 1956 and 1941 were also invited in 2001. In the fifth Tromsø study 8130 subjects (78% of those invited) were investigated. Among these, 7965 gave an informed consent for later use of the data for

research purposes. Information about s-ferritin and transferrin saturation was available in 7527 persons. A protocol similar to that used during previous surveys was followed [35-36].

4.1.4. Hospital records

The Kirkenes hospital is the only hospital in the east part of Finnmark County. The Hospital database therefore covers health information for the whole population. The University Hospital in northern Norway, Tromsø, is more than 800 kilometres away. The University Hospital database covers health information for the population in Tromsø. In order to find participants with acute diseases such as liver and kidney diseases or alcoholic liver damage a computer search through the patient administrative system for in- and outpatients from the Kirkenes hospital in Sør-Varanger was conducted from 1 January 1993 to 31 December 1994 (paper I). In addition a new computer search was performed in the hospital databases at both Kirkenes Hospital and the University Hospital in northern Norway in the period from 1 January 1994 to 31 December 2001 in order to find participants with already diagnosed hereditary haemochromatosis, invited to the population (paper IV). The International Classification System, ninth revision (ICD-9) was used from 1 January 1994 to 31 December 1998. The International Classification System tenth revision (ICD-10) was used from 1 January 1999 to 31 December 2001. In the appendix, the main ICD-9 and ICD-10 codes used for detecting cases from the hospital records are listed.

The Department of Information Technology at the Kirkenes Hospital and the University Hospital of northern Norway conducted all the electronic searches.

4.2. Classification of ethnicity

Table 2 presents the distribution in the different ethnic groups stratified for each survey.

Table 2. Distribution of participants in different ethnic groups stratified for each survey.

Ethnic groups	SAMINOR [1]	Sør-Varanger [1]	Tromsø V [1]
Sámi [2]	4932	226	262
Kven [3]	-	1066	201
Sámi/Kven	-	496	109
Non-Sámi	9698	1556	6534

[1] Subgroups may not total to the entire study samples, due to missing values

[2] Sámi I and Sámi II groups are merged in the SAMINOR study

[3] SAMINOR was performed in areas with sparse Kven settlements, accordingly the Kvens were few in number and is included in the other groups

4.2.1. The SAMINOR study

The main questionnaire had several questions about family background, language and self-perceived ethnicity. Each of the grandparents, parents and the participant were asked about which language was used at home; Sámi, Norwegian, Kven or other languages (to be specified). For the participants themselves, their parents and grandparents, the question on ethnicity had the same four categories of answers. They were also asked about self-perceived ethnicity. It was possible to fill in more than one

alternative. Originally the population was categorized based on the language spoken at home: I: Sami language for all grandparents, parents and respondents (three generations) II: At least two grandparents with Sami language III: At least one Sami characteristic (language or ethnicity) IV: Kvens V: Norwegians VI: Foreigners (language specified).

Based on preliminary analyses we decided to categorise the study subject into three main groups; Group I has Sámi language for three generations. Group II and III are merged (Sámi II). The Kvens and foreigners are merged together with the Norwegians due to few in number and minor differences in mean iron values when stratified for sex and age (non-Sámi).

We therefore performed stratified analyses for 1) Sámi I 2) Sámi II and 3) the remaining population, non – Sámi. Each of these groups is divided into inland and coastal areas.

4.2.2. The Sør-Varanger study

Different ethnic groups were determined by self-reported answers. The main questionnaire had questions about one or several grandparents' language and ethnic affiliation. The questionnaire had two questions about ethnicity;

- What language do / did you, your grandparents use at home?
- What is your grandparent's ethnic background?

It was possible to fill in more than one alternative. In the analysis ethnic groups were categorized based on the language or affiliation of the grandparents. The Sámi group had one or several grandparents with Sámi affiliation or language. The Kven group had had one or several grandparents with Kven affiliation or language. One Sámi/Kven group had one or several grandparents with both Sámi and kven background. The Norwegian group had no information about Sámi or Kven affiliation or language.

4.2.3. The TromsøV study

In the Tromsø V survey the supplementary questionnaire had questions about each of the grandparent's language and affiliation. It was asked about what language(s) were used at home; Sámi, Norwegian, Finnish/ Kven or other languages (to be specified). In addition the participants were asked about self-perceived ethnicity. It was possible to fill in more than one alternative.

The ethnic groups were categorized based on the language or affiliation of the grandparents in addition to self-perceived ethnicity. The Sámi group had one or several grandparents with Sámi language or self-perceived Sámi ethnicity. The Kven group had one or more grandparents with Kven language or self-perceived Kven ethnicity. The Norwegian group had no information about Sámi or Kven affiliation or language. The degree of missing was 10 % in this study.

4.3. Blood sampling and analysis

The Department of Clinical Chemistry, University Hospital of northern Norway, conducted all the blood analyses.

4.3.1. Analyses of s-ferritin, s-iron and transferrin

Both transferrin saturation and s-ferritin were standard tests. Non-fasting blood samples were obtained at admission by means of venipuncture.

In Sør-Varanger serum was stored frozen at – 20 ° C until s-ferritin, s-iron, transferrin saturation and TIBC levels were analysed in 2000. In the SAMINOR and the Tromsø surveys blood samples were analysed immediately after sampling.

S-ferritin was measured on a Hitachi Modular P analyser from Roche Diagnostics, Germany. All reagents were purchased from the same company.

The methods for analyses are described in each respective paper.

4.3.2. DNA analysis

Participants with transferrin saturation or s-ferritin above the reference limits in two separate blood samples were tested for three different HFE mutations: C282Y, H63D and S65C. Genomic DNA was isolated from spots of whole blood. The hemochromatosis gene mutation analyses of Cys282Tyr and His63Asp were performed according to Mangasser-Stephan K, Tag C, Reiser A, Gressner AM. "Rapid Genotyping of Hemochromatosis Gene Mutations on the LightCycler with Fluorescent Hybridization Probes" [37]. The His63Asp probes in this method also detect the Ser65Cys mutation, as verified by sequencing (data not shown). Absence of all these three mutations was designated as wild type.

4.3.3. Analyses of CRP

C-reactive protein concentrations were measured with a turbidimetric assay. The method was standardized against 470 (RPPHS- Reference Preparation for Proteins in Human Serum).

4.4. Statistics

Statistical analysis were conducted employing the SAS software package, version 8.2 or 9.1 (SAS Institute Inc., Cary, NC, USA). The analyses were parametric and were based one analysis of variance, logistic regression and linear regression. All analyses were stratified for gender. Distributions for s-ferritin showed positive skewness. Therefore s-ferritin values were logarithmically transformed and hence replaced by log e (ferritin). S-ferritin values were log – normally distributed. Transferrin saturation was normally distributed. The statistics are described in appropriate details in the individual papers. Results were considered statistically significant with p-value of 0.05 or less.

Calculation of prevalence

Prevalence is the count of a disease in the study population. Point prevalence can define an occurrence of a disease. The point prevalence rate comprises all the cases of a disease that

exist in an area at a point in time [16]. For prevalence, unlike incidence, there is no requirement to exclude from the denominator those individuals who already have been diagnosed with the disease. The formula is; Point prevalence rate = all cases/population at risk x 100% [16] [38].

4.5. Ethics

All surveys were carried out in accordance with the Second Helsinki Declaration and were approved by the Regional Board of Research Ethics. In addition, the SAMINOR study was also approved by the Sámi consultant at the Board. The National Data Protection Authority (Datatilsynet) gave approval for storing of individuals' information and for later linkages. In 1993, The Sør-Varanger study was acknowledged by the Regional Board of Research Ethics, and the Norwegian Data Inspectorate gave permission to store personal information about the participants. In relation to the extension of the Sør-Varanger study in1999, both the Regional Board of Research Ethics and the National Data Protection Authority gave new approvals.

All participants gave written, informed consent prior to the screening.

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5. SUMMARY OF RESULTS

5.1. Iron status in a multiethnic population (age 36 – 80 yr) in northern Norway: the SAMINOR study.

The aim of paper I and II was to evaluate iron status, s-ferritin and transferrin saturation, in an area with mixed Sámi and Norwegian population. In total 16 538 men and women aged 36-79 yr participated in the SAMINOR study and gave informed consent to medical research, a response rate of 61 %. Participation rates at the coast and in inland areas were 59.6 % and 65.5 %, respectively. More women than men participated in the survey, 65.6 % versus 56.6 %, respectively. Information about ethnicity, and iron status were available from 14630 persons. We analysed iron status, s-ferritin and transferrin saturation, in these two groups with respect to gender, age and residence. We also wanted to examine how change in lifestyle factors as body mass index (BMI) smoking habits and alcohol consumption influenced changes in s-ferritin levels.

Paper II presents results from the SAMINOR study, with special emphasis on the distribution of s-ferritin and transferrin saturation within the different settlements in northern Norway. Sámi men and women living in the inland areas had significantly higher mean s-ferritin than non-Sámi living in the same area ($p<0.0001$). The inland Sámi also had significantly higher s-ferritin than the coastal Sámi and non-Sámi populations, both genders ($p<0.013$). S-ferritin increased with increasing age for all women, while the opposite was true for men. Also mean transferrin saturation was higher for the inland residents, but significant only for the male participants. Lifestyle factors had impact on s-ferritin level. Being overweight (25 – 29 kg/m^2) or obese (> 30 kg/m^2) was positively associated with s-ferritin levels when compared to reference group (18.5 – 25 kg/m^2) for both men and women. For men, present and previous smoking was negatively associated with s-ferritin levels when compared to no smoking. In

women, smoking had no impact on s-ferritin. Alcohol shows considerable positive association to s-ferritin levels in men and women. The effect increased with increasing consumption. We concluded that iron levels in rural areas in Northern Norway are to a considerably extent influenced by lifestyle factors. It is only at the inland that differences in iron levels between Sámi and non-Sámi groups are visible. The differences in s-ferritin levels can therefore be explained by continuous high consumption of high bioavailable iron for the inland Sámi I group. At the coastal settlements, sea fish are still the traditional diet for all inhabitants which explains the lack of difference in iron levels between the ethnic categories.

In paper III we wanted to examine whether dietary habits are the main cause of differences in iron levels between the Sámi and Norwegian participants in the SAMINOR survey. Information concerning consumption of different foods, both modern and traditional, was obtained through questionnaires with a food frequency design. Five different dietary patterns had previously been described by Brustad et al; "reindeer", "fish", "average", "fruit and vegetables", and "westernized, traditional marine". In a multiple linear regression analyses, stratified by gender we found that Sámi I descent, reindeer food pattern and obesity (> 30 kg/m^2) were positively associated with ferritin compared to the reference groups. In women, these associations were still positive when all independent variables were mutually adjusted for each of the other variables, but the effect was smaller. In men the effect of Sámi ethnicity disappeared. The reindeer food pattern did still show a positive association with s-ferritin.

Iron depletion, s-ferritin < 13 µg/l, was smallest in the reindeer pattern in both men and women. In conclusion, the differences in iron levels described earlier between inland Sámi and non-Sámi can be explained by several factors such as food habits, age and obesity. Traditional food with high bioavailable iron seems to protect against depleted iron stores in both genders

5.2. Serum levels of iron in Sør -Varanger, Northern Norway – an iron mining municipality.

The purpose of paper III was to investigate iron status in a population with a high proportion of miners, in addition to assess whether iron status of miners was influenced by their work in an iron mine. Iron status was measured in a total of 1401 men and 1548 women. Among these participants, 893 (30.3 %) were employed at A/S Sydvaranger, of whom 476 were miners and 417 were wage earners with different tasks in the company. We performed stratified analyses for 1) miners, 2) other industry workers at A/S Sydvaranger, and 3) the remaining population. We did not demonstrate any differences in iron levels between the two non-mining groups (group 2 and 3) so they were therefore merged and used as a control.

For men, mean s-ferritin decreased with age, and for women s-ferritin increased with age, especially after 49 years. S-ferritin increased significantly with increasing BMI, both sexes included. The prevalence of self reported acute pulmonary diseases is shown in table 3. In addition the hospital database localised one person diagnosed with acute pneumonia in 1993. None of the participants were diagnosed with liver, kidney or alcoholic associated diseases, according to the database. The prevalence of moderate iron overload was 14 % among miners and 10 % among non-miners in the age group 30 – 49 years. Moderate iron overload increased slightly with age in men, both among miners and non-miners. In a stratified analyses no difference in prevalence was found, RR = 1.2/ (95 % CI; 0.9 – 1.6). S-ferritin levels > 699 µg/l were observed in two men, one miner and one non-miner. Also among the women, one miner and one non-miner had severe iron overload. The prevalence of iron deficiency among the male population was 5.2 % for miners and 3.7 % for non-miners, respectively. RR = 1.4/ (95 % CI; 0.9 – 2.4). No age differences were demonstrated.

5.3. Low prevalence of hereditary haemochromatosis in multiethnic populations in northern Norway

In paper IV we studied the prevalence of hereditary haemochromatosis in two multiethnic populations in northern Norway namely Sør-Varanger and Tromsø municipalities. Participants in two population-based studies from Sør-Varanger and Tromsø, northern Norway were analysed for s-ferritin and transferrin saturation. In both surveys the questionnaire had questions about ethnic affiliation, namely Norwegian, Sámi and Kven. Participants with transferrin saturation or s-ferritin above the reference limits in two separate blood samples were tested for three different HFE mutations C282Y, H63D and S65. The total number of subjects included in the analysis, both studies counted, was 6212 women and 4935 men.

The estimated prevalence for C282Y/C282Y mutation in both municipalities was lower than in comparable studies in Norway. The prevalence was lowest in the Sør-Varanger population (men 0.19% and women 0.22%), which also had the highest portion of individuals with Sámi and Kven affiliation. Screening in Tromsø demonstrated that family screening and improved knowledge about hereditary haemochromatosis has reduced the number of haemochromatosis patients with high iron levels. We concluded that the prevalence of hereditary haemochromatosis is lower in multiethnic populations in northern Norway compared to previous studies from other parts of Norway.

6. GENERAL DISCUSSION

6.1. Methodological considerations

Cross-sectional population data can provide information about diseases at a specified time. In addition cross-sectional data can be used for examining associations between exposure and outcome. Three different cross-sectional studies formed the basis for our data. Age was the predefined selection in all three studies. Table 3 shows age distribution in respective studies. In addition, in the SAMINOR study, selected areas were defined where more than 5 % of the population reported to be Sámi in the 1970 Census [32]. The reason was to ensure that participants with Sámi affiliation were represented in the study sample.

6.1.1. Bias and validity

Bias is defined as a differential error that usually produces findings in an epidemiological study consistently distorted in one direction, owing to non -random factors [38]. The validity of a study refers to whether the findings can be taken as being a reasonable representation of the true situation. The validity is affected by selection bias, information bias and confounding [38-39].

Selection bias

Selection bias occurs when the study sample is not representative for the total source population. In all three studies all persons in selected age groups was invited. The most apparent selection bias in our studies of whom we have limited information about. Non-responders may differ from participants with respect to lifestyle, morbidity and mortality [40-42]. The participation rate in the Sør-Varanger study was highly dependent on age and to some degree on sex (Table 3). The overall participation rate of 61 % in the Sør-Varanger study can partly be explained by the fact of low response rate from individuals younger than 30 years.

Table 3. Age distributions in the SAMINOR, the Sør-Varanger and the Tromsø studies

	SAMINOR		Sør- Varanger		Tromsø	
	Women	Men	Women	Men	Women	Men
Age	No (%)	No (%)	N (%)	No (%)	No (%)	No (%)
25-29			156 (10)	239 (13)		
30-39 [1]	765 (10)	606 (9)	370 (24)	441 (25)	417 (9)	278 (8)
40-49	2068 (27)	1843 (26)	404 (26)	439 (25)	733 (16)	598 (17)
50-59	2270 (30)	2253 (32)	313 (20)	344 (19)	702 (16)	359 (11)
60-69	1539 (21)	1524 (21)	314 (20)	324 (18)	1434 (32)	1232 (36)
70-79	916 (12)	846 (12)			1077 (24)	872 (25)
+ 80					147 (3)	116 (3)
Total	7558 (100)	7072 (100)	1787 (100)	1577 (100)	4510 (100)	3455 (100)

[1] *In the SAMINOR study age group is 36 – 39 year*

The administration rules for registration of postal addresses to their parents domicile at the time of military service and higher education may explain some of the non-attendance among people aged 18 – 29 years. In addition, young healthy individuals don't se the reason to participate in a health survey. In the Tromsø V study, 78 % of the invited population attended. The attendance rate increased by age until the age of 80 years when it decreased, which may be due to health related issues. The participation rates by age and gender in the Tromsø V study are given in table 4.

In table 4 participation rate in the SAMINOR study is represented. The total response rate in SAMINOR was 61.3 % when participants aged 30 years was excluded due to small sample size and low participation rate (39 %). The SAMINOR study was performed mainly in rural areas which partly can explain the low participation rate for young people. For example in the Sør -Varanger study many of the communities have no educational opportunities after twelve years of schooling and higher education has to be achieved elsewhere.

In summary, participation rate was highest in the Tromsø study. This is also the municipality where the population has been the subject of several cardio-vascular screening studies and therefore is aware of the benefit of such studies. The other two surveys were done in rural areas where few or non screening studies have been performed previously.

Table 4. Participation rates in the studies populations by gender and age group

	SAMINOR		Sør-Varanger		Tromsø	
Age	Women n (%)	Men n (%)	Women n (%)	Men n (%)	Women n (%)	Men n (%)
18-29			440 (52)	299 (32)		
30-39[1]	870 (56)	710 (43)	435 (65)	371 (49)	423 (57)	283 (41)
40-49	2365 (65)	2095 (53)	434 (72)	397 (57)	762 (71)	614 (61)
50-59	2530 (72)	2533 (60)	343 (81)	314 (68)	722 (94)	363 (93)
60-69	1738 (70)	1704 (64)	326 (79)	312 (75)	1463 (91)	1248 (90)
70-79	1050 (56)	943 (56)			1099 (87)	885 (88)
+80					150 (70)	118 (73)
Total	8553 (66)	7985 (57)	1978 (67)	1693 (52)	4619 (81)	3511 (76)

[1] *In the SAMINOR study, age group is 36 – 39 years*

Information bias

The observed associations may also be biased due to errors in the assessments of exposure or disease [39]. It may fail to detect a case of disease, a possible causal, factor or an outcome of interest. Measurement bias may occur in collecting baseline data, continuous variables. For categorical data we talk about misclassification [39].

To minimise information bias all questionnaires and the informed consent were available in Sámi and Norwegian language in the SAMINOR study. The questionnaires were constructed in Norwegian. The Sámi version was completed by professional translators and then tested on a few persons for the meaning of the questions. The translation revealed that some of the questions could not find a direct translation due to lack of specific Sámi words. The use of Sámi language questionnaires was low; 1.6% and 1.3% of the main and additional versions, respectively. In the six municipalities where the Sámi language Act are applied, the use of Sámi questionnaires were higher; 5.7% and 4.8%, respectively.

A weakness in the Tromsø V study is the 10 % missing answers in the Tromsø survey to the questions about ethnicity. This may be due to the sensitivity of these questions. Ethnicity in epidemiological research is used increasingly as a key variable to compare populations in terms of health and risks for diseases [43-46]. Our research is done in three separate surveys where questions about ethnic affiliation were maid different. This makes the ethnic categorization difficult. Information on both iron measurements and ethnic affiliation was not optimal in none of the surveys. Less missing in s-ferritin and ethnic affiliation was in the SAMINOR study. However, based on the knowledge of the degree of multiethnic composition in each of communities, it is still possible to make conclusions on different health aspects.

Self-administered questionnaires can cause bias due to the imperfect memory of individuals. Recall bias refers to the phenomenon that occurs when subjects who have experienced an

adverse event or disease are more likely to recall previous risk factors than subjects that do not have this experience. However, in our studies the participants were not aware of screening of iron levels or screening for hereditary haemochromatosis as possible endpoints.

Biological variations can cause bias. For example, s-iron has 24 hour variations and is highest during the day. However, in all three studies blood samples were taken at daytime, so the biological variations were random.

Measurement bias includes those arising from machine imprecision and inaccurate observation by investigator or diagnostician. In all our three studies the same well-established, validated laboratory was used. The personnel in all three studies, were trained to conduct the procedures i.e. both venipuncture and serum analyses. In the Sør -Varanger study, the serum was frozen at – 20 ° C until s-ferritin, s-iron, transferrin saturation and TIBC levels were analysed in 2000. Though – 20 ° is not optimal to preserve serum in the case of future analyses, we still know that iron is highly resistant to destruction.

6.1.2. Confounding versus mediator

Confounding is when the association between a specific risk factor and disease outcome is distorted by extraneous factors called confounders. Failure to control for these factors lead to confounding bias [38, 47]. A confounder must be associated both with the dependent and the independent variable under study.

If a variable is included in an intermediate step in the causal pathway between the dependent and the independent variable, the variable is not a confounder but a mediator (moderator) [47]. A moderator variable is one that moderates or modifies the way in which the exposure and the disease are related.

While selection and information bias must be tackled at the design stage or during data collection, confounders and mediators can, if appropriate information about them is available, be managed in the analysis.

To controlling for confounding several methods were used in our analysis:

1. Stratification by gender and age was done in all papers (paper I –IV), by mining status (paper I), by ethnic groups and geographic areas (paper II – III) and by gender, geographic areas and ethnic groups (paper IV). 2. Through multivariable models that included potential confounders as covariates (paper I, II, III).

The use of vitamin C and iron consumption are possible confounders that are not controlled for in the analyses due to lack about information. Also confounding by infectious diseases is important for the analysis and conclusions, because s-ferritin increase when acute diseases are present. In paper I we had information about acute pulmonary diseases and we coupled the study population to hospital records in an effort to check for acute diseases in the period blood sampling where taken. This information was included in the analysis. In paper II and III we used CRP as a confounder in our analysis.

In paper II and III, body mass index, was used as a surrogate estimate of physical activity. Strictly speaking body mass index is a mediator and not a confounder. But physical activity did not remain as an independent predictor of s-ferritin levels when body mass index was in the model. This could be due to the more precise estimation of body mass index than information about total physical activity from the questionnaire.

6.1.3. Generalizability

In all epidemiological studies it is a question if the results are applicative to other populations. The northernmost part of Norway consists of a multiethnic population of Sámi, Norwegian

and Kvens. These groups have different culture and language. Lifestyle is to a great extent affected by habits and culture, which again can influence on health and disease patterns.

In the SAMINOR study this was demonstrated by higher mean levels of s-ferritin and transferrin saturation among the inland Sámi I groups (paper II). In the SAMINOR study over 30 % reported Sámi affiliation. The differences in iron levels described between inland Sámi and non-Sámi can be explained by several factors such as food habits, age and obesity (paper III). Also the prevalence of depleted iron stores was lowest in the reindeer group in both genders. Traditional food with high bioavailable iron seems to protect against depleted iron stores in both genders. Few studies have been done on iron levels in male populations in Norway. Women in this survey aged 35 – 49 yr had iron depletion consistent with results from other iron studies done in Norway, in comparable age groups [47], except for the women in the reindeer pattern. In the Tromsø study, almost 96 % reported Norwegian affiliation, 1.6 % and 2.5 % reported Sámi and Kven affiliation, respectively. Tromsø is an urban area and the lifestyle is to a greater extent representative of the whole population. Different dietary patterns are therefore more unlikely between ethnic groups. There is no reason to believe that the distribution of s-ferritin and transferrin saturation, or the prevalence of iron depletion in Tromsø, differs from the population of Norway.

In Sør -Varanger almost 46 % reported Norwegian affiliation, 7 % and 32 % reported Sámi and Kven affiliation, respectively. Mixed Sámi and Kven affiliation was reported by15 % of the participants. Mean s-ferritin in Sør - Varanger were lower than in Tromsø, both among men and women.

Because the questions about ethnic affiliation are different in the three surveys categorisation in ethnic groups has dissimilar background. In particular in the Sør -Varanger and the SAMINOR studies, the result on iron levels can be difficult to compare with the rest of the population of Norway, due to the mixed ethnic population in these areas.

However, the prevalence of hereditary haemochromatosis is lower in two populations in northern Norway. Hereditary haemochromatosis is a genetic disorder and our findings do not resemble previous results from Trøndelag and Oslo [49-51]. The explanation for this is mixture of several ethnic groups in the northern Norway.

6.2. Categorization of ethnic groups in health research

The process of defining and recognizing different Indigenous Peoples for health research purpose is difficult and can be highly contested in some situations [52-53]. Until recently in Norway, health research on the Sámi people has been scarce and no national strategies to identify health information at national level have been developed. One reason can be the challenges to make a significant categorization of the Sámi as a group. The use of ethnic labels can vary with context, time and situation, and is also associated with how one is perceived by others. The use of self-perceived ethnicity should therefore be used together with other measurements on ethnicity [54-55].

The Sámi population is a heterogenous group. Different subgroups within the Sámi population have their own regional dialect and cultural traditions and some have gone through stronger cultural assimilation than others. However, it has been a revitalization process of Sámi identity among the young population, especially in the coastal areas [56].

The questionnaires in the three studies did not have similar questions about ethnic affiliation, mainly because they were not implemented at the same time. The ethnic definitions used in the papers (paper I – IV) have limitations since they may have different validity in different geographic regions and within different subgroups of the Sámi population.

However, despite the difficulties in categorizing, we find differences between ethnic groups concerning mean levels of s-ferritin and transferrin saturation (paper II and III). In addition it

seems that among the mixed ethnic population there is a lower prevalence of the hereditary haemochromatosis (paper IV).

6.3. S-ferritin

The methods of s-ferritin measurement in the three studies changed between 2000 and 2004, but the methods were harmonized with relevant factors for each period and were also calibrated against the WHO International Ferritin Standard. It is therefore possible to compare s-ferritin levels between the different surveys. Mining as occupation had no significant influence on iron status in our study (paper I). Nor was it possible to demonstrate any effect from smoking habits. BMI was positively associated to s-ferritin (paper I – III). Age also influenced s-ferritin levels. In men s-ferritin tended to decrease with advancing age. Similar variations have been reported for haemoglobin in elderly men [35]. In women s-ferritin increased from the age of 40 (paper I-III). Food patterns also predicted s-ferritin levels (paper III). Among men, traditional food habits with intake of reindeer meat eliminate the association of ethnicity. In women food habits reduce the association between s-ferritin and ethnicity, but there is still some effect left. One explanation can be that the food frequency questionnaire covers food habits among men better than among women.

6.4. Iron deficiency

Anaemia and iron deficiency is a widespread global health problem. The main reason is nutritional iron deficiency and among women menstrual blood loss. In non-industrial countries the problems are exaggerated by infections such as malaria, hockworms, schistosomiasis and HIV/AIDS. In our studies iron deficiency was defined as s-ferritin $< 16\mu g/l$ and iron depletion was defined as s-ferritin $< 13\ \mu g/l$. Figure 3 shows the distribution of iron deficiency in each study stratified by gender and age. As shown in paper III, high

intake of high bioavailable iron reduces the risk of iron depletion. Almost no men in the Sámi I group had iron depletion also women in this ethnic group had the lowest frequency of iron depletion, due to high intake of reindeer meet.

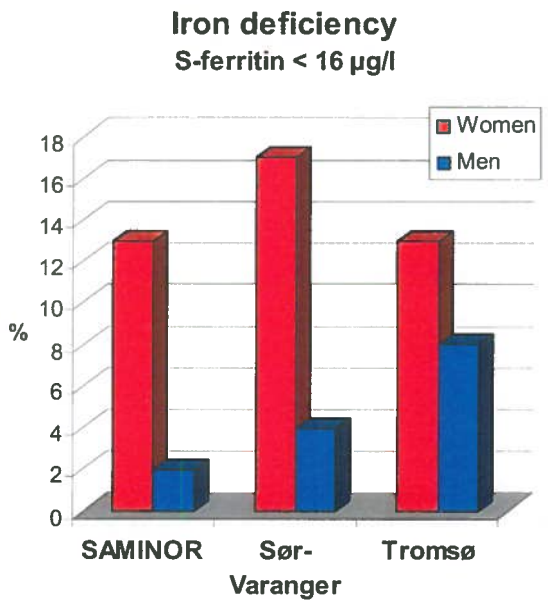

Figure 3. Prevalence of iron deficiency by surveys

6.5. Hereditary haemochromatosis

In the HUNT screening the following definition was used:

Hereditary haemochromatosis is a diagnosis given to persons with confirmed high serum transferrin saturationand high serum ferritin and no other conditions explaining the high serum ferritin [11].

In our screening we actually lowered the screening criteria for s-ferritin and transferrin saturation even more than in HUNT (paper IV) in order to include all possible individuals with the three known mutations. If the reference limits in HUNT were to be followed, this would reduce the prevalence of C282Y/C282Y additional in our study to 0.02% in women and 0.06 % in men. However, this does not mean that we disagree with the definitions used in HUNT, which are more consistent with the recommendation by the Norwegian Society of Haematology. Screening for a genetic condition for research purposes and for a clinical elucidation and treatment for hereditary haemochromatosis are two different issues. In a clinical practice the definitions by the Norwegian Society of Haematology should be encouraged for use when hereditary haemochromatosis is an issue.

Genetic haemochromatosis is believed to be a disease restricted to those of European ancestry [7-8,13]. In northwestern Europe more than 80% of genetic haemochromatosis patients are homozygous for one mutation, the substitution of tyrosine for cysteine at position 282 (C282Y) in the unprocessed protein.

Two different health survey programs, namely the Norwegian- Russian Study and the Tromsø V Study, form the basis for the screening of hereditary haemochromatosis in northern Norway. Blood tests were performed on the participants, in total 10871 individuals. This is the first haemochromatosis screening study, incorporating the indigenous people in northern Scandinavia and the Kven immigrants.

The present analyses demonstrated in general a low prevalence of C282Y mutation in northern Norway, especially among individuals with Sámi and Kven affiliation. However, whether a multiethnic population is the only cause of the low prevalence remains to be investigated. Genetic- screening of the different ethnic groups would in this case give the definitive answer. However, such a screening is controversial, especially in northern Norway, where investigation of Sámi skulls was a respectable science in the eighteenth through to the middle of nineteenth century [57-58]. Such research was detested by the local population and remains an unpleasant memory for their descendants. There is therefore pronounced scepticism in some areas against genetic research because it is associated with these skull measurements.

Population-based screening

Hereditary haemochromatosis meets most of the World Health Organization criteria for population screening, the disease is relatively common, early diagnosis is possible and treating asymptomatic patients significantly prevents morbidity [59-60]. Large-scale screening for hereditary haemochromatosis was suggested already in 1984 by Olsson et al. [61]. Åsberg et al. concluded that a population-based phenotypic screening for hereditary haemochromatosis in young men would be of benefit [62]. This was based on the idea that early detection of the disorder will prevent clinical manifestations and early morbidity.

These statements are most probably based on the fact that the majority of individuals with clinical haemochromatosis with high iron levels have been incidentally diagnosed. After the mutation of the HFE gene was discovered in 1996 there has been increasing focus on haemochromatosis among researchers. Also among clinicians the knowledge about this disorder has improved greatly. Although haemochromatosis fulfils the criteria established by the World Health organization for population screening for medical condition, our study

demonstrates that extensive knowledge about this hereditable condition among physicians, most probably makes population screening unnecessary (paper IV).

7. CONCLUDING REMARKS AND FURTHER PERSPECTIVES.

Main conclusions

The present thesis has addressed different aspects related iron status, s-ferritin and transferrin saturation, in particular for populations living high latitudes.

Iron status, s-ferritin and transferrin saturation, in northern Norway do not show considerably differences to other population studies in Norway or in northern Europe, except at inland areas where mean s-ferritin are higher than I comparable groups. The observed differences in iron levels can be explained by nutritional habits. The prevalence of hereditary haemochromatosis is lower in northern Norway, probably because of the multiethnic population.

The main conclusions can be summarized as follow:

1. In men there is a decline in s-ferritin level in the oldest age groups, in all ethnic groups. In women s-ferritin levels increase with ageing after menopause, with ethnicity having some effect.

2. In Sør -Varanger it seems that the population has lower mean s-ferritin levels than in the comparable municipality of Tromsø.

3. Sámi living inland and speaking the Sámi language over three generations have significant higher s-ferritin levels and transferrin saturation than other Sámi groups and Norwegians. The main reason is continuous high consumption of high bioavailable iron for the inland Sámi I group. At the coastal settlements, sea fish are still the traditional diet for all inhabitants which explain the lack of difference in iron levels between the ethnic categories.

4. Traditional food with high bioavailable iron seems to protect against depleted iron stores in both genders. It is reasonable to conclude that traditional food provides essential nutrients in the diet such as an extra iron supplement, and thus its use should be encouraged.

5. The prevalence of hereditary haemochromatosis is lower in multiethnic populations in northern Norway compared to previous studies from other parts of Norway.

6. Though haemochromatosis fulfils the criteria established by the World health organization for population screening for medical condition, our study demonstrates that extensive knowledge about this hereditable condition among physicians most probably renders population screening unnecessary.

Further research and implication for clinical practice

Several issues regarding iron levels among persons living in northern Norway can be included in further research.

1. Iron levels as s-ferritin and transferrin saturation, together with haemoglobin should be measured and analysed to clarify the frequency of iron deficiency anaemia in the population.

   In the Tromsø V study haemoglobin was also measured and the data are available for analysis.

2. Changes in s-ferritin levels over time have not yet been measured in a larger population sample. Such a study could help clarify if the decrease in s-ferritin with age in men is normal or is a predictor of morbidity.

3. Questions about ethnic and linguistic affiliation and categorization of ethnic groups should be central in future population-based project in northern Norway.

4. Greater focuses on knowledge about hereditary haemochromatosis by medical doctors make the suggestion of population screening for this disorder unnecessary. In the context of this hereditary disease, family counselling should be encouraged.

5. Improve diagnostic Classification system of Diseases, ICD, are needed, so that conditions such as hyperferritinemia will not be incorrectly coded.

8. CORRECTIONS

Some mistakes have unfortunately been printed in paper I.

The age group 36 – 39 year in table 2, table 3 and table 4 is incorrect. The correct age group in all three tables is 30 – 39 year.

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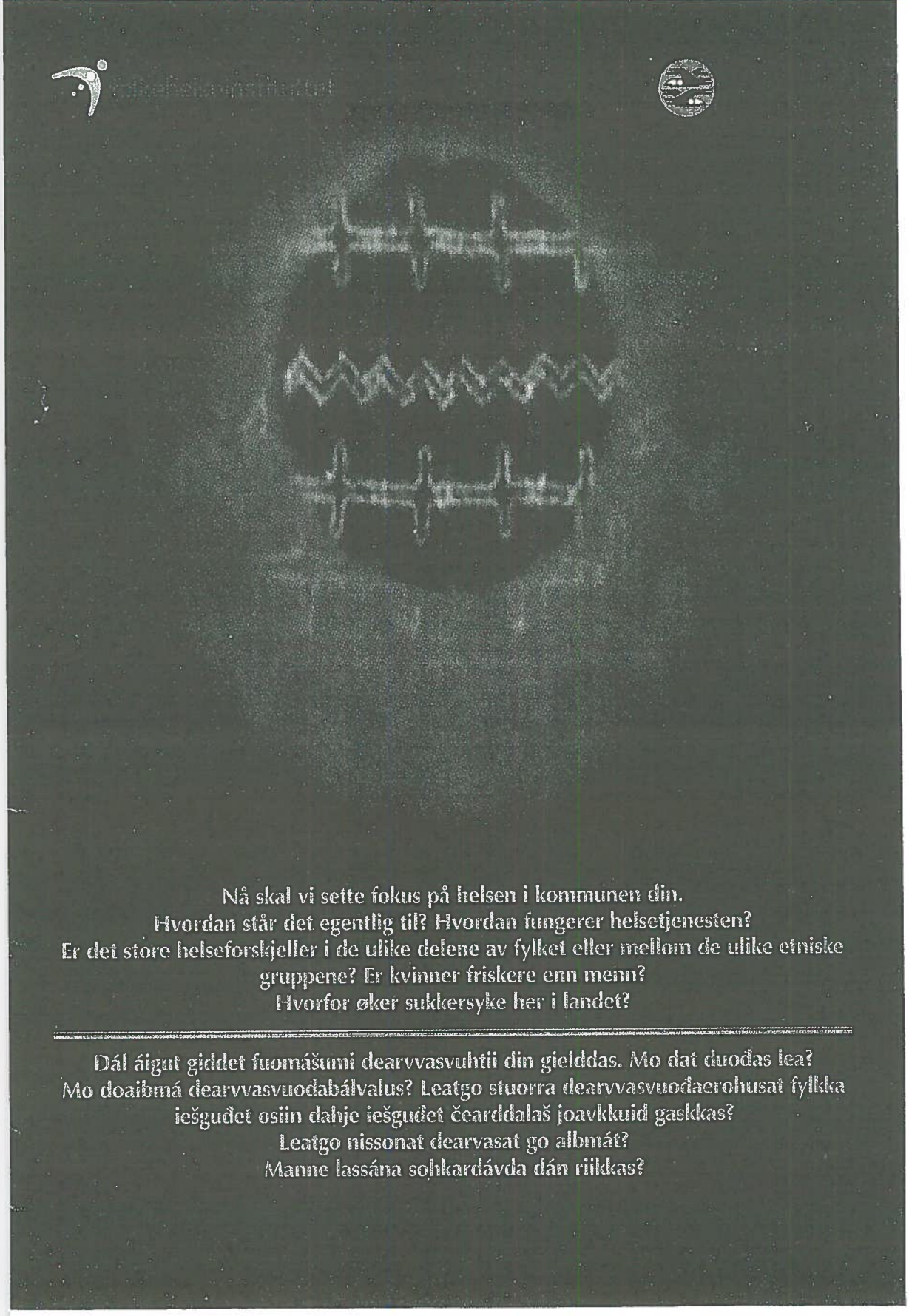
Appendix 1
Questionnaire the SAMINOR study 2003
Original Norwegian and Sámi version



Nå skal vi sette fokus på helsen i kommunen din.
Hvordan står det egentlig til? Hvordan fungerer helsetjenesten?
Er det store helseforskjeller i de ulike delene av fylket eller mellom de ulike etniske gruppene? Er kvinner friskere enn menn?
Hvorfor øker sukkersyke her i landet?

Dál áigut giddet fuomášumi dearvvasvuhtii din gielddas. Mo dat duođas lea?
Mo doaibmá dearvvasvuođabálvalus? Leatgo stuorra dearvvasvuođaerohusat fylkka iešguđet osiin dahje iešguđet čearddalaš joavkkuid gaskkas?
Leatgo nissonat dearvasat go albmát?
Manne lassána sohkardávda dán riikkas?

Helseundersøkelsen har tre formål:

- Du som deltar i helseundersøkelsen får sjekket om du har bestemte sykdommer, eller om det er fare for at du kan få dem.
- Å få ny kunnskap om helse, sykdom og levekår i områder med samisk og norsk bosetting.
- Å lage en oversikt over folks helse – en «helseprofil» for fylket. Dette er viktig for å gi fylket og de enkelte kommunene et bedre grunnlag for å planlegge helsetjenesten i framtida.

Hvem kan delta?

Alle født 1925–1967 og i 1973 fra områder med samisk og norsk bosetting. Det er 9 kommuner i Finnmark, 6 i Troms, 4 i Nordland og 2 i Nord-Trøndelag med i undersøkelsen.

Hvordan får du time til helseundersøkelsen?

Du får tilsendt et spørreskjema sammen med innkallingen. Vi ber om at du fyller ut skjemaet hjemme og tar det med når du møter fram til helseundersøkelsen. Helseundersøkelsen vil foregå enten i buss eller i et fast lokale i kommunen. Hvis den oppsatte timen ikke passer, kan du møte når du vil innenfor åpningstiden vår. Undersøkelsen er gratis.

Hvordan foregår helseundersøkelsen?

Det gjøres målinger av blodtrykk, høyde, vekt og livvidde, og det taes en blodprøve. Blodprøven kan senere bli analysert på fettstoffer i blodet, blodsukker, markører for betennelsesreaksjoner, kosthold, hormoner, lever- og nyrefunksjon samt beinmarkører. Genetiske analyser av blodet kan også bli aktuelt.

Omtrent fire uker etter helseundersøkelsen får du et brev i posten med opplysninger om

Dearvvasvuođaiskkadeami dieđuin leat golbma ulbmila:

- Dus gii searvvat iskkadeapmái iskat leatgo dus dihto dávddat, dahje leago dus várra daid oažžut.
- Oažžut ođđa máhtu dearvvasvuođa, dávddaid ja eallindili birra sámi ja dáža ássanguovlluin.
- Ráhkadit várdosa olbmuid dearvvasvuođas – fylkka «dearvvasvuođaprofiilla». Dát lea dehálaš vai fylkkas ja juohke gielddas lea buoret vuođđu plánet boahttevaš dearvvasvuođabálvalusa.

Gii sáhttá searvat?

Juohkehaš riegádan 1925–1967 ja 1973 guovlluin gos ásset sápmelaččat ja dážat. 9 gieldda Finnmárkkus, 6 Tromssas, 4 Nordlánddas ja 2 Davvi-Trøndelagas leat iskkadeamis mielde.

Mo oaččut diimmu dearvvasvuođaiskkadeapmái?

Oaččut gažadanskovi oktan rávkamiin. Bivdit du deavdit skovi ruovttus ja váldit dan mielde go boađát iskkadeapmái. Iskadeapmi lea juogo busses dahje dihto lanjas gielddas. Jus biddjon áigi ii heive, de sáhtát boahtit vaikke goas min rahpanáiggis. Iskkadeapmi lea nuvttá.

Mo iskkojuvvot?

Varradeaddu, allodat, lossodat ja seakkáš mihtiduvvojit, ja váldo varraiskkus. Varraiskosis sáhttá mannil iskat vara buoideávdnasiid, varrasohkkara, infekšunreakšuvnnaid mearkkaid, biepmu, hormonaid, vuoivvas- ja monimušdoaimma ja dáktemearkkaid. Vara genetalaš analysat maid soitet šaddat áigeguovdilat.

Sullii njeallje vahku mannil dearvvasvuođaiskkadeami oaččut poasttas reivve ieža kolestrola, varradeattu ja varrasohkkara birra, ja mo dat leat rávvejuvvon meriid ektui.

ditt kolesterol, blodtrykk og blodsukker, og hvordan du ligger an i forhold til anbefalte verdier. De som har særlig høy risiko for å få hjerte- og kar sykdommer og sukkersyke, vil bli bedt om å ta kontakt med sin egen lege for videre oppfølging.

Alle som møter fram til helseundersøkelsen, får et tilleggsskjema, med spørsmål om blant annet kosthold og levekår.

De som fullfører hele helse- og levekårsundersøkelsen vil være med i trekningen av 3 reisegavekort hver verdt kr. 10000,–. Vi regner med en deltakelse på ca. 15000 personer.

Bivdit sin geain lea hui alla váibmo- ja suotnadávddavárra ja sohkardávda, váldit oktavuoða iežaset doaktáriin joatkka čuovvoleapmái.

Juohkehaš gii boahtá iskkadeapmái, oažžu lassiskovi, gažaldagaiguin ee. biepmu ja eallindili birra.

Sii geat čađahit olles dearvvasvuođa- ja eallindilleiskkadeami leat mielde vuorbádeamen 3 mátkeskeaŋkakoartta man árvu lea 10000,– ru. guđesge. Doaivut ahte su. 15000 olbmo servet.

Vi trenger din tillatelse

Når du møter fram til helseundersøkelsen, ber vi deg om å undertegne et samtykke der du sier deg enig i et eller flere av de fire punktene nedenfor. (Du vil få kopi av samtykke erklæringen).

1) At du kan bli kontaktet med anbefaling om oppfølging, behandling eller for å forebygge sykdom.

2) At opplysningene dine kan brukes til medisinsk forskning etter vurdering og tilråding fra *Regional komité for medisinsk forskningsetikk i Nord-Norge* og *Datatilsynet*.

3) At resultatene dine (etter godkjenning fra *Datatilsynet*) kan settes sammen med opplysninger om deg i andre registre for forskningsformål slik som *Kreftregisteret, Dødsårsaksregisteret* og folketellingene. I alle disse tilfellene vil navn og personnummer bli fjernet. Forsikringsselskaper får ikke tilgang til dataene.

4) At blodprøven din kan lagres og brukes til medisinsk forskning og genetiske analyser for å finne årsak til sykdom. All bruk av denne prøven vil bare skje i samsvar med godkjenning fra *Datatilsynet* og etter at *Regional komité for medisinsk forskningsetikk i Nord-Norge* har vurdert og tilrådd prosjektet.

Mii dárbbašat du lobi

Go boadát iskkadeapmái, de bivdit du čállit vuollái miehtama, mas logat iežat leat ovttamielas ovtta dahje moatti dán njeallje čuoggás vulobealde (Miehtamis oačču máŋgosa).

1) Ahte duinna sáhttá váldit oktavuođa go áigu rávvet čuovvoleami, dálkkodit dahje eastadit dávddaid.

2) Ahte visot du dieđut sáhttet adnot medisiinnalaš dutkamii *Regional komite for medisinsk forskningsetikk i Nord-Norge* ja *Datatilsynet* árvvoštallama ja rávvaga mielde.

3) Ahte du bohtosiid (*Datatilsynet* dohkkeheami mielde) sáhttá čohkket dieđuiguin du birra eará registariin dutkandoaimmaide nugo *Kreftregistret, Dødsårsaksregistret* ja olmmošlohkamat. Visot dáid oktavuođain sihkko namma ja personnummar. Dáhkádusfitnodagat eai beasa dáid dieđuid oaidnit.

4) Ahte du varraiskkus sáhttá ráddjot ja adnot medisiinnalaš dutkamii ja genetalaš analysaide gávnnahit dávddaid árttaid. Dán iskosa juohke geavaheapmi geavvá dušše *Datatilsynet* dohkkeheami mielde ja maŋŋil go *Regional komite for medisinsk forskningsetikk i Nord-Norge* lea árvvoštallan ja rávven prošeavtta.

Selv om du sier ja til dette nå, kan du senere ombestemme deg og be om å bli slettet fra undersøkelsen uten at du må oppgi noen grunn for det. Dette gjøres ved skriftlig beskjed til **Institutt for samfunnsmedisin, UiTø, 9037 Tromsø**. Blodprøven din vil da bli tilintetgjort.

Vi ønsker å følge alle som møter til helseundersøkelsen i lang tid framover med hensyn til hjerteinfarkt, hjerneslag og andre aktuelle sykdommer. Derfor ønsker vi å lagre opplysningene du har gitt, frem til fylte 100 år, for å sammenholde disse med opplysninger fra sentrale registre slik som *Kreft-* og *Dødsårsaksregisteret.*

Resultatene vil bli publisert i massemedia, og det utformes en rapport fra helse- og levekårsundersøkelsen når den er avsluttet.

Datatilsynet har gitt konsesjon for lagring av opplysninger fra undersøkelsen og forskningsprosjektet er tilrådd av *Regional komite for medisinsk forskningsetikk i Nord- Norge.*

Vaikke dása dál mieđat, de sáhtát maŋŋil molsut oaivila ja bivdit sihkkot iskkadeamis dieditkeahttá makkárge ákka dasa. Dán dagat čálalaččat Institutt for samfunnsmedisinii; **Institutt for samfunnsmedisin, UiTø, 9037 Tromsø**. Du varraiskkus dalle bálkestuvvo.

Mii dáhtošeimmet guhkit áiggi čuovvut juohkehačča gii boahtá dearvvasvuođaiskkadeapmái váibmodohppehaga, vuoiŋŋašgáldnanvigi ja eará vejolaš dávddaid hárrái. Danne dáhtošeimmet rádjat du addán dieđuid, gitta devdon 100 jahkái, vai daid beassá sulastahttit guovddáš registariid dieđuiguin, nugo *Kreft-* ja *Dødsårsaksregistret.*

Bohtosiid almmuhat mediain, ja čállo raporta dearvvasvuođa- ja eallindilleiskkadeamis go dat lea loahpahuvvon.

Datatilsynet lea addán sierralobi rádjat iskkadeami dieđuid ja dutkanprošeavtta lea rávven *Regional komite for medisinsk forskningsetikk i Nord-Norge.*

Velkommen til helseundersøkelsen

Selv om du nettopp har vært hos lege eller selv om du føler deg frisk, kan du likevel delta i undersøkelsen. Da hjelper du oss til bedre kunnskap og riktigere oversikt over helsen i kommunen og fylket ditt.

Bures boahtin dearvvasvuođaiskkadeapmái

Vaikke leatge aiddo leamaš doaktára luhtte dahje dovddat iežat dearvvasin, de sáhtát liikká searvat iskkadeapmái. Dalle veahkehat min oažžut eanet máhtu ja riektasat dieđuid du gieldda ja fylkka dearvvasvuodas.

Dearvvuođaiguin / Med hilsen

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Helse- og levekårs-undersøkelsen

Personlig innbydelse

1. EGEN HELSE

Hvordan er helsen din nå? *(Sett bare ett kryss)*

☐ Dårlig ☐ Ikke helt god ☐ God ☐ Svært god

Har du, eller har du hatt?

	JA	NEI	Alder første gang
Astma	☐	☐	
Kronisk bronkitt/emfysem/KOLS	☐	☐	
Diabetes (sukkersyke)	☐	☐	
Fibromyalgi/kronisk smertesyndrom	☐	☐	
Psykiske plager som du har søkt hjelp for	☐	☐	
Hjerteinfarkt (sår på hjertet)	☐	☐	
Angina pectoris (hjertekrampe)	☐	☐	
Hjerneslag/hjerneblødning	☐	☐	
Multippel sklerose (MS)	☐	☐	
Ulcerøs kolitt	☐	☐	

	JA	NEI
Får du smerter eller ubehag i brystet når du: Går i bakker, trapper eller fort på flatmark?	☐	☐
Kan slike smerter opptre selv om du er i ro?	☐	☐

2. MUSKEL OG SKJELETTPLAGER

	JA	NEI
Har du i løpet av *det siste året* vært plaget med smerter og/eller stivhet i muskler og ledd som har vart *i minst 3 måneder* sammenhengende?	☐	☐

Har du noen gang hatt:	JA	NEI	Alder siste gang
Brudd i håndledd/underarm?	☐	☐	
Lårhalsbrudd?	☐	☐	

3. MAGE OG TARM SYMPTOMER

	JA	NEI
Har du hatt sure oppstøt, halsbrann eller brystbrann nesten daglig i minst en uke?	☐	☐
Har du noen gang hatt smerter eller verk i magen som har vart i minst 2 uker?	☐	☐

Hvis JA, hvor i magen sitter smertene? *(Sett ett kryss)*

☐ Øvre del ☐ Nedre del ☐ Hele magen

Er smertene eller «verken» jevnt over tilstede? *(Sett ett kryss)*

I perioder av ukers varighet ☐

I perioder av måneders varighet ☐

Bestandig ☐

	JA	NEI
Er du ofte plaget av oppblåsthet, rumling i magen eller rikelig luftavgang?	☐	☐

3. MAGE OG TARM SYMPTOMER (fortsettelse)

Er avføringen din vanligvis: *(Sett ett eller flere kryss)*

☐ Normal ☐ Løs ☐ Hard og perlete

☐ Vekslende hard og løs ☐ Illeluktende

	JA	NEI
Har du i perioder tre eller flere avføringer daglig?	☐	☐
Har du hatt plager i mage/tarm etter inntak av melk?	☐	☐

Er det andre i familien som har de samme magesymptomene?

☐ Mor ☐ Far ☐ Søsken ☐ Barn ☐ Ingen

4. ANDRE PLAGER

Under finner du en liste over ulike problemer. Har du opplevd noe av dette *den siste uken* (til og med i dag)?

(Sett ett kryss for hver plage)

	Ikke plaget	Litt plaget	Ganske mye	Veldig mye
Plutselig frykt uten grunn	☐	☐	☐	☐
Føler deg redd eller engstelig	☐	☐	☐	☐
Matthet eller svimmelhet	☐	☐	☐	☐
Føler deg anspent eller oppjaget	☐	☐	☐	☐
Lett for å klandre deg selv	☐	☐	☐	☐
Søvnproblemer	☐	☐	☐	☐
Nedtrykt, tungsindig	☐	☐	☐	☐
Følelse av å være unyttig, lite verd	☐	☐	☐	☐
Følelse av at alt er et slit	☐	☐	☐	☐
Følelse av håpløshet mht. framtida	☐	☐	☐	☐
Tenkt på å gjøre slutt på livet ditt	☐	☐	☐	☐

5. SYKDOM I FAMILIEN

	JA	NEI	VET IKKE
Har en eller flere av dine foreldre eller søsken hatt hjerteinfarkt eller angina pectoris?	☐	☐	☐

Kryss av for de slektningene som har eller har hatt noen av sykdommene og angi deres alder for når de fikk sykdommene. *(Hvis flere søsken, før opp den som fikk det tidligst i livet)*

	Mor	Far	Søster	Bror	Barn	Ingen	Alder første gang
Hjerteinfarkt før 60-års alder	☐	☐	☐	☐	☐	☐	
Hjerteinfarkt etter 60 års-alder	☐	☐	☐	☐		☐	
Diabetes	☐	☐	☐	☐	☐	☐	
Hjerneslag	☐	☐	☐	☐	☐	☐	
Astma	☐	☐	☐	☐	☐	☐	
Tykktarmskreft	☐	☐	☐	☐	☐	☐	
Brystkreft	☐	☐	☐	☐	☐	☐	
Eggstokkreft	☐	☐	☐	☐	☐	☐	

Hvor mange søsken har du? Brødre Søstre

6. BRUK AV MEDISINER

Med medisiner mener vi her medisiner kjøpt på apotek. Kosttilskudd og vitaminer regnes ikke med her.

Bruker du?	Nå	Før, men ikke nå	Aldri brukt
Medisin mot høyt blodtrykk	☐	☐	☐
Kolesterolsenkende medisin	☐	☐	☐
Insulin	☐	☐	☐
Tabletter mot sukkersyke	☐	☐	☐

Hvor ofte har du i løpet av *de siste 4 ukene* brukt følgende medisiner? *(Sett ett kryss pr. linje)*

	Ikke brukt siste 4 uker	Sjeldnere enn hver uke	Hver uke, men ikke daglig	Daglig
Smertestillende uten resept	☐	☐	☐	☐
Smertestillende på resept	☐	☐	☐	☐
Sovemedisin	☐	☐	☐	☐
Beroligende medikamenter	☐	☐	☐	☐
Medisiner mot depresjon	☐	☐	☐	☐
Annen medisin på resept	☐	☐	☐	☐
	1	2	3	4

For de medisinene du har krysset av for i de to punktene ovenfor og som du har brukt i løpet av *de siste 4 ukene*:

Angi navnet og hvilken grunn det er til at du tar/har tatt disse (sykdom eller symptom): *(Kryss av for hvor lenge du har brukt medisinen)*

		Hvor lenge?	
Navn på medisinen: *(sett ett navn pr. linje)*	Grunn til bruk av medisinen:	Inntil 1 år	1 år eller mer
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐

Dersom det ikke er nok plass her, kan du fortsette på eget ark som du legger ved.

7. MAT OG DRIKKE

Hvor ofte spiser du vanligvis disse matvarene?
(Sett ett kryss pr. linje)

	Sjelden/ aldri	1-3 g. pr.mnd	1-3 g. pr. uke	4-6 g. pr. uke	1-2 g. pr. dag	3 g. el. mer pr. dag
Frukt	☐	☐	☐	☐	☐	☐
Bær	☐	☐	☐	☐	☐	☐
Ost *(alle typer)*	☐	☐	☐	☐	☐	☐
Poteter	☐	☐	☐	☐	☐	☐
Kokte grønnsaker	☐	☐	☐	☐	☐	☐
Rå grønnsaker/salat	☐	☐	☐	☐	☐	☐
	1	2	3	4	5	6

7. MAT OG DRIKKE (fortsettelse)

Hva slags fett bruker du oftest? *(Sett ett kryss pr. linje)*

	Bruker ikke	Meieri-smør	Hard margarin	Myk/flytt margarin	Oljer	Annet
På brødet	☐	☐	☐	☐	☐	☐
I matlagingen	☐	☐	☐	☐	☐	☐
	1	2	3	4	5	6

Bruker du følgende kosttilskudd:

	Ja, daglig	Iblant	Nei
Tran, trankapsler?	☐	☐	☐
Fiskeoljekapsler *(omega 3)?*	☐	☐	☐
Vitamin- og/eller mineraltilskudd?	☐	☐	☐

Hvor mye drikker du vanligvis av følgende? *(Sett ett kryss pr. linje)*

	Sjelden/ aldri	1-6 glass pr. uke	1 glass pr. dag	2-3 glass pr. dag	4 glass el. mer pr. dag
Helmelk, kefir, yoghurt	☐	☐	☐	☐	☐
Lettmelk, cultura, lett yoghurt	☐	☐	☐	☐	☐
Skummet melk (sur, søt)	☐	☐	☐	☐	☐
Ekstra lettmelk	☐	☐	☐	☐	☐
Fruktjuice	☐	☐	☐	☐	☐
Vann	☐	☐	☐	☐	☐
Brus/Cola med sukker	☐	☐	☐	☐	☐
Brus/Cola uten sukker	☐	☐	☐	☐	☐
	1	2	3	4	5

Hvor mange kopper kaffe og te drikker du *daglig?*
(Sett 0 for de typene du ikke drikker daglig) Antall kopper

Filterkaffe .....

Kokekaffe/trykkanne .....

Annen kaffe .....

Te .....

Omtrent hvor ofte har du i løpet av det siste året drukket alkohol? *(Lettøl og alkoholfritt øl regnes ikke med)*

Har aldri drukket alkohol ☐1	Har ikke drukket siste år ☐2	Noen få ganger siste år ☐3	Omtrent 1 gang i måneden ☐4
2-3 ganger pr. måned ☐5	Ca. 1 gang i uka ☐6	2-3 ganger i uka ☐7	4-7 ganger i uka ☐8

Til dem som har drukket siste år:
Når du har drukket, hvor mange glass eller drinker har du vanligvis drukket? Antall

Omtrent hvor mange ganger det siste året har du drukket så mye som minst 5 glass eller drinker i løpet av ett døgn? Antall ganger

Når du drikker, drikker du da vanligvis: *(Sett ett eller flere kryss)*
☐ Øl ☐ Vin ☐ Brennevin

8. RØYKING OG BRUK AV SNUS

Hvor lenge er du vanligvis daglig i et røykfylt rom? Antall hele timer

	JA	NEI
Røykte noen av de voksne hjemme da du vokste opp?	☐	☐
Bor du, eller har du bodd, sammen med noen dagligrøykere etter at du fylte 20 år?	☐	☐

	Ja, nå	Ja, før	Aldri
Har du røykt/røyker du daglig?	☐	☐	☐

Hvis du røyker daglig nå, røyker du:	JA	NEI
Sigaretter?	☐	☐
Sigarer/sigarillos/pipe?	☐	☐
Rulletobakk/rullings?	☐	☐

Hvis du har røykt daglig *tidligere*, hvor lenge er det siden du sluttet? Antall år

Hvis du røyker daglig nå, eller har røykt tidligere:
Hvor mange sigaretter røyker/røykte du vanligvis daglig? Antall sigaretter

Hvor gammel var du da du begynte å røyke daglig? Alder i år

Hvor mange år til sammen har du røykt daglig? Antall år

	Ja, nå	Ja, før	Aldri
Har du brukt/bruker du snus daglig?	☐	☐	☐

Hvis du bruker/har brukt snus, hvor mange år til sammen har du brukt snus? Antall år

9. MOSJON OG FYSISK AKTIVITET

Hvordan har din fysiske aktivitet i fritiden vært det siste året? *(Tenk deg et ukentlig gjennomsnitt for året. Arbeidsvei regnes som fritid. Besvar begge spørsmålene)*

	Timer pr. uke:			
Lett aktivitet *(Ikke svett/andpusten)*	Ingen	Under 1	1-2	3 og mer
	☐	☐	☐	☐
Hard fysisk aktivitet *(Svett/andpusten)*	☐ 1	☐ 2	☐ 3	☐ 4

Angi bevegelse og kroppslig anstrengelse i *din fritid*. Hvis aktiviteten varierer meget f. eks. mellom sommer og vinter, så ta et gjennomsnitt. Spørsmålet gjelder *bare det siste året*.
(Sett kryss i den rute som passer best)

Leser, ser på fjernsyn eller annen stillesittende beskjeftigelse? ☐ 1

Spaserer, sykler eller beveger deg på annen måte *minst 4 timer i uka?* ☐ 2
(Regn også med gang eller sykling til arbeidsstedet, søndagsturer m.m.)

Driver mosjonsidrett, tyngre hagearbeid e.l.? ☐ 3
(Merk at aktiviteten skal vare minst 4 timer i uka)

Trener hardt eller driver konkurranseidrett regelmessig og *flere ganger i uka?* ☐ 4

10. UTDANNING OG ARBEID

Hvor mange års skolegang har du gjennomført?
(Ta med alle år du har gått på skole eller studert) Antall år

Hvordan trives du i din jobb?
1 ☐ Svært godt 2 ☐ Godt 3 ☐ Dårlig 4 ☐ Veldig dårlig

	JA	NEI
Mener du at du står i fare for å miste ditt nåværende arbeid eller inntekt de nærmeste 2 årene?	☐	☐

Mottar du noen av følgende ytelser?	JA	NEI
Sykepenger	☐	☐
Attføring	☐	☐
Sosialhjelp/-stønad	☐	☐
Overgangsstønad for enslige forsørgere	☐	☐

11. RESTEN AV SKJEMAET SKAL BARE BESVARES AV KVINNER

Hvor gammel var du da du fikk menstruasjon aller første gang? Alder i år

Hvis du ikke lenger får menstruasjon, hvor gammel var du da den sluttet? Alder i år

Er du gravid nå?

Ja	Nei	Usikker	Over fruktbar alder
☐ 1	☐ 2	☐ 3	☐ 4

Hvor mange barn har du født? Antall barn

Hvis du har født barn, fyll ut hvert barns fødselsår, og hvor mange måneder du ammet etter fødselen.
(Hvis du ikke ammet, skriv 0)

Barn:	Fødselsår:	Ammet antall mnd.:
1. barn		
2. barn		
3. barn		
4. barn		
5. barn		

(Hvis flere barn, bruk ekstra ark)

Bruker du, eller har du brukt? *(Sett ett kryss for hver linje)*

	Nå	Før, men ikke nå	Aldri
P-pille/minipille/p-sprøyte	☐	☐	☐
Hormonspiral (ikke vanlig spiral)	☐	☐	☐
Østrogen (tabletter eller plaster)	☐	☐	☐
Østrogen (krem eller stikkpiller)	☐	☐	☐

Hvis du bruker/har brukt *reseptpliktig* østrogen:
Hvor lenge har du brukt dette? Antall år

Hvis du bruker p-pille, minipille, p-sprøyte, hormonspiral eller østrogen; hvilket merke bruker du?

Spesifiser: _____

Ikke skriv her

BRUK AV HELSETJENESTER

Hvor mange ganger de *siste 12 måneder* har du selv brukt:
(sett ett kryss for hver linje)

	Ingen	1-3 ganger	4 eller flere
Kommunelege/fastlege	☐	☐	☐
Spesialist	☐	☐	☐
Legevakt	☐	☐	☐
Sykehus innleggelse	☐	☐	☐
Hjemmesykepleie	☐	☐	☐
Kommunal hjemmehjelp	☐	☐	☐
Fysioterapeut	☐	☐	☐
Kiropraktor	☐	☐	☐
Tannlege	☐	☐	☐
Alternativ behandler	☐	☐	☐

Hvor *mange leger* har du selv vært hos de siste 12 måneder?
(angi antall)

Har du fått tildelt navngitt fastlege? ☐ Ja ☐ Nei

Når du er til undersøkelse, hvilket språk kommuniserer du og legen på? *(sett ett eller flere kryss)*
☐ Norsk ☐ Samisk ☐ Bruker tolk ☐ Annet språk

Tror du det skjer noen gang at du og legen misforstår hverandre p.g.a. språklige problemer?
☐ Aldri ☐ Sjelden ☐ Av og til ☐ Ofte ☐ Usikker

Dersom det er behov for tolk, synes du at legen er flink nok til å be om det?
☐ Ja, alltid ☐ Ja, som regel ☐ Nei, ikke alltid
☐ Nei, aldri ☐ Jeg liker ikke å bruke tolk

Hvor fornøyd eller misfornøyd er du med følgende sider ved den kommunale *legetjenesten* i din bostedskommune?
(sett ett kryss per linje)

	Meget fornøyd	Fornøyd	Misfornøyd	Meget misfornøyd	Vet ikke
Avstand til legen	☐	☐	☐	☐	☐
Legens tilgjengelighet på telefon	☐	☐	☐	☐	☐
Ventetid på legetime	☐	☐	☐	☐	☐
Tid inne hos legen	☐	☐	☐	☐	☐
Mulighetene for å få fortalt om dine plager	☐	☐	☐	☐	☐
Legens forståelse av din kulturelle bakgrunn	☐	☐	☐	☐	☐
Legens informasjon om dine helseplager, undersøkelse og behandlingsopplegg	☐	☐	☐	☐	☐

BRUK AV HELSETJENESTER (fortsettelse)

	Meget fornøyd	Fornøyd	Misfornøyd	Meget misfornøyd	Vet ikke
Legens språkbeherskelse (samisk eller norsk)	☐	☐	☐	☐	☐
Totalt sett, hvor fornøyd eller misfornøyd er du med den kommunale *legetjenesten*?	☐	☐	☐	☐	☐

Hvor lenge er det siden du var hos lege sist? *(angi i hele tall)*
(år) *(måneder)*

Dersom du noen gang har benyttet alternative behandlere, hvilke har du brukt? *(sett ett eller flere kryss)*
☐ Helbreder *(guvllár, leser, blåser, håndspålegger)*
☐ Healer
☐ Akupunktør
☐ Soneterapeut, homeopat, kinesiolog osv.

Dersom du har benyttet en alternativ behandler, hvor lenge er det siden sist? *(angi i hele tall)*
(år) *(måneder)*

Tenk deg at du i dag skulle få behov for hjelp/bistand fra den kommunale helse- og sosialtjenesten *(hjemmesykepleie, hjemmehjelp, sosiale tjenester, fysioterapi o.s.v.)*

Vet du hvor du skal henvende deg?
☐ Ja ☐ Nei ☐ Usikker

Er du trygg på at du får hjelp hvis du trenger det?
☐ Ja ☐ Nei ☐ Usikker

Dersom du i dag får hjelp fra den kommunale helse- og sosial tjenesten, er du fornøyd med tilbudet?
☐ Ja ☐ Nei ☐ Usikker

SKADER/ULYKKER

Har du vært utsatt for noen ulykker som medførte behandling hos lege og/eller sykehusinnleggelse?

Lege ☐ Ja ☐ Nei antall ganger

Sykehus innleggelse ☐ Ja ☐ Nei antall ganger

SKADER/ULYKKER (fortsettelse)

Hvis ja, hva slags ulykke(r) er du blitt behandlet for?
(sett ett eller flere kryss pr. linje)

	Arbeid	Hjem	Fritid	Ingen
Bil	☐	☐	☐	☐
Motorsykkel	☐	☐	☐	☐
Snøscooter	☐	☐	☐	☐
Firehjulssykkel	☐	☐	☐	☐
Traktor	☐	☐	☐	☐
Fallulykke	☐	☐	☐	☐
Kuttskade	☐	☐	☐	☐
Annet	☐	☐	☐	☐

Har ulykken(e) ført til nedsatt arbeidsevne?

☐ Helt ☐ Delvis ☐ Ikke i det hele tatt

FAMILIE OG SPRÅKBAKGRUNN

I Nord-Norge bor det folk med ulik etnisk bakgrunn. Det vil si at de snakker ulike språk og har forskjellige kulturer. Eksempler på etnisk bakgrunn, eller etnisk gruppe er norsk, samisk og kvensk.

Hvilket hjemmespråk har/hadde du, dine foreldre og besteforeldre? *(sett ett eller flere kryss)*

	Norsk	Samisk	Kvensk	Annet, beskriv
Morfar:	☐	☐	☐	☐
Mormor:	☐	☐	☐	☐
Farfar:	☐	☐	☐	☐
Farmor:	☐	☐	☐	☐
Far:	☐	☐	☐	☐
Mor:	☐	☐	☐	☐
Jeg selv:	☐	☐	☐	☐

Hva er din, din fars og din mors etniske bakgrunn?
(sett ett eller flere kryss)

	Norsk	Samisk	Kvensk	Annet, beskriv
Min etniske bakgrunn er:	☐	☐	☐	☐
Fars etniske bakgrunn er:	☐	☐	☐	☐
Mors etniske bakgrunn er:	☐	☐	☐	☐

Hva regner du deg selv som? *(sett ett eller flere kryss)*

Norsk	Samisk	Kvensk	Annet, beskriv
☐	☐	☐	☐

ARBEIDSLIV/ØKONOMI

Hvilken type arbeid/livsopphold har du? *(sett ett eller flere kryss)*

☐ Fastlønnet, heltid ☐ Fastlønnet, deltid
☐ Sesongarbeid ☐ Selvstendig næringsdrivende
☐ Arbeidsledig ☐ Hjemmeværende
☐ Alderstrygd ☐ Uføretrygd
☐ Annet *(beskriv)* .....

ARBEIDSLIV/ØKONOMI (fortsettelse)

Kunne du tenke deg å flytte fra din bostedskommune dersom du fikk tilbud om arbeid et annet sted?

☐ Ja ☐ Nei ☐ Deler av året ☐ Usikker

Dersom du er *arbeidsledig*, angi hvor lenge du har vært arbeidssøker: *(angi i hele tall)*

(år) *(måneder)*

Dersom du er *selvstendig næringsdrivende*, hvilken type næring jobber du i? *(sett ett eller flere kryss)*

☐ Reindrift ☐ Fiske ☐ Jordbruk ☐ Skogbruk
☐ Forretningsvirksomhet ☐ Annet *(spesifiser)* .....

Hvor mange personer bor det i din husstand?

(antall personer)

Hvor stor er familiens/husstandens bruttoinntekt per år?

☐ Under kr. 150 000 ☐ Kr. 150 000–300 000
☐ Kr. 301 000–450 000 ☐ Kr. 451 000–600 000
☐ Kr. 601 000–750 000 ☐ Over kr. 750 000

Hvor ofte spiller du på ulike pengespill slik som lotto, tipping, spillcautomater og lignende?

☐ Aldri/sjelden ☐ 1-3 ganger i mnd.
☐ 1 gang i uka ☐ 2-6 ganger i uka ☐ Hver dag

Hvor mye spiller du for ukentlig i gjennomsnitt?

☐ Under kr. 100 i uka ☐ Kr. 100-500 i uka
☐ Kr. 501–1000 i uka ☐ Over kr. 1000 i uka

MOBBING

Med mobbing mener vi når en eller flere personer *gjentatte ganger* sier eller gjør vonde ting mot deg, og du har vanskeligheter med å forsvare deg.

Har du vært utsatt for mobbing?

☐ Ja, de siste 12 mnd. ☐ Ja, før ☐ Nei

Dersom du har vært utsatt for mobbing, hvilken type mobbing er du blitt utsatt for? *(sett ett eller flere kryss)*

☐ Baksnakking ☐ Ignorering
☐ Diskriminerende bemerkninger ☐ Annet

Kan du angi hvor dette foregår/foregikk?
(sett ett eller flere kryss)

☐ På skolen ☐ På skoleinternat ☐ I yrkeslivet
☐ I lokalsamfunnet ☐ Annet

DEARVVASVUOĐA - JA EALLINDILLE-ISKKADEAPMI

Bovdehus

1. DU DEARVVASVUOHTA

Mo lea du dearvvasvuohta dál? *(Russe dušše oktii)*
☐ Heittot ☐ Ii nu buorre ☐ Buorre ☐ Hirbmat buorre
1 2 3 4

	JUO	II	Ahki vuosttas geardde
Leago dus, dahje leago dus leamaš?			
Astma	☐	☐	
Bistevaš bronkihtta/emfysema/KOLS	☐	☐	
Diabetes (sohkardávda)	☐	☐	
Fibromyalgia/bistevaš bávčča ssyndroma	☐	☐	
Psykalaš váttut maidda leat jearran veahki	☐	☐	
Váibmodohppehat (váibmohávvi)	☐	☐	
Angina pectoris (váibmogeasáhat)	☐	☐	
Vuoiŋŋašgáldnanvihki/vuoiŋŋašvardin	☐	☐	
Multippel sklerose (MS)	☐	☐	
Ulcerøs kolitt	☐	☐	

	JUO	II
Bávččagastágo dahje unohastágo rattis go: Goarknut milliid, ráhpáid dahje váccát joðánit dulbohagas?	☐	☐
Sáhttágo ná bávččastit vaikke it lihkat?	☐	☐

2. DEAHKKE- JA DÁKTERIGGEGIVSSIT

	JUO	IN
Leatgo *manimus jagi* váivašuvvan bákčasiiguin ja/dahje stirdun dehkiiguin ja laddasiiguin mii lea bistán *uhcimusat 3 mánu* oktilaččat?	☐	☐

	JUO	II	Ahki manimus háve
Leago dus goassige leamaš:			
Doddjon giehtaladas/giehtadiiggus?	☐	☐	
Doddjon noras?	☐	☐	

3. ČOAVJE- JA ČOALLEDÁVDAMEARKKAT

	JUO	II
Leago dus leamaš čáhcečolohagat, čottaboalddáhat dahje raddeboalddáhat masá beaivválaččat uhcimusat vahku?	☐	☐
Leatgo dus goassige leamaš čoavjjis bákčasat dahje várka mii lea bistán uhcimusat 2 vahku?	☐	☐

Jus JUO, gokko čoavjjis dovdojit bákčasat? *(Russe oktii)*
☐ Bajit oasis ☐ Vuolit oasis ☐ Miehtá čoavjji

Dovdojitgo bákčasat dahje «várka» jámmat? *(Russe oktii)*
☐ Bistá ain vahkuid ☐ Bistá ain mánuid ☐ Čađat

	JUO	IN
Giksašuvatgo dávjá baggamiin, čoavješnjoarramiin dahje hirbmat buoskkuhemiin?	☐	☐

Leago du baika dábálaččat: *(Russe okti dahje moddii)*
☐ Dábálaš ☐ Njárbat ☐ Garas ja gágirlágan
☐ Vurohagaid garas ja njárbat ☐ Guohca

	JUO	IN
Baikkátgo soames áiggiid golmma dahje eanet geardde beaiváí?	☐	☐
Leatgo giksašuvvan čovjjiin/čoliiguin go mielkki jugat?	☐	☐

Leago earáin bearrašis seamma dávdamearkkat?
Eatnis ☐ Áhčis ☐ Oappás/vieljas ☐ Mánáin ☐ Ii ovttasge ☐

4. EARÁ GIVSSIT

Vulobealde lea listu iešguđet váttisvuođain. Leatgo *manimus vahku* dáin ovttage dovdan (otnáš rádjai)?
(Russe juohke givssi buohta)

	Ii giksašuvvan	Veahášgiksašuvvan	Olu	Hirbmat olu
Fáhkka ballu ákka haga	☐	☐	☐	☐
Dovdan balu dahje árgodaga	☐	☐	☐	☐
Skurvvas dahje oaivejorran	☐	☐	☐	☐
Dovdan iežat čavgen dahje huššas	☐	☐	☐	☐
Álki iežat sivahallat	☐	☐	☐	☐
Oađđinváttisvuođat	☐	☐	☐	☐
Hurvvas, lossamiella	☐	☐	☐	☐
Dovdan leat ávkemeahttun, unnán árvvus	☐	☐	☐	☐
Dovdan ahte visot lea lossat	☐	☐	☐	☐
Dovdan eahpedoaivvu boahtteáiggi ektui	☐	☐	☐	☐
Jurddašan loahpahit eallima	☐	☐	☐	☐
	1	2	3	4

5. BEARRAŠIS DÁVDDAT

	JUO	II	IN DIEĐE
Leago ovttas dahje mánggasis du váhnemiin dahje oappáin/vieljain leamaš váibmodohppehat dahje angina pectoris?	☐	☐	☐

Russe daid fulkkiid buohta geain lea dahje lea leamaš muhtun dáid dávddain ja almmut sin agi goas ožžo dávddaid.
(Jus eanet oappát/vieljat, čále su gii áramusat eallimis dan oaččui)

	Eadni	Áhčči	Oabbá	Vielja	Mánná	Ii oktage	Ahki vuosttas geardde
Váibmodohppehat ovdal 60-jagi agi	☐	☐	☐	☐	☐	☐	
Váibmodohppehat manŋil 60-jagi	☐	☐	☐	☐	☐	☐	
Diabetes	☐	☐	☐	☐	☐	☐	
Vuoiŋŋasgáldnanvihki	☐	☐	☐	☐	☐	☐	
Astma	☐	☐	☐	☐	☐	☐	
Gassačoallehorasdávda	☐	☐	☐	☐	☐	☐	
Čižžeborasdávda	☐	☐	☐	☐	☐	☐	
Manneráksaborasdávda	☐	☐	☐	☐	☐	☐	

Galle oappá/vielja leat dus? Vielja Oappá

6. DÁLKASIID GEAVAHEAPMI

Dálkasiiguin oaivvildat dás apotehkas oston dálkasiid. Biebmolasáhusat ja vitamiinnat eai lohkko dás mielde.

Geavahatgo?	Dál	Ovdal, muhto in dál	In goassige
Dálkasa alla varradeddui	☐	☐	☐
Kolesterolgeahpedeaddji dálkasa	☐	☐	☐
Insuliinna	☐	☐	☐
Tableahtaid sohkardávdii	☐	☐	☐

Man dávjá leat *maŋimus 4 vahkus* geavahan dáid dálkasiid?
(Russe oktii juohke linnjás)

	In atnán maŋimuš 4 vahku	Hárvebut go juohke vahku	Juohke vahku, muhto in beaivválaččat	Beaivválaččat
Bávčča svuogiheaddji resepta haga	☐	☐	☐	☐
Bávčča svuogiheaddji resepttain	☐	☐	☐	☐
Oađđendálkasiid	☐	☐	☐	☐
Ráfohandálkasiid	☐	☐	☐	☐
Dálkasiid hurvvi vuostá	☐	☐	☐	☐
Eará dálkasiid resepttain	☐	☐	☐	☐
	1	2	3	4

Daid dálkasiidda maid leat russen bajábeal guovtti čuoggás ja maid leat atnán *maŋimus 4 vahku*:

Bija nama ja manne daid geavahat/leat geavahan (dávda dahje dávdamearka): *(Russe dasa man guhká leat dálkasa geavahan)*

		Man guhká?	
Dálkasa namma: (Ovtta nama juohke linnjái)	Manne geavahan dálkasa:	Gitta 1 jagi	Iagi dahje guhkit
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐

Jus dás ii leat doaivái sadji, de sáhtát joatkit eará báhpárii, maid de bijat mielde.

7. BORRAMUŠ JA JUHKAMUŠ

Man dávjá borat dábálaččat dáid borramušaid?
(Russe oktii juohke linnjás)

	Hárve/ in goassige	1-3 g. mánnui	1-3 g. vahkkui	4-6 g. vahkkui	1-2 g. beaivái	3 g. dahje eanet beaivái
Šattuid	☐	☐	☐	☐	☐	☐
Murjjiid	☐	☐	☐	☐	☐	☐
Vuosttá *(buot šlájaid)*	☐	☐	☐	☐	☐	☐
Buđehiid	☐	☐	☐	☐	☐	☐
Vuššon ruotnasiid	☐	☐	☐	☐	☐	☐
Varas ruotnasiid/ saláhta	☐	☐	☐	☐	☐	☐
	1	2	3	4	5	6

Makkár vuoja ánát dávjjimusat? *(Russe oktii juohke linnjás)*

	In geavat	Mejeri-vuoja	Gárra margariinna	Dipma/geahppa margariinna	Oljjuid	Eará
Láibbi alde	☐	☐	☐	☐	☐	☐
Borramuš-ráhkadeamis	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

Geavahatgo dáid biebmolasáhusaid:

	Iuo, beaivválaččat	Soames háve	In
Trána, tránatableahtaid	☐	☐	☐
Guollevuodjatableahtaid *(omega 3)*	☐	☐	☐
Vitamiidna/minerálalasáhusaid	☐	☐	☐

Man olu jugat dábálaččat dáin: *(Russe oktii juohke linnjás)*

	Hárve/ in goassige	1-6 glása vahkkui	1 glása beaivái	2-3 glása beaivái	4 gl. dahje eanet beaivái
Ollesmielkki, kefira, yoghurta	☐	☐	☐	☐	☐
Geahppamielkki, cultura geahppa yoghurta	☐	☐	☐	☐	☐
Skummamielkki (suvrra, čielga)	☐	☐	☐	☐	☐
Liigegeahppamielkki	☐	☐	☐	☐	☐
Šaddomáihlli	☐	☐	☐	☐	☐
Čázi	☐	☐	☐	☐	☐
Bruvssa/Cola sohkkariin	☐	☐	☐	☐	☐
Sohkkarhis bruvssa/Cola	☐	☐	☐	☐	☐
	1	2	3	4	5

Galle gohpa gáfe dahje deaja jugat *beaivái?*
(Bija 0 daid šlájaide maid it juga beaivválaččat)

Galle gohpa

Filttargáfe .....

Vuoššangáfe/deattagievnni .....

Eará gáfe .....

Deaja .....

Sullii man dávjá leat maŋimus jagi juhkan alkohola?
(Geahppavuolla ja alkoholahis vuolla ii lohkko)

In goassige juhkan alkohola	In juhkan maŋimuš jagi	Hui moatti háve maŋimuš jagi	Sullii oktii mánnui
☐ 1	☐ 2	☐ 3	☐ 4
2-3 geardde mánnui	Su. oktii vahkkui	2-3 geardde vahkkui	4-7 geardde vahkkui
☐ 5	☐ 6	☐ 7	☐ 8

Sidjiide geat leat juhkan maŋimus jagi:
Go leat juhkan, galle glása dahje driŋkka leat dábálaččat juhkan? Galle

Sullii gallii maŋimus jagi leat juhkan nu olu go uhcimusat 5 glása dahje driŋkka jándoris? Gallii

Go jugat, jugatgo dalle dábálaččat? *(Russe oktii dahje moddii)*
☐ Vuola ☐ Viinni ☐ Buolliviinni

8. BORGGUHEAPMI JA SNUVSSEN

Man guhká leat beaivái dábálaččat suovvalanjas? Galle olles diimmu

Borgguhiigo oktage rávisolmmoš ruovttus go bajássaddet? JUO ☐ IN ☐

Ásatgo, dahje leatgo ássan, ovttas beaivválaš borgguheaddjiiguin maŋŋil go devdet 20 jagi? JUO ☐ IN ☐

Leatgo borgguhan/borgguhatgo beaivválaččat?
☐ Juo, dál ☐ Juo, ovdal ☐ In

Jus borgguhat beaivválaččat dál, borgguhatgo: JUO IN
Sigareahtaid? ☐ ☐
Sigáraid/sigarillos/biippu? ☐ ☐
Geassanduhpáha/rullings? ☐ ☐

Jus beaivválaččat leat borgguhan *ovdal*, man guhká lea dassá go heitet? Galle jagi

Jus borgguhat beaivválaččat dál, dahje leat borgguhan ovdal:
Galle sigareahta borgguhat/ borgguhit dábálaččat beaivái? Galle sigareahta

Man boaris ledjet go borgguhišgohtet beaivválaččat? Ahki

Galle jagi leat oktiibuot borgguhan beaivválaččat? Galle jagi

Leatgo snuvssen/snuvssetgo beaivválaččat?
☐ Juo, dál ☐ Juo, ovdal ☐ In

Jus snuvsset/leat snuvssen, galle jagi leat oktiibuot snuvssen? Galle jagi

9. LÁŠMMOHALLAN JA RUMAŠLAŠ LIHKADEAPMI

Mo lea du rumašlaš lihkadeapmi astoáiggis leamaš maŋimus jagi? *(Jurddaš gaskameari vahkus jahkái. Mátki bargui lohkko astoáigin. Vástit goappašiid gažaldagaid)*

	Diimmuid vahkkui:			
	Ii ovttage	Vuollel 1	1–2	3 dahje eanet
Gehppes lihkadeapmi *(Ii bivastuvvo/šeddaluvvo)*	☐	☐	☐	☐
Garra rumašlaš bargu *(Bivastuvvo/šeddaluvvo)*	☐ 1	☐ 2	☐ 3	☐ 4

Almmut lihkadeami ja rumašlaš rahčanušaid *du astoáiggis*. Jus lea hui máŋggalágan lihkadeamit omd. gaskal geasi ja dálvvi, de bija gaskameari. Gažaldat guoská dušše *maŋimus jahkái*. *(Russe ruvttui mii buoremusat heive)*

Logat, geahčat tv dahje eará jaskačohkká budaldus? ☐ 1

Váccát, sihkelasttát dahje lihkadat earálágan *ainjuo 4 diimmu vahkkui?* *(Loga maid vázzima dahje sihkelastima bargui, sotnabeaivvážkii jna.)* ☐ 2

Lášmmohalat, barggat losit bealdobarggu js.? *(Merke ahte lihkadeapmi galgá leat ainjuo 4 diimmu vahkkui)* ☐ 3

Hárjehalat garrasit dahje gilvvohalat jeavddalaččat ja *máŋgii vahkkui?* ☐ 4

10. OAHPPU JA BARGU

Galle jagi leat skuvllaid vázzán? *(Bija buot jagiid go leat skuvllaid vázzán dahje studeren)* Galle jagi

Mo loavttát barggus?
1 ☐ Hirbmat bures 2 ☐ Bures
3 ☐ Heittogit 4 ☐ Hirbmat heittogit

Oaivvildatgo ahte orut massimin dálá barggut dahje sisaboađut lagamus 2 jagi? JUO ☐ IN ☐

Oačcutgo ovttage dáid doarjagiin? JUO IN
Buohcceruda ☐ ☐
Barguimáhcahandoarjaga ☐ ☐
Sosiálveahki/-doarjaga ☐ ☐
Gaskaboddosašdoarjaga ovttaskas fuolaheaddjiide ☐ ☐

11. DUŠŠE NISSONOLBMOT GALGET VÁSTIDIT DÁS RÁJES SKOVIS

Man boaris ledjet go vuosttas geardde ožžot mánnodávddaid? Ahki

Jus eai šat leat mánnodávddat, man boaris ledjet go dat nohke? Ahki

Leatgo dál áhpeheapme?
Juo ☐ 1 In ☐ 2 Láhpesihkkar ☐ 3 Badjel sahkkoagi ☐ 4

Galle máná leat riegádahttán? Galle máná

Jus leat máná riegádahttán, deavdde juohke máná riegádanjagi, ja galle mánu njamahit maŋŋil riegádahttima?
(Jus it njamahan, čále 0)

Mánná:	Riegádanjahki:	Galle mánu njamahan:
1. mánná		
2. mánná		
3. mánná		
4. mánná		
5. mánná		

(Jus eanet mánát, čále sierra árkui)

Geavahatgo, dahje leatgo geavahan? *(Russe oktii juohke linnjás)*

	Dál	Ovdal,muhto in dál	In goassige
P-pilla/minipilla/p-cirgganasa	☐	☐	☐
Hormonspirála (ii dábálaš spirála)	☐	☐	☐
Østrogena (čableahtaid dahje plastera)	☐	☐	☐
Østrogena (vuoidasa dahje čuggestatpilkid)	☐	☐	☐

Jus geavahat/leat geavahan *reseptageatnegas* østrogena: Man guhká leat dan geavahan? Galle jagi

Jus geavahat p-pilla, minipilla, p-cirgganasa, hormonspirála dahje østrogena: makkár mearkka geavahat?

Almmut:

Ale čále dákko

DEARVVASVUOĐABÁLVALUSAID GEAVAHEAPMI

Gallii leat *manjimus 12 mánus* ieš geavahan:
(russe oktii juohke linnjás)

	In oktiige	1-3 geardde	4 dahje eanet
Gielddadoaktára/fástadoaktára	☐	☐	☐
Spesialistta	☐	☐	☐
Doavttervávtta	☐	☐	☐
Buohccevissui sisačállima	☐	☐	☐
Ruovttubohccedivššu	☐	☐	☐
Gielđda ruovttuveahki	☐	☐	☐
Fysioterapevtta	☐	☐	☐
Kiropraktora	☐	☐	☐
Bátnedoaktára	☐	☐	☐
Molssaevttolaš dálkkodeaddji	☐	☐	☐

***Galle doaktára* luhtte leat ieš leamaš manjimus 12 mánu?**
(almmut galle)

Leatgo ožžon namahuvvot fástadoaktára? ☐ Juo ☐ In

Go leat iskkadeamis, makkár gillii gulahallabeahtti doaktáriin?
(russe oktii dahje mánjii)

☐ Dárogillii ☐ Sámegillii ☐ Gevahan dulkka
☐ Eará gillii

Jáhkátgo ahte doai doaktáriin eahppi áddehala giella-váttisvuođaid geažil?

☐ Ean goassige ☐ Hárve ☐ Duollet dálle ☐ Dávjá
☐ Eahpesihkar

Jus dárbbašuvvo dulka, leago doavttir du mielas doarvái čeahppi dan bivdit?

☐ Juo, álohii ☐ Juo, dábálaččat ☐ Ii álohii
☐ Ii goassige ☐ In liiko dulkka geavahit

Man duhtavaš dahje duhtameahttun leat don gielđda doavtterbálvalusa čuovvovaš beliin du ássangielddas?
(russe oktii juohke linnjás)

	Hirbmat duhtavaš	Duhtavaš	Duhta-meahttun	Hirbmat duhtameahttun	In diede
Doaktára lusa gaska	☐	☐	☐	☐	☐
Doaktára fidnet telefovnnas	☐	☐	☐	☐	☐
Vuordináigi doaktára lusa	☐	☐	☐	☐	☐
Áigi doaktára luhtte	☐	☐	☐	☐	☐
Beasat muitalit du váttuid birra	☐	☐	☐	☐	☐
Doaktára áddejupmi du kulturduogážii	☐	☐	☐	☐	☐
Doaktára diediheapmi du dearvvasvuođa-váttuid, iskkadeami ja dálkkodeami birra	☐	☐	☐	☐	☐

DEARVVASVUOĐABÁLVALUSAID GEAVAHEAPMI (joatkka)

	Hirbmat duhtavaš	Duhtavaš	Duhta-meahttun	Hirbmat duhtameahttun	In diede
Doaktára giellamáhttu (sámegiella dahje dárogiella)	☐	☐	☐	☐	☐
Oppalohkái, man duhtavaš dahje duhtameahttun leat don gielđda doavtterbálvalusain?	☐	☐	☐	☐	☐

Man guhká lea dassá go manjimus fitnet doaktára luhtte?
(almmut olles loguin)

(jagi) *(mánu)*

Jus goassige leat geavahan molssaevttolaš dálkkodeaddji, geaid leat geavahan? *(russe oktii dahje moddii)*

☐ Guvllára *(lohkki, bossu, giehtadálkkodeaddji)*
☐ Healera
☐ Akupunktora
☐ Soneterapevtta, homeopata, kinesiologa jna.

Jus leat geavahan molssaevttolaš dálkodeaddji, de goas lei manjimus? *(almmut olles loguin)*

(jagi) *(mánu)*

Jurddaš mat ahte dál dárbbašat veahki gielđda dearvvasvuođa- ja sosiálbálvalusas ***(ruovttubuohccedivššus, ruovttuveahkis, sosiála bálvalusain, fysioterapias jna.)***

Dieđátgo geainna galggat váldit oktavuođa?
☐ Juo ☐ In ☐ Eahpesihkar

Leatgo oadjebas ahte oačču veahki jus dan dárbbašat?
☐ Juo ☐ In ☐ Eahpesihkar

Jus dál oačču veahki gielđda dearvvasvuođa- ja sosiálbálvalusas, leatgo duhtavaš dainna?
☐ Juo ☐ In ☐ Eahpesihkar

VAHÁGAT/LIHKOHISVUOĐAT

Leat go leamaš lihkohisvuođas man geažil fertejit doaktára lusa ja/dahje buohccivissui čálihuvvot?

Doaktára lusa ☐ Juo ☐ In Gallii

Buohccevissui čálihuvvot ☐ Juo ☐ In Gallii

VAHÁGAT/LIHKOHISVUOĐAT (joatkka)

Jus juo, de makkár lihkohisvuodas(ide) leat dálkkoduvvon? *(russe oktii dahje moddii juohke linnjái)*

	Bargu	Ruoktu	Asttoaigi	In makkárge
Biila	☐	☐	☐	☐
Mohtorsikkel	☐	☐	☐	☐
Muohtaskohter	☐	☐	☐	☐
Njealjejuvllatsihkkel	☐	☐	☐	☐
Traktor	☐	☐	☐	☐
Gahčča nlihkohisvuođat	☐	☐	☐	☐
Čuohpadanvahágat	☐	☐	☐	☐
Eará	☐	☐	☐	☐

Lea(t)go lihkohisvuohta(đat) geahpedan bargonávccaid?

☐ Áibbas ☐ Belohahkii ☐ Ii/eai oppanassiige

BEARAŠ JA GIELLADUOGÁŠ

Davvi-Norggas ásset máŋgga čearddaduogáš olbmot. Dát mearkkaša ahte hállet máŋggalágan giela ja leat iešguđet kultuvrrat. Ovdamearkkat čearddalaš duogážii, dahje čerdii leat dáža, sámi ja kveana.

Makkár ruovttugiella lea/lei dus, du váhnemiin ja áhkuin/ádjáin? *(russe oktii dahje máŋgii)*

	Dárogiella	Sámegiella	Kveanagiella	Eará, čilge
Eatniáhčis:	☐	☐	☐	☐
Eatnieatnis:	☐	☐	☐	☐
Áhčiáhčis:	☐	☐	☐	☐
Áhčieatnis:	☐	☐	☐	☐
Áhčis:	☐	☐	☐	☐
Eatnis:	☐	☐	☐	☐
Mus:	☐	☐	☐	☐

Mii lea du, áhččát ja eadnát čearddaduogáš? *(russe oktii dahje moddii*

	Dáru	Sámi	Kveana	Eará, čilge
Mu čearddaduogáš lea:	☐	☐	☐	☐
Áhči čearddaduogáš lea:	☐	☐	☐	☐
Eatni čearddaduogáš lea:	☐	☐	☐	☐

Maid logat iežat leat? *(russe oktii dahje moddii)*

	Dáža	Sámi	Kveana	Eará, čilge
	☐	☐	☐	☐

BARGOEALLIN/RUHTADILLI

Makkár bargu/eallinbirgejupmi lea dus? *(russe oktu dahje moddii)*

☐ Fástabálká, ollesáigi ☐ Fástabálká, oasseáigi
☐ Áigodatbargu ☐ Iešbirgejeaddji ealáhusdoalli
☐ Bargguheapme ☐ Ruovttus
☐ Boarrásiidoajus ☐ Bargonávccahisvuođaruhta

☐ Eará *(čilge)* .....

BARGOEALLIN/RUHTADILLI (joatkka)

Sáhtášitgo jurddašit fárret ássangielddastat jus fállo dutnje bargu eará báikkis?

☐ Juo ☐ In ☐ Muhtun ráje jagis ☐ Eahpesihkar

Jus leat *bargguheapme*, muital man guhká leat barggu ohcan: *(almmut olles loguin)*

..... *(jagi)* ..... *(mánu)*

Jus leat *iešbirgejeaddji ealáhusdoalli*, makkár ealáhusas barggat? *(russe oktii dahje moddii)*

☐ Boazodilis ☐ Guolásteamis ☐ Eanadoalus
☐ Vuovdedoalus ☐ Gávpedoaimmas
☐ Eará *(čilge)* .....

Gallis ásset du bearašgottis?

..... *(galle olbmo)*

Man stuoris lea bearraša/bearašgotti bruttosisaboahtu jahkái?

☐ Vuollel 150 000 ru. ☐ Ru. 150 000–300 000
☐ Ru. 301 000–450 000 ☐ Ru. 451 000–600 000
☐ Ru. 601 000–750 000 ☐ Badjel 750 000 ru.

Man dávjá spealat makkárnu ruhtaspealuin nugo lotto, tihppen, speallanautomáhtat ja sullasaččain?

☐ In goassige/hárve ☐ 1–3 geardde mánnui
☐ Oktii vahkkui ☐ 2–6 geardde vahkkui
☐ Juohke beaivvi

Man olu spealat gaskamearálaččat vahkkui?

☐ Vuollel 100 ru. vahkkui ☐ 100–500 ru. vahkkui
☐ 501–1000 ru. vahkkui ☐ Badjel 1000 ru. vahkkui

GIVSSIDEAPMI

Givssidemiin oaivvildat go okta dahje moattis dutnje baháid *máŋgii dadjet dahje dahket*, ja dus lea váttis iežat bealuštit.

Leatgo goassige givssiduvvon?

☐ Juo, manjimus 12 mánu ☐ Juo, ovdal ☐ In

Jus leat givssiduvvon, de mo leat givssiduvvon? *(russe oktii dahje moddii)*

☐ Bostalemiin ☐ Badjelgeahččamiin
☐ Vealaheaddji mearkkašumiiguin ☐ Eará

Sáhtášitgo muitalit gos dát geavvá/geavai? *(russe oktii dahje moddii)*

☐ Skuvllas ☐ Skuvlainternáhtas ☐ Fidnoeallimis
☐ Báikegottis ☐ Eará

TILLEGGSSPØRSMÅL TIL HELSE- OG LEVEKÅRSUNDERSØKELSEN

Takk for fremmøte til helseundersøkelsen. På denne måten har du bidratt til å skaffe ny viten om helse og levekår i områder med samisk og norsk bosetting. Hovedformålet med undersøkelsen har vært å skaffe ny viten om hjerte- kar sykdommer for å kunne forebygge dem. I tillegg skal undersøkelsen gi oss kunnskap om andre sykdommer og plager slik at vi kan lage en oversikt over folks helse i fylket. Vi ber deg derfor svare på noen spørsmål om forhold som kan ha betydning for disse og andre sykdommer.

Det utfylte skjemaet sendes i vedlagte svarkonvolutt. Portoen er betalt. På forhånd takk for hjelpen!

Med vennlig hilsen:
Senter for samisk helseforskning og
Nasjonalt folkehelseinstitutt

Dato for utfylling:

Dag Måned År

1. SYMPTOMER

	JA	NEI
Hoster du omtrent daglig i perioder av året?	☐	☐
Har du hatt slik hoste så lenge som i en 3 måneders periode i begge de to siste år?	☐	☐
Hender det at du er plaget av søvnløshet?	☐	☐

Hvis ja, når er du mest plaget av søvnløshet?
(Sett ett eller flere kryss)
☐ Hele året ☐ Vår ☐ Sommer ☐ Høst ☐ Vinter

	JA	NEI
Har du det siste året vært plaget av søvnløshet slik at det har gått ut over arbeidsevnen?	☐	☐

Er du stort sett fornøyd med tilværelsen?
☐ Meget fornøyd
☐ Ganske fornøyd
☐ Litt misfornøyd
☐ Meget misfornøyd

	JA	NEI
Hender det at du i lengre perioder – i minst 14 dager- er trist og nedfor?	☐	☐

Har du i de siste 14 dager følt deg ute av stand til å takle dine vanskeligheter?
☐ Nei ☐ Av og til ☐ Ofte ☐ Nesten hele tiden

Hender det at du føler deg ensom?
☐ Nei ☐ Av og til ☐ Ofte

2. KOSTHOLD NÅ

Vi vil gjerne spørre deg om hvor ofte du pleier å spise enkelte matvarer. Tenk på gjennomsnittet det siste året. Sett *ett kryss* pr. linje for antall ganger. Hvis du ikke husker nøyaktig, fyll ut så godt du kan.

Hvor mange ganger i uken pleier du å spise middag? Antall ganger

Hvor ofte pleier middagen å inneholde:

	Aldri/ sjelden	1 pr. mnd.	2-3 pr. mnd.	1 pr. uke	2 pr. uke	3 pr. uke	4 pr. uke	5+ pr. uke
Fisk	☐	☐	☐	☐	☐	☐	☐	☐
Kjøtt *(helt, oppmalt)*	☐	☐	☐	☐	☐	☐	☐	☐
Verken fisk el. kjøtt	☐	☐	☐	☐	☐	☐	☐	☐

Hvor ofte spiser du kokt torsk og sei til middag?

	Aldri	1-11 pr. år	1 pr. mnd.	2-3 pr. mnd.	1 pr. uke	2 pr. uke	3+ pr. uke
Torsk *(f.eks. fersk, lettsaltet, røkt, bokna)*	☐	☐	☐	☐	☐	☐	☐
Sei *(f.eks. fersk, bokna)*	☐	☐	☐	☐	☐	☐	☐

Hvor ofte spiser du annen kokt fisk til middag?

	Aldri	1-5 pr. år	6-11 pr. år	1 pr. mnd.	2-3 pr. mnd.	1 pr. uke	2+ pr. uke
Fete fiskeslag *(f.eks. kokt laks, kveite, ørr, røye, ørret, sik)*	☐	☐	☐	☐	☐	☐	☐
Magre fiskeslag *(f.eks. kokt hyse/ kolje, abbor, gjedde, harr)*	☐	☐	☐	☐	☐	☐	☐

Hvor ofte spiser du stekt fisk til middag?

	Aldri	1-5 pr. år	6-11 pr. år	1 pr. mnd.	2-3 pr. mnd.	1 pr. uke	2+ pr. uke
Fete fiskeslag *(f.eks. stekt laks, sild, røye, ørret, sik)*	☐	☐	☐	☐	☐	☐	☐
Magre fiskeslag *(f.eks. stekt sei, torsk, abbor, gjedde, harr)*	☐	☐	☐	☐	☐	☐	☐

Hvor ofte spiser du fiskemat til middag?

	Aldri	1-5 pr. år	6-11 pr. år	1 pr. mnd.	2-3 pr. mnd.	1 pr. uke	2+ pr. uke
Fiskekaker/boller/ pudding	☐	☐	☐	☐	☐	☐	☐
Fiskegrateng, plukkfisk	☐	☐	☐	☐	☐	☐	☐
Fiskepinner, panert fisk	☐	☐	☐	☐	☐	☐	☐

Hvor ofte spiser du fiskepålegg?

	Aldri	1-11 pr. år	1 pr. mnd.	2-3 pr. mnd.	1-2 pr. uke	3-6 pr uke	5+ pr. uke
Speket/saltet fisk	☐	☐	☐	☐	☐	☐	☐
Røkt fisk	☐	☐	☐	☐	☐	☐	☐
Makrell i tomat	☐	☐	☐	☐	☐	☐	☐
Nedlagt sild	☐	☐	☐	☐	☐	☐	☐
Kaviar	☐	☐	☐	☐	☐	☐	☐
Annet fiskepålegg	☐	☐	☐	☐	☐	☐	☐

Hvor mange *ganger pr. år* spiser du fiskeinnmat?

	0	1-3	4-6	7-9	10+
Fiskelever	☐	☐	☐	☐	☐
Rogn	☐	☐	☐	☐	☐

Hvor ofte spiser du følgende retter?

	Aldri	1-5 pr. år	6-11 pr. år	1 pr. mnd.	2-3 pr. mnd.	1 pr. uke	2+ pr. uke
Pizza	☐	☐	☐	☐	☐	☐	☐
Spagetti, pastaretter	☐	☐	☐	☐	☐	☐	☐
Hamburger i brød	☐	☐	☐	☐	☐	☐	☐
Kjøttkaker/ karbonader	☐	☐	☐	☐	☐	☐	☐
Pølser	☐	☐	☐	☐	☐	☐	☐
Gryterett	☐	☐	☐	☐	☐	☐	☐

Hvor ofte spiser du rent kjøtt til middag *(f.eks. koteletter, steik, grytekjøt, biff, filet)*?

	Aldri	1-5 pr. år	6-11 pr. år	1 pr. mnd.	2-3 pr. mnd.	1 pr. uke	2+ pr. uke
Kylling	☐	☐	☐	☐	☐	☐	☐
Svin	☐	☐	☐	☐	☐	☐	☐
Okse/storfe	☐	☐	☐	☐	☐	☐	☐
Sau/lam	☐	☐	☐	☐	☐	☐	☐
Elg	☐	☐	☐	☐	☐	☐	☐
Hval	☐	☐	☐	☐	☐	☐	☐

Hvor mange egg fra sjøfugl spiser du pr. år?

	0	1-3	4-6	7-9	10+
Antall egg	☐	☐	☐	☐	☐

Hvor ofte spiser du kjøtt av rein?

	Aldri	1-11 pr. år	1 pr. mnd.	2-3 pr. mnd.	1 pr. uke	2 pr uke	3+ pr. uke
Kokt reinkjøtt *(buljong)*	☐	☐	☐	☐	☐	☐	☐
Stekt reinkjøtt *(helt, skåret, oppmalt)*	☐	☐	☐	☐	☐	☐	☐
Røkt reinkjøtt	☐	☐	☐	☐	☐	☐	☐
Tørket reinkjøtt	☐	☐	☐	☐	☐	☐	☐

Hvor ofte spiser du andre matvarer av rein?

	Aldri	1-5 pr. år	6-11 pr. år	1 pr. mnd.	2-3 pr. mnd.	1+ pr. uke
Blodmat av rein	☐	☐	☐	☐	☐	☐
Margbein	☐	☐	☐	☐	☐	☐
Reintunge	☐	☐	☐	☐	☐	☐
Reinlever	☐	☐	☐	☐	☐	☐

Hvor ofte spiser du bær?
Én gang tilsvarer 1 brødskive med syltetøy, tyttebær til 1 porsjon middag, 1 porsjon dessert, 1 glass saft, eller en tur hvor du spiste friske bær.

	Aldri	1-5 pr. år	6-11 pr. år	1 pr. mnd.	2-3 pr. mnd	1-2 pr. uke	3+ pr. uke
Molter:							
Friske, frosne, rørte	☐	☐	☐	☐	☐	☐	☐
Kokt/kjøpt syltetøy	☐	☐	☐	☐	☐	☐	☐
Tyttebær:							
Friske, frosne, rørte	☐	☐	☐	☐	☐	☐	☐
Kokt/kjøpt syltetøy	☐	☐	☐	☐	☐	☐	☐
Blåbær:							
Friske, frosne, rørte	☐	☐	☐	☐	☐	☐	☐
Kokt/kjøpt syltetøy	☐	☐	☐	☐	☐	☐	☐
Saft	☐	☐	☐	☐	☐	☐	☐
Krøkebær:							
Friske, frosne	☐	☐	☐	☐	☐	☐	☐
Saft	☐	☐	☐	☐	☐	☐	☐

Hvordan pleier du/ditt hushold å skaffe følgende råvarer til eget bruk? *(Sett ett eller flere kryss)*

	Spiser aldri/ sjelden	Helt selv-forsynt	Delvis selv-forsynt	Kjøper i butikk	Kjøper privat	Bytter eller får
Kjøtt:						
Rein	☐	☐	☐	☐	☐	☐
Saut	☐	☐	☐	☐	☐	☐
Elg	☐	☐	☐	☐	☐	☐
Fisk:						
Ferskvann	☐	☐	☐	☐	☐	☐
Saltvann	☐	☐	☐	☐	☐	☐
Bær:						
Molter	☐	☐	☐	☐	☐	☐
Tyttebær	☐	☐	☐	☐	☐	☐

Hvor ofte pleier du å jakte, fiske og plukke bær?

	Aldri	Sjelden	Av og til	Mye av fritiden
Jakte rype/småvilt	☐	☐	☐	☐
Jakte storvilt	☐	☐	☐	☐
Fiske	☐	☐	☐	☐
Plukke bær	☐	☐	☐	☐

Hvor ofte har du spist et hovedmåltid fra ditt husholds jakt/fiske siste år?

	Aldri	1-5 pr. år	6-11 pr. år	1 pr. mnd.	2-3 pr. mnd.	1 pr. uke	2+ pr. uke
Hovedmåltid jakt	☐	☐	☐	☐	☐	☐	☐
Hovedmåltid fiske	☐	☐	☐	☐	☐	☐	☐

3. KOSTHOLD I OPPVEKSTEN

Tenk på maten du fikk hjemme før du flyttet for deg selv. Hvis du bodde mesteparten av året på skoleinternat, tenk på maten du fikk der.

Bodde du på internat (statsinternat eller privat) da du gikk på barne- og ungdomsskolen?

- ☐ Ja, ungdomsskolen
- ☐ Ja, barneskolen
- ☐ Ja, både barne- og ungdomsskolen
- ☐ Nei, ingen av delene

Hvis ja, hvor mange klassetrinn?

Hvor lenge var du på internat i snitt for hvert klassetrinn?
☐ 1-3 mnd. ☐ 4-6 mnd. ☐ 7-9 mnd.

Hvor ofte spiste du fisk og reinkjøtt i oppveksten?

	Aldri	1-11 pr. år	1 pr. mnd.	2-3 pr. mnd.	1-2 pr. uke	3-4 pr. uke	5+ pr. uke
Kokt/stekt fisk	☐	☐	☐	☐	☐	☐	☐
Reinkjøtt	☐	☐	☐	☐	☐	☐	☐

Hvor ofte spiste du andre matvarer i oppveksten?

	Aldri	1-11 pr. år	1 pr. mnd.	2-3 pr. mnd.	1 pr. uke	2 pr. uke	3+ pr. uke
Blodmat	☐	☐	☐	☐	☐	☐	☐
Sauekjøtt	☐	☐	☐	☐	☐	☐	☐
Kjøttkaker, pølser	☐	☐	☐	☐	☐	☐	☐
Fiskemat	☐	☐	☐	☐	☐	☐	☐
Fiskelever og rogn	☐	☐	☐	☐	☐	☐	☐
Grøt, pannekaker	☐	☐	☐	☐	☐	☐	☐

	JA	NEI
Fikk du medisinsk tran i oppveksten?	☐	☐
Fikk du servert tran til for eksempel fisk (i stedet for annet fett)?	☐	☐

Hvor ofte spiste du ville bær og planter i oppveksten?

	Aldri	1-5 pr. år	6-11 pr. år	1 pr. mnd.	2-3 pr. mnd	1-2 pr. uke	3+ pr. uke
Ville bær	☐	☐	☐	☐	☐	☐	☐
Syregress	☐	☐	☐	☐	☐	☐	☐
Kvann	☐	☐	☐	☐	☐	☐	☐

Er maten du spiser nå, forskjellig fra det du fikk i oppveksten?

- ☐ Nei
- ☐ Litt forskjellig
- ☐ Ganske forskjellig
- ☐ Veldig forskjellig

4. NATTSPISING

	JA	NEI
Våkner du ofte opp for å spise etter at du har lagt deg om kvelden?	☐	☐

Hvis «ja», besvar de neste 4 spørsmålene:

Når har du oftest plagene? *(Sett ett eller flere kryss)*
☐ Hele året ☐ Vår ☐ Sommer ☐ Høst ☐ Vinter

Hva spiser du om natten? *(Sett ett eller flere kryss)*
☐ Kjøtt ☐ Brødmat ☐ Godteri ☐ Annet

	JA	NEI
Spiser du mer enn halvparten av døgnets matmengde etter kl. 20 om kvelden?	☐	☐

Er andre i familien plaget med nattspising?

JA	NEI	VET IKKE
☐	☐	☐

	JA	NEI
Har du skiftarbeid, nattarbeid eller går vakter?	☐	☐

5. OPPVEKST, FAMILIE OG VENNER

I hvilken kommune har du bodd lengre enn *ett* år?
Kommune:

1. Fødested: ..... fra 0 år til ..... år
2. ..... fra ..... år til ..... år
3. ..... fra ..... år til ..... år
4. ..... fra ..... år til ..... år
5. ..... fra ..... år til ..... år

(Hvis du har bodd i flere kommuner, bruk eget ark.)

	JA	NEI
Bor du sammen med ektefelle/samboer?	☐	☐

Har du delt eller daglig omsorg for	JA	NEI
Barn?	☐	☐
Foreldre/andre?	☐	☐

Hvor mange gode venner har du?
(De som du kan snakke fortrolig med og som kan gi deg hjelp dersom du trenger det. Telt ikke med de du bor sammen med.) Antall venner

Er du tilknyttet noen av de følgende menigheter/trossamfunn: *(Sett ett eller flere kryss)*

- ☐ Medlem i statskirka
- ☐ Den Læstadianske menighet
- ☐ Annen menighet
- ☐ Ikke medlem av noen menighet

Føler du at du kan påvirke det som skjer i lokalsamfunnet der du bor? *(Sett bare ett kryss)*

- ☐ Ja, i stor grad
- ☐ Ja, en del
- ☐ Ja, i liten grad
- ☐ Nei
- ☐ Har ikke forsøkt

6. VERDITILKNYTNING

TIL ALLE:

Er det viktig for deg å ha kontakt med naturen?

Meget viktig ☐ Viktig ☐ Lite viktig ☐ Helt uviktig ☐

Er utnytting av naturen gjennom fiske, jakt og bærplukking viktig for deg?

Meget viktig ☐ Viktig ☐ Lite viktig ☐ Helt uviktig ☐

Er bevaring av slekts- og familietradisjoner viktig for deg?

Meget viktig ☐ Viktig ☐ Lite viktig ☐ Helt uviktig ☐

Har du opplevd at du er blitt mobbet eller diskriminert på grunn av din etniske (*samisk, kvensk, russisk, tamilsk, norsk, etc.)* bakgrunn?

Svært mange ganger ☐ Noen ganger ☐ En sjelden gang ☐ Aldri ☐

Tror du at diskriminering av etniske minoriteter kan ha negative helsemessige konsekvenser?

I stor grad ☐ I noen grad ☐ I liten grad ☐ Absolutt ikke ☐

Føler du deg presset ut av næringen din?

I stor grad ☐ I noen grad ☐ I liten grad ☐ Absolutt ikke ☐

7. TIL DEM MED SAMISK BAKGRUNN:

Er samiske kledestradisjoner viktige for deg?

Meget viktig ☐ Viktig ☐ Lite viktig ☐ Helt uviktig ☐

Hvilken betydning har duodji for deg?

Meget stor betydning ☐ Stor betydning ☐ Liten betydning ☐ Ingen betydning ☐

Hva betyr bevaring og utvikling av det samiske språket for deg?

Meget stor betydning ☐ Stor betydning ☐ Liten betydning ☐ Ingen betydning ☐

Er det viktig for deg å bo i et lokalsamfunn der du daglig kan møte andre samer?

Meget viktig ☐ Viktig ☐ Lite viktig ☐ Helt uviktig ☐

Synes du at bevaring av typiske samiske næringer er viktig?

Meget viktig ☐ Viktig ☐ Lite viktig ☐ Helt uviktig ☐

Er utviklingen av det moderne samiske skoleverket viktig for deg?

Meget viktig ☐ Viktig ☐ Lite viktig ☐ Helt uviktig ☐

Er det viktig for deg at samiske lokalsamfunn bør få et større innslag av moderne arbeidsplasser?

Meget viktig ☐ Viktig ☐ Lite viktig ☐ Helt uviktig ☐

Hva betyr samiske media (radio, TV, aviser, bøker) for deg?

Meget stor betydning ☐ Stor betydning ☐ Liten betydning ☐ Ingen betydning ☐

Hva betyr moderne samisk kunst (billedkunst, musikk, film og teater) for deg?

Meget stor betydning ☐ Stor betydning ☐ Liten betydning ☐ Ingen betydning ☐

Hvordan ser du på at samisk samfunn og kultur med årene har fått en sterkere internasjonal kontakt?

Meget viktig ☐ Viktig ☐ Lite viktig ☐ Helt uviktig ☐

Hva betyr Sametinget for deg?

Meget stor betydning ☐ Stor betydning ☐ Liten betydning ☐ Ingen betydning ☐

Opplever du forurensning av eller inngrep i naturen som en trussel mot din samiske tilværelse?

I stor grad ☐ I noen grad ☐ I liten grad ☐ Absolutt ikke ☐

Føler du at den moderne utviklingen fortrenger den samiske kulturen?

I stor grad ☐ I noen grad ☐ I liten grad ☐ Absolutt ikke ☐

TAKK FOR HJELPEN!
HUSK Å POSTLEGGE SKJEMAET I DAG!

2 0 1 1 6 5 1 3 8

B.N.

Beaivi goas deavddát:

Beaivi Mánnu Jahki

LASSIGAŽALDAGAT DEARVVASVUODA- JA EALLIN-DILLEISKKADEAPMÁI

Giitu go bohtet dearvvasvuođaiskkadeapmái. Dán láhkai leat veahkehan háhkat ođđa dieđuid dearvvasvuođa ja eallindili birra guovlluin gos ásset sápmelaččat ja dážat. Iskkadeami váldoulbmil lea leamaš háhkat ođđa dieđuid váibmovarrasuotnadávddaid birra, vai dáid sáhtášii eastadit. Iskkademiin galgat dasa lassin oažžut máhtu eará dávddaid ja givssiid birra, nu ahte sáhttit olbmuid dearvvasvuodas fylkkas bidjat várdosa. Danne bivdit du vástidit soames gažaldaga diliin mat sáhttet leat mávssolaččat dáid ja eará dávddaide.

Devdon skovvi sáddejuvvo čuovvu vástidankonfaluhtas. Porto lea mákson. Giitu ovddalgihtii veahki ovddas!

Ustitlaš dearvvuođaiguin
Sámi dearvvašvuođadutkama guovddáš ja Nasjonalt folkehelseinstitutt

1. DÁVDAMEARKKAT

Gosatgo masá beaivválaččat soames áiggiid jagis? JUO ☐ IN ☐

Leatgo ná gossan nu guhká go 3 mánu guokte manjimus jagi? ☐ ☐

Dáhpáhuvvágo ahte giksašuvat nagirgeahtesvuodas? ☐ ☐

Jus juo, goas giksašuvat eanemus nagirgeahtesvuodas?
(Russe okti dahje moddii)

☐ Miehtá jagi ☐ Giddat ☐ Geassit
☐ Čakčat ☐ Dálvit

Leatgo manjimus jagi giksašuvvon nagirgeahtes-vuodas nu ahte lea čuohcan bargonávccaide? JUO ☐ IN ☐

Leatgo eanaš duhtavaš iežat eallindiliin?

☐ Hirbmat duhtavaš ☐ Hui duhtavaš
☐ Veahás duhtameahttun ☐ Hirbmat duhtameahttun

Geavvágo ahte guhkit áiggi – ainjuo 14 beaivvi – leat váivvis ja šlunddas? JUO ☐ IN ☐

Leatgo manjimus 14 beaivvi dovdan ahte it nákce čoavdit váttisvuođaidat?

☐ In ☐ Muhtumin ☐ Dávjá ☐ Masá oppa áigge

Dovddatgo goassige iežat okto?

☐ In ☐ Muhtumin ☐ Dávjá

2. BORRAMUŠ ĐÁL

Áiggošeimmet dus jearrat ahte man dávjá lávet muhtun borramušsorttaid borrat. Jurddas manjimus jagi gaskameari. *Russe juohke linnjái* galle geardde. Jus ii muitte justa, de deavdde nu bures go sáhtát.

Gallii vahkus lávet mállásiid borrat? Gallii

Man dávjá lea mállásiin:

	In goassige lárve	1 g. mánnu	2-3 g. mánnu	1 g. vahkku	2 g. vahkku	3 g. vahkku	4 g. vahkku	5+ vahkku
Guolli	☐	☐	☐	☐	☐	☐	☐	☐
Biergu	☐	☐	☐	☐	☐	☐	☐	☐
lobha, ferdnejuvvon	☐	☐	☐	☐	☐	☐	☐	☐
Ii guolli iige biergu	☐	☐	☐	☐	☐	☐	☐	☐

Man dávjá borat vuššon dorski ja sáiddi mállásiidda?

	In goassige	1-11 g.	1 g. jahkái	2-4 g. mánnui	1 g. mánnui	2 g. vahkkui	3+ g. vahkkui
Dorski *(omd. varas, veahás sáhtejuvvon, suovas, boahkis)*	☐	☐	☐	☐	☐	☐	☐
Sáiddi *(omd. varas, boahkis)*	☐	☐	☐	☐	☐	☐	☐

Man dávjá borat eará vuššon guoli mállásiidda?

	In goassige	1-5 g. jahkái	6-11 g. jahkái	1 g. mánnui	2-3 g. mánnui	1 g. vahkkui	2+ g. vahkkui
Buoiddes guollesorttaid *(omd. luosa, bálká, hábká, rávdu, dápmoha, čuovžža)*	☐	☐	☐	☐	☐	☐	☐
Ruoidna guolle-sorttaid *(omd. divssu/juvssu, vuskona, hávgga, hárri)*	☐	☐	☐	☐	☐	☐	☐

Man dávjá borat báiston guoli mállásiidda?

	In goassige	1-5 g. jahkái	6-11 g. jahkái	1 g. mánnui	2-3 g. mánnui	1 g. vahkkui	2+ g. vahkkui
Buoiddes guollesorttaid *(omd. báiston luosa, sallida,rávdu, dápmoha, čuovžža)*	☐	☐	☐	☐	☐	☐	☐
Ruoidna guollesorttaid (omd. báiston sáiddi, dorski, vuskkona, hávgga, hárri)	☐	☐	☐	☐	☐	☐	☐

2. BORRAMUŠ DÁL (joatkka)

Man dávjá borat guolleborramuša mállásiidda?

	In goassige	1-5 g. jahkái	6-11 g. jahkái	1 g. mánnui	2-3 g. mánnui	1-2 g. vahkkui	3+ g. vahkkui
Guollegáhkuid/ bulláid/deartna	☐	☐	☐	☐	☐	☐	☐
Guollegratiinna/ guolleruita	☐	☐	☐	☐	☐	☐	☐
Guollesákkiid/ skávuhuvvon guoli	☐	☐	☐	☐	☐	☐	☐

Man dávjá borat guollesuvlli?

	In goassige	1-11 g. jahkái	1 g. mánnui	2-3 g. mánnui	1-2 g. vahkkui	3-4 g. vahkkui	5+ g. vahkkui
Spihke-/ sálteguoli	☐	☐	☐	☐	☐	☐	☐
Suovasguoli	☐	☐	☐	☐	☐	☐	☐
Makrealla tomáhtas	☐	☐	☐	☐	☐	☐	☐
Sallitsuvlli (omd. suvrrasallit, tomáhtasallit)	☐	☐	☐	☐	☐	☐	☐
Meaddennjuvddus	☐	☐	☐	☐	☐	☐	☐
Eará guollesuvlli	☐	☐	☐	☐	☐	☐	☐

Galle geardde jagis borat guollesiskkožiid?

	0	1-3	4-6	7-9	10+
Guollevuoivasa	☐	☐	☐	☐	☐
Meaddemiid	☐	☐	☐	☐	☐

Man dávjá borat čuovvovaš borramušaid?

	In goassige	1-5 g. jahkái	6-11 g. jahkái	1 g. mánnui	2-3 g. mánnui	1 g. vahkkui	2+ g. vahkkui
Pizza	☐	☐	☐	☐	☐	☐	☐
Spagetti, pastaborramušaid	☐	☐	☐	☐	☐	☐	☐
Hamburgera láibbis	☐	☐	☐	☐	☐	☐	☐
Biergogáhkuid/ karbonádaid	☐	☐	☐	☐	☐	☐	☐
Márfiid	☐	☐	☐	☐	☐	☐	☐
Ruitoborramuša	☐	☐	☐	☐	☐	☐	☐

Man dávjá borat obba bierggu mállásiidda *(omd. čielgečaskasiid, čoarbeali, ruitobierggu, bitta, deahki)*?

	In goassige	1-5 g. jahkái	6-11 g. jahkái	1 g. mánnui	2-3 g. mánnui	1 g. vahkkui	2+ g. vahkkui
Vuoncáčivgga	☐	☐	☐	☐	☐	☐	☐
Spiinni	☐	☐	☐	☐	☐	☐	☐
Vuoksá/šibiha	☐	☐	☐	☐	☐	☐	☐
Sávzza/lábbá	☐	☐	☐	☐	☐	☐	☐
Ealgga	☐	☐	☐	☐	☐	☐	☐
Fállá	☐	☐	☐	☐	☐	☐	☐

Man dávjá borat bohccobierggu?

	In goassige	1-11 g. jahkái	1 g. mánnui	2-3 g. mánnui	1 g. vahkkui	2-4 g. vahkkui	5+ g. vahkkui
Vuššon bohccobierggu/liema	☐	☐	☐	☐	☐	☐	☐
Báiston bohccobierggu *(Olles, čáhppon, fierdnejuvvon)*	☐	☐	☐	☐	☐	☐	☐
Suovasbierggu	☐	☐	☐	☐	☐	☐	☐
Goikebierggu	☐	☐	☐	☐	☐	☐	☐

Man dávjá borat eará borramuša bohccos?

	In goassige	1-5 g. jahkái	6-11 g. jahkái	1 g. mánnui	2-3 g. mánnui	1 g. vahkkui	2+ g. vahkkui
Bohccovarraborramuša	☐	☐	☐	☐	☐	☐	☐
Addamiid	☐	☐	☐	☐	☐	☐	☐
Bohcconjuokčama	☐	☐	☐	☐	☐	☐	☐
Bohccovuoivasa	☐	☐	☐	☐	☐	☐	☐

Galle mearraloddemani borat jahkái?

	0	1-3	4-6	7-9	10+
Galle mani	☐	☐	☐	☐	☐

Man dávjá borat murjjid?

Oktii vástida 1 láibevajahas muorjemeastuin, jorjaid 1 máleslihttái, 1 bajálušlihttái, 1 glása máihlli, dahje ovtta málkkis goas borret varas murjjiid.

	In goassige	1-5 g. jahkái	6-11 g. jahkái	1 g. mánnui	2-3 g. mánnui	1-2 g. vahkkui	3+ g. vahkkui
Luopmániid:							
Varas, galmmihuvvon, firrojuvvon	☐	☐	☐	☐	☐	☐	☐
Vuššon/oston meastu	☐	☐	☐	☐	☐	☐	☐
Joŋaid:							
Varas, galmmihuvvon, firrojuvvon	☐	☐	☐	☐	☐	☐	☐
Vuššon/oston meastu	☐	☐	☐	☐	☐	☐	☐
Sarridiid:							
Varas, galmmihuvvon, firrojuvvon	☐	☐	☐	☐	☐	☐	☐
Vuššon/oston meastu	☐	☐	☐	☐	☐	☐	☐
Máihlli	☐	☐	☐	☐	☐	☐	☐
Čáhppesmurjjiid:							
Varas, galmmihuvvon	☐	☐	☐	☐	☐	☐	☐
Máihlli	☐	☐	☐	☐	☐	☐	☐

Mo lávet don/láve du dállodoallu háhkat čuovvovaš vuođđoávdnasiid iežat/iežas atnui? *(Russe okta dahje moddii)*

	In bora goassige háve	Vissot háhkat ieža	Belohahkái háhkat ieža	Oastit bivdiis	Oastit priváhta	Lonuhat dahje oažžut
Bierggu:						
Bohcco	☐	☐	☐	☐	☐	☐
Sávzza	☐	☐	☐	☐	☐	☐
Ealgga	☐	☐	☐	☐	☐	☐

	In bara goassige/ hárve	Visot háhkat ieža	Beliohahkii háhkat ieža	Oastit luvddas	Oastit priváhta	Lonuhat dahje oažžu
Guoli:						
Sáivaguoli	☐	☐	☐	☐	☐	☐
Mearraguoli	☐	☐	☐	☐	☐	☐
Murjjiid:						
Luopmániid	☐	☐	☐	☐	☐	☐
Jonaid	☐	☐	☐	☐	☐	☐

Man dávjá lávet bivdit, guolástit ja murjet?

	In goassige	Hárve	Muhtumin	Olu ástoáiggis
Bivdit rievssahiid/ fudožiid	☐	☐	☐	☐
Bivdit fuođđuid	☐	☐	☐	☐
Guolástit	☐	☐	☐	☐
Murjet	☐	☐	☐	☐

Man dávjá leat borran váldomállása iežat dállodoalu sállašis manjimus jagi?

	In goassige	1-5 g. jahkái	6-11 g. jahkái	1 g. mánnui	2-3 g mánnui	1 g. vahkkui	2+ g. vahkkui
Váldomállása bivddus	☐	☐	☐	☐	☐	☐	☐
Váldomállása guolásteamis	☐	☐	☐	☐	☐	☐	☐

3. BORRAMUŠ BAJÁSŠADDAMIS

Jurddaš ruovttu borramuša birra ovdal go fárrejit sierra. Jus ásset eanaš oasi jagis internáhtas, de jurddaš borramuša birra doppe.

Ássetgo internáhtas (stáhtainternáhtas dahje priváhta) go vázzet mánáid- ja nuoraidskuvlla?

- ☐ Juo, nuoraidskuvllas
- ☐ Juo, mánáidskuvllas
- ☐ Juo, sihke mánáid- ja nuoraidskuvllas
- ☐ In goappáge

Jus juo, galle luohká?

Man guhká ledjet internáhtas gaskamearálaččat juohke luohkás? ☐ 1-3 mánu ☐ 4-6 mánu ☐ 7-9 mánu

Man dávjá borret guoli ja bohccobierggu bajášsaddamis?

	In goassige	1-11 g. jahkái	1 g. mánnui	2-3 g. mánnui	1-2 g vahkkui	3-4 g. vahkkui	5+ g. vahkkui
Vuššon/báiston guoli	☐	☐	☐	☐	☐	☐	☐
Bohccobierggu	☐	☐	☐	☐	☐	☐	☐

Man dávjá borret eará borramušaid bajášsaddamis?

	In goassige	1-11 g. jahkái	1 g. mánnui	2-3 g. mánnui	1 g. vahkkui	2 g. vahkkui	3+ g. vahkkui
Varraborramuša	☐	☐	☐	☐	☐	☐	☐
Sávzzabierggu	☐	☐	☐	☐	☐	☐	☐
Biergogáhkuid, márffiid	☐	☐	☐	☐	☐	☐	☐
Guolleborramuša	☐	☐	☐	☐	☐	☐	☐
Guollevuoivasa ja meaddemiid	☐	☐	☐	☐	☐	☐	☐
Suohkada, bánnogáhkuid	☐	☐	☐	☐	☐	☐	☐

	JUO	IN
Ožžotgo medisiinnalaš trána bajášsaddamis?	☐	☐
Ožžotgo trána omd. guollái *(eará vuoja sadjái)*?	☐	☐

Man dávjá borret meahccemurjjiid ja šattuid bajášsaddamis?

	In goassige	1-5 g. jahkái	6-11 g. mánnui	1 g. mánnui	2-3 g. vahkkui	1-2 g vahkkui	3+ g. vahkkui
Meahccemurjjiid	☐	☐	☐	☐	☐	☐	☐
Jupmuid	☐	☐	☐	☐	☐	☐	☐
Borranrási	☐	☐	☐	☐	☐	☐	☐

Leago borramuš maid dál borat earálágan go maid borret bajášsaddamis?

- ☐ Ii
- ☐ Vealháš earálágan
- ☐ Hui earálágan
- ☐ Hirbmat earálágan

4. IDJABORRAN

	JUO	IN
Morihatgo dávjá boradit manjjil go eahkedis leat velledan?	☐	☐

Jus "juo", vástit boahtte 4 gažaldaga:

Goas leat dus dávjjimusat givssit? *(Bija ovtta dahje moadde ruossa)*

- ☐ Miehtá jagi
- ☐ Gidđat
- ☐ Geassit
- ☐ Čakčat
- ☐ Dálvit

Maid borat ihkku? *(Russo oktii dahje moddii)*

- ☐ Bierggu
- ☐ Láibeborramuša
- ☐ Njálgáid
- ☐ Eará

	JUO	IN
Boratgo eanet go beali jándora borramušas manjjil di. 20 eahkedis?	☐	☐

	JUO	EAI	IN DIEĐE
Givssiduvvojitgo carát bearrašis idjaborramiin?	☐	☐	☐

	JUO	IN
Leago dus bargovuorru, idjabargu dahje vuoruid váccát?	☐	☐

5. BAJÁSŠADDAN, BEARAŠ JA USTIBAT

Man gielddas leat ássan guhkitgo *ovtta* jagi?

Gielda:

1. Riegádanbáiki. . . . . 0 jagi rájes . . . . . jahkái
2. . . . . jagi rájes . . . . . jahkái
3. . . . . jagi rájes . . . . . jahkái
4. . . . . jagi rájes . . . . . jahkái
5. . . . . jagi rájes . . . . . jahkái

	JUO	IN
Ásatgo ovttas náittosguimmiin/elošteaddjiin?	☐	☐

	JUO	II
Leago dus beaivválaš dahje juhkkon fuolahus:		
Mánnái/mánáide?	☐	☐
Váhnemiidda/earáide?	☐	☐

Galle buori ustiba leat dus?
(Geaiguin sáhtát oadjebasat hállat ja geat sáhttet du veahkehit jus dan dárbbašat. Ále loga sin geaiguin ovttas ásat, muhto eará fulkkiid gal)

Galle ustiba

Gulatgo ovttage dáid searvegottiide/oskkuide?
(Russe oktii dahje moddii)

☐ Stáhtagirku miellahttu
☐ Lestadiánalaš searvegoddái
☐ Eará searvegoddái
☐ In miellahttu ovttage searvegottis

Dovddatgo ahte sáhtát váikkuhit dan mii dáhpáhuvvá báikegottis gos ásat? *(Russe duše oktii)*

☐ Juo, hui olu ☐ Juo, muhtun muddui
☐ Juo, unnán ☐ In ☐ In leat geahččalan

6. ÁRVOČATNAŠUPMI

BUOHKAIDE:
Leago dutnje dehálaš leat luonddus?

Hirbmat dehálaš	Dehálaš	Unnán dehálaš	Áibbas deattoheapme
☐	☐	☐	☐

Leago luonddu ávkkástallan nugo guolásteapmi, bivdu ja murjen dutnje dehálaš?

Hirbmat dehálaš	Dehálaš	Unnán dehálaš	Áibbas deattoheapme
☐	☐	☐	☐

Leatgo sohka- ja bearašárbevierut dutnje dehálaččat bisuhit?

Hirbmat dehálaš	Dehálaš	Unnán dehálaš	Áibbas deattoheapme
☐	☐	☐	☐

Leatgo vásihan ahte leat givssiduvvon dahje vealahuvvon du čearddalaš duogáža ***(sámi, kveana, ruošša, tamila, dáža jna.)*** **geažil?**

Hui mánggii	Muhtumin	Hárve	In oppanassiige
☐	☐	☐	☐

Jáhkátgo ahte čearddalaš unnitloguid vealaheapmi sáhttá dearvvasvuhtii čuohcat beajos guvlui?

Hui olu	Muhtun láhkai	Unnán	Ii oppanassiige
☐	☐	☐	☐

Dovddatgo ahte eláhusastis leat duvdojuvvomin eret?

Hui olu	Muhtun láhkai	Unnán	Ii oppanassiige
☐	☐	☐	☐

7. SIDJIIDE GEAIN LEA SÁMI DUOGÁŠ:

Leatgo sámi bivttasvierut dutnje dehálaččat?

Hirbmat dehálaš	Dehálaš	Unnán dehálaš	Áibbas deattoheapme
☐	☐	☐	☐

Maid mearkkaša dutnje duodji?

Hirbmat stuorra mearkkašupmi	Stuorra mearkkašupmi	Unnán mearkkašupmi	Ii makkárge mearkkašupmi
☐	☐	☐	☐

Maid mearkkaša dutnje sámegiela seailluheapmi ja ovddideapmi?

Hirbmat stuorra mearkkašupmi	Stuorra mearkkašupmi	Unnán mearkkašupmi	Ii makkárge mearkkašupmi
☐	☐	☐	☐

Leago dutnje dehálaš ássat báikegottis gos beaivválaččat sáhtál deaivvadit eará sámiiguin?

Hirbmat dehálaš	Dehálaš	Unnán dehálaš	Áibbas deattoheapme
☐	☐	☐	☐

Leago du mielas dehálaš ahte mihtilmas sámi eláhusat bisuhuvvojit?

Hirbmat dehálaš	Dehálaš	Unnán dehálaš	Áibbas deattoheapme
☐	☐	☐	☐

Leago dehálaš dutnje ahte ovddiduvvo ođđaáigásaš sámi skuvla?

Hirbmat dehálaš	Dehálaš	Unnán dehálaš	Áibbas deattoheapme
☐	☐	☐	☐

Leago dutnje dehálaš ahte sámi báikegottit berrešit oažžut eanet ođđaáigásaš bargosajiid?

Hirbmat dehálaš	Dehálaš	Unnán dehálaš	Áibbas deattoheapme
☐	☐	☐	☐

Maid mearkkašit dutnje sámi mediat (TV, aviissat, girjjit)?

Hirbmat stuorra mearkkašupmi	Stuorra mearkkašupmi	Unnán mearkkašupmi	Ii makkárge mearkkašupmi
☐	☐	☐	☐

Maid mearkkaša dutnje odda sámi dáidda (govvadáidda, musihkka, fillbma ja teáhter)?

Hirbmat stuorra mearkkašupmi	Stuorra mearkkašupmi	Unnán mearkkašupmi	Ii makkárge mearkkašupmi
☐	☐	☐	☐

Mo du mielas lea go sámi servodat ja kultuvra jagiid mielde lea oažžon lagat riikkaidgaskasaš oktavuodaid?

Hirbmat dehálaš	Dehálaš	Unnán dehálaš	Áibbas deattoheapme
☐	☐	☐	☐

Maid mearkkaša dutnje Sámediggi?

Hirbmat stuorra mearkkašupmi	Stuorra mearkkašupmi	Unnán mearkkašupmi	Ii makkárge mearkkašupmi
☐	☐	☐	☐

Dovddatgo ahte nuoskkideapmi luonddus dahje sisabahkken lundui áitá du sámi eallima?

Hui olu	Muhtun láhkai	Unnán	Ii oppanassiige
☐	☐	☐	☐

Dovddatgo ahte ođđaáigásaš ovdáneapmi duvdá eret sámi kultuvrra?

Hui olu	Muhtun láhkai	Unnán	Ii oppanassiige
☐	☐	☐	☐

GIITU VEAHKI OVDDAS!
MUITTE SKOVI OTNE POSTET!

Appendix 2
Questionnaire the Sør-Varanger study 1994
Original Norwegian version

VIKTIG INFORMASJON!

FORURENSNING OG HELSE I SØR-VARANGER.

Som du ser av invitasjonsbrevet på forsiden av dette ark er du
VELKOMMEN TIL HELSEUNDERSØKELSEN I DE GRENSENÆRE STRØK.

Kjennskap til forurensningen fra nikkelindustrien på Kola har foruroliget mange i Sør-Varanger. Det er i løpet av de siste årene godt dokumentert hvilke økologiske effekter på planter, fisk og dyr nikkelutslipp og svoveldioksyd har hatt. Spørsmålet om forurensningen også kan ha gitt helseskader opptar folk i kommunen. Disse forhold er bakgrunnen for en større helseundersøkelse som vil pågå i Sør-Varanger i perioden mai-oktober 1994. Formålet med undersøkelsen er å kartlegge mengden av nikkel og tungmetaller i befolkningen, å finne utbredelsen av lungesykdommer og allergiske lidelser hos kommunens innbyggere, samt se på mulige helseeffekter hos barnet i løpet av svangerskapet.

Denne undersøkelsen er faglig underlagt Institutt for samfunnsmedisin ved Universitetet i Tromsø, og den gjennomføres i samarbeid med Statens helseundersøkelser, fylkeslegen i Finnmark og kommunehelsetjenesten i Sør-Varanger. Både Sosial- og helsedepartementet og Miljøverndepartementet har bevilget penger til undersøkelsen. Ved hjelp av bevilgninger fra Utenriksdepartementet vil det bli gjennomført tilsvarende undersøkelse på russisk side av grensen.

Hver enkelt innbygger mellom 18 og 69 år får nå et tilbud om en enkel helseundersøkelse. Vi ber om at du først svarer på vedlagte spørreskjema og bringer dette med deg til undersøkelsen. Alle opplysninger vil bli konfidensielt behandlet. Når du kommer til undersøkelsen vil du bli bedt om å levere en urinprøve. Utstyr til å samle prøven i utleveres på fremmøtestedet (det er ikke ønskelig at urinprøven tas med hjemmefra). Det vil bli tatt blodprøve, og du vil bli bedt om å puste i et apparat som kalles spirometer for å undersøke lungefunksjonen din. Det vil videre bli tatt et skjermbilde, og du må være forberedt på å kle av deg på overkroppen (alt unntatt en tynn trøye) i forbindelse med dette. For et utvalg av befolkningen ønsker å vi gjøre en hudtest på allergi. Dersom du er en av dem som får tilbud om dette, vil du ved undersøkelsen få klebet en lapp på ryggen. Resultatet av testen skal avleses tre dager senere, og tid og sted for avlesing vil bli avtalt på forhånd. Dersom det viser seg ved denne undersøkelsen at du har en sykdom som du trenger behandling for, vil du bli henvist til kommunelegen i Sør-Varanger.

For å kunne studere virkningen av sykelighet i befolkningen på lengre sikt, vil vi be om samtykke til å bruke ditt personnummer for med visse mellomrom å jevnføre data fra helseundersøkelsen med opplysninger i sykehusregisteret ved Kirkenes Sykehus, Kreftregisteret, Medisinsk fødselsregister og Dødsårsaksregisteret. Av vitenskapelige årsaker kan det senere bli aktuelt å innkalle enkelte personer på nytt. Dette trenger vi også tillatelse til.

Undersøkelsen er tilrådd av Regional etisk komite for helseregion V og av Datatilsynet.

Undersøkelsen blir mest verdifull om fremmøtet er så stort som mulig. Vi håper derfor at du har anledning til å komme. Møt selv om du føler deg frisk, eller om du er under legebehandling, eller om du er blitt undersøkt med tanke på astma/allergi i den senere tid. Undersøkelsen er gratis.
Undersøkelsen er frivillig og det er også adgang til å trekke seg på et senere tidspunkt hvis du skulle ønske det. Dersom du ikke kan møte ber vi deg likevel om å returnere skjemaet.

Med hilsen

Institutt for samfunnsmedisin
Universitetet i Tromsø

Kommunehelsetjenesten
i Sør-Varanger

Fylkeslegen i Finnmark

Statens Helseundersøkelser

Har du spørsmål i forbindelse med undersøkelsen kan du ringe Institutt for samfunnsmedisin tlf. 776 44 816

Innbydelse til undersøkelse for kartlegging av
FORURENSNING OG HELSE I SØR-VARANGER

Kjære mottaker!

En spesiell "Miljøundersøkelse" vil nå bli gjennomført i Sør-Varanger. Formålet med undersøkelsen er å se om det er sammenheng mellom forurensning i kommunen og befolkningens helse.

Tid og sted for frammøte er oppgitt nedenfor. Orientering om undersøkelsen finner du på baksiden av brevet.

Vi ber deg være vennlig å fylle ut vedlagte spørreskjema, og ta dette med til undersøkelsen!

Undersøkelsen er viktig for både din helse, og for kartlegging av miljøfaktorer i kommunen. Det er av stor betydning at frammøtet blir så fullstendig som mulig. Vi håper derfor at du har mulighet til å komme. Møt selv om du føler deg frisk, eller nylig har vært hos lege.

Med hilsen

Kommunehelsetjenesten *Fylkeslegen*
Universitetet i Tromsø *Statens Helseundersøkelser*

FORURENSNING OG HELSE I SØR-VARANGER

KONFIDENSIELT

I innvitasjonsbrevet er jeg informert om undersøkelsen Forurensning og helse i Sør-Varanger. Jeg er derfor orientert om formålet med undersøkelsen.

Jeg samtykker i at mine resultater brukes til statistikk og forskning og i at opplysningene kan kobles til andre registre som Sykehusregisteret ved Kirkenes Sykehus, Kreftregisteret, Medisinsk fødselsregister og Dødsårsaksregisteret. Forutsetningen er at mitt navn og fødselsnummer fjernes før data studeres. Jeg samtykker også i at jeg kan kontaktes igjen dersom det av vitenskapelige årsaker er behov for en ny undersøkelse.

UNDERSKRIFT

IKKE SKRIV HER

SOSIALE FORHOLD

Kjønn: Mann ☐ Kvinne ☐ Alder: ☐☐ år

Nasjonalitet: _____

I hvilken kommune har du bodd MER enn ett år?

Kommune: .	Angi din alder:
1. Fødested:.....	fra ☐☐ år til ☐☐ år
2.	fra ☐☐ år til ☐☐ år
3.	fra ☐☐ år til ☐☐ år
4.	fra ☐☐ år til ☐☐ år
5.	fra ☐☐ år til ☐☐ år
6.	fra ☐☐ år til ☐☐ år

Sivilstand: ☐ Ugift ☐ Gift ☐ Skilt ☐ Enke/enkemann ☐ Separert ☐ Samboer

Hvor mange års utdanning har du i alt, ta med barneskole/folkeskole og ungdomskole? ☐☐ år

Hvilken yrkesutdannelse har du?

.....

Er din nåværende arbeidssituasjon:

☐ hjemmeværende ☐ deltids arbeid
☐ heltids arbeid utenfor hjemmet ☐ skolegang
☐ uførepensjon ☐ alderspensjon
☐ arbeidsledig ☐ attføring
☐ sykemeldt ☐ annen situasjon

ASTMA

	JA	NEI
Har du hatt astma?	☐	☐
Hvis Ja, har astmadiagnosen vært stilt av lege?	☐	☐
Har du hatt astma i løpet av de siste 12 mnd.?	☐	☐
Har du noen gang hatt piping (pipelyd) i brystet? (Med piping menes høye eller dype lyder som også kan være svake).	☐	☐
Hvis Ja, har du noen gang i løpet av de siste 12 måneder hatt piping i brystet?	☐	☐
Har du vært tungpustet i forbindelse med at du hadde pipelyder i brystet?	☐	☐
Hvis Ja, blir du/ble du helt bra i pusten mellom disse anfallene med tung pust?	☐	☐
Har du hatt slike pipelyder når du ikke har vært forkjølet?	☐	☐
Har du piping i brystet eller blir du mer tungpustet enn jevnaldrende ved anstrengelse?	☐	☐
Har du piping i brystet eller blir du mer tungpustet enn jevnaldrende i rå, kald luft?	☐	☐
Hender det at du våkner om natten med kortpustethet og tetthet i brystet?	☐	☐

ALLERGI

	JA	NEI
Har du hatt eksem?	☐	☐

Hvis Ja, kryss av om eksemet passer godt med noen av følgende beskrivelser:

	JA	NEI
a. **Atopisk eksem eller "barneeksem":** langvarig utslett med kløe i et eller flere av områdene ansikt/knehaser/albuebøyer/ankelledd/håndledd.	☐	☐
b. **"Kontakteksem":** eksem som kommer ved direkte kontakt med bestemte stoffer. Oppstår oftest på hendene, men kan også oppstå andre steder på kroppen.	☐	☐

Hvis Ja,

- oppstår eksemet på hendene ☐, andre steder ☐
- hvilke stoffer gir deg eksem: metaller ☐, gummi ☐, lær ☐, parfyme ☐, vaskemidler ☐, annet ☐, angi: _____

	JA	NEI
c. **Annen form for eksem?**	☐	☐

Hvis Ja, hvilke? _____

Hvis du har svart Ja på a og/eller b, har du hatt slikt eksem i løpet av de siste 12 måneder?	☐	☐
Har du fått eksem eller utslett av å bruke ørepynt eller andre smykker, under spennen på klokkereimen eller under metallknapper?	☐	☐
Har du hull i ørene?	☐	☐

Hvis ja, hvor mange hull totalt? ☐ hull

Har du hatt "høysnue"?
(dvs. allergiske plager fra nese og/eller øyne som renning fra nesen, nesetetthet, nysing, kløe i nese/øyne, hovne øyne, "røde" øyne. Plagene skyldes ikke bare allergi mot høy og gress, men kan være forårsaket av kontakt med dyr, husstøv, matvarer og annet).

	JA	NEI
	☐	☐

Hvis du har svart Ja, har du hatt slike plager de siste 12 måneder? ☐ ☐

Kryss av hvis følgende påstander passer:

Jeg er allergisk, men har ikke vært undersøkt av lege for det.	☐	☐
Jeg er ikke allergisk.	☐	☐

Kryss av om du har hatt overfølsomhet/allergi de siste 12 måneder som passer godt med noen av de følgende beskrivelser:

Jeg har hatt: ved kontakt med	hoste eller pipende pust	plager fra øyne/nese	plager fra hud	andre plager
- dyr	☐	☐	☐	☐
- gress, trær (pollen)	☐	☐	☐	☐
- blomster	☐	☐	☐	☐
- matvarer	☐	☐	☐	☐
- medisiner	☐	☐	☐	☐
- innendørs støv	☐	☐	☐	☐
- andre stoffer	☐	☐	☐	☐
- utendørs forurensning	☐	☐	☐	☐
- arbeid i hjemmet	☐	☐	☐	☐
- i yrket	☐	☐	☐	☐

	JA	NEI
Har du noen annen form for overfølsomhet/allergi som ikke passer med noe av det som står ovenfor?	☐	☐

Hvis Ja, hvilke? _____

	JA	NEI
Har allergidiagnosen(e) vært stilt av lege?	☐	☐

Hvis ja, angi hvilken/hvilke diagnose(r)?

_____

	JA	NEI
Har noen i familien (foreldre, søsken) hatt astma, "høysnue", eksem, elveblest eller andre sykdommer som dere tror kan skyldes allergi?	☐	☐

Hvis Ja - kryss av	Mor	Far	Søsken	Barn	Andre
Astma	☐	☐	☐	☐	☐
"Høysnue"	☐	☐	☐	☐	☐
Eksem	☐	☐	☐	☐	☐
Elveblest	☐	☐	☐	☐	☐
Annen allergi	☐	☐	☐	☐	☐

LUFTVEISPLAGER

Dersom du er usikker på følgende spørsmål, kryss av for Nei.

	JA	NEI
Hoster eller harker (kremter) du vanligvis om morgenen?	☐	☐
Hoster du om dagen eller om natten?	☐	☐
Hoster du nærmest daglig til sammen 3 måneder eller lenger i løpet av et år?	☐	☐
Har du vanligvis oppspytt når du hoster eller harker om morgenen?	☐	☐
Har du vanligvis oppspytt i løpet av dagen eller natten?	☐	☐
Har du oppspytt av denne type nærmest daglig i mer enn tre måneder hvert år?	☐	☐
Har du i løpet av de siste tre årene hatt en periode eller mer med økt hoste og oppspytt som varte mer enn tre uker?	☐	☐
Har du vanskeligheter med å gå av andre årsaker enn hjerte-lungesykdommer (f.eks. gikt)?	☐	☐
Blir du tungpustet når du må skynde deg på flat mark eller gå i slak motbakke?	☐	☐
Hvis Ja, blir du kortpustet når du spaserer på flat mark sammen med andre på din egen alder?	☐	☐
Hvis Ja, må du stoppe opp for å puste når du spaserer i vanlig fart på flat mark?	☐	☐
Blir du tungpustet når du går opp to etasjer i vanlig fart?	☐	☐
Er du tungpustet når du sitter i ro?	☐	☐

SYKDOMMER

	JA	NEI
Har du de siste tre årene hatt noen sykdom i lungene som reduserte dine aktiviteter i en uke eller lenger?	☐	☐
Hvis Ja, hadde du mer oppspytt enn vanlig under disse sykdomsperiodene?	☐	☐
Hvis Ja, har du hatt mer enn én slik sykdomsperiode i løpet av de siste 3 år?	☐	☐

Kryss av hvis du har hatt eller har en eller flere av følgende sykdommer.

Hjerteinfarkt	☐
Hjertekrampe (angina)	☐
Hjertesvikt	☐
Lungebetennelse	☐
Kronisk bronkitt	☐
Tuberkulose	☐
Emfysem (utvidede lunger)	☐
Pleuritt (brysthinnebetennelse)	☐
Operasjon eller skade av brystkassen	☐

SKJERMBILDEUNDERSØKELSE

Fikk du tatt skjermbilde mens du var:

	USIKKER	NEI	JA	ANTALL
Barn (0-10 år)	☐	☐	☐	
Ungdom (11-18 år)	☐	☐	☐	

YRKESFORHOLD

Hvilke arbeidsforhold har du hatt lenger enn 1 år?
(Skolegang skal ikke tas med). Start med ditt nåværende arbeidsforhold og gå bakover i tid. Angi yrke, varighet og type bedrift.

	Yrke:	Varighet:	Type bedrift/ arbeidsplass:
1.		Fra 19 ☐☐ til 19 ☐☐	
2.		Fra 19 ☐☐ til 19 ☐☐	
3.		Fra 19 ☐☐ til 19 ☐☐	
4.		Fra 19 ☐☐ til 19 ☐☐	
5.		Fra 19 ☐☐ til 19 ☐☐	
6.		Fra 19 ☐☐ til 19 ☐☐	
7.		Fra 19 ☐☐ til 19 ☐☐	

Har du vært utsatt for/vært i kontakt med noen av de følgende stoffer i arbeidslivet?

	JA	ANTALL ÅR
Glassvatt/steinull	☐	☐☐
Asbest	☐	☐☐
Steinstøv	☐	☐☐
Nikkel	☐	☐☐
Løsemidler	☐	☐☐

Har du arbeidet ved A/S Sydvaranger? JA ☐ NEI ☐

Hvis Ja - angi sted og antall år.

Bjørnevatn: Gruben ☐☐ år
Vedlikeholdsavdelingen ☐☐ år
Grovknuseren, forsepareringen, eller pukkverket ☐☐ år
Vulkearbeid ☐☐ år
Annet, angi_____ ☐☐ år

Kirkenes: Jernbanen ☐☐ år, Finknuseren ☐☐ år
Separasjonsverket ☐☐ år, Pelletsverket ☐☐ år
Kaia ☐☐ år, Vedlikeholdsavdelingen ☐☐ år
Vulkearbeid ☐☐ år, Administrasjonen ☐☐ år
Annet, angi_____ ☐☐ år

BOLIGFORHOLD

Hva slags bustype bor du i?
enebolig ☐ tomannsbolig/rekkehus ☐
blokk ☐ annet ☐

Flyttet inn i boligen/leiligheten år 19☐☐ Byggeår 19☐☐

Antall boende i boligen/leiligheten:
Voksne og barn over 15 år: ☐☐ stk
Barn under 15 år: ☐☐ stk

Boligen ligger i et område som passer med følgende beskrivelse:
Trafikk: sterk ☐ middels ☐ lite ☐ ingen ☐

Er det teppegulv på ditt soverom? JA ☐ NEI ☐

Er det fuktproblemer eller mistanke om muggdannelse i boligen? JA ☐ NEI ☐

Bruker familien vanligvis ekstra luftfukter? ☐ ☐

Har familien selv dyr? ☐ ☐

Hvis Ja, hvilke?
hund ☐ katt ☐ andre ☐ hvilke: _____

Hvis Nei, har du omtrent daglig kontakt med dyr? JA ☐ NEI ☐

Har du i løpet av de siste 3 måneder hatt plager som du tror skyldes forhold med..	Ja, ofte (hver uke)	Ja, av og til	Nei aldri
– egen bolig (inneklima)?	☐	☐	☐
– arbeidslokaler/skolelokaler (inneklima)?	☐	☐	☐

Bor du fast sammen med noen som røyker? JA ☐ NEI ☐

Hvis Ja, hvor mange sigaretter røyker de til sammen hjemme per dag? ☐☐ antall

KOSTHOLD

Har du regelmessig brukt drikkevann fra egen brønn?

☐ Nei ☐ Ja - hvilke perioder? (oppgi din alder)

1. Fra ☐☐ år til ☐☐ år Kommune: _____
2. Fra ☐☐ år til ☐☐ år Kommune: _____

Hvor mye melk og hvilken type melk mener du at du drakk i din oppvekst?

	Antall glass (2 dl) per dag 0	1-2	3-4	5-6	7-8	9+	Type melk Meieri-melk	Gårds-melk
Barneår 5-12 år	☐	☐	☐	☐	☐	☐	☐	☐
Ungdomsår 13-18 år	☐	☐	☐	☐	☐	☐	☐	☐

Hvor ofte spiser du mat som du mener stammer fra Sør-Varanger?

	Daglig	5-6 ggr pr uke	3-4 ggr pr uke	1-2 ggr pr uke	1-3 ggr pr mnd	mindre enn 1 g pr mnd	aldri/ nesten aldri
Kjøtt:							
Elgkjøtt	☐	☐	☐	☐	☐	☐	☐
Reinkjøtt	☐	☐	☐	☐	☐	☐	☐
Storfe	☐	☐	☐	☐	☐	☐	☐
Svin	☐	☐	☐	☐	☐	☐	☐
Sau	☐	☐	☐	☐	☐	☐	☐
Fugl	☐	☐	☐	☐	☐	☐	☐
Innmat fra vilt	☐	☐	☐	☐	☐	☐	☐
Fisk:							
Laks	☐	☐	☐	☐	☐	☐	☐
Ørret/rør	☐	☐	☐	☐	☐	☐	☐
Annen innlandsfisk	☐	☐	☐	☐	☐	☐	☐
Saltvannsfisk	☐	☐	☐	☐	☐	☐	☐
Bær/sopp:							
Bær	☐	☐	☐	☐	☐	☐	☐
Sopp	☐	☐	☐	☐	☐	☐	☐
Jordbær	☐	☐	☐	☐	☐	☐	☐

JA NEI

Tar du daglig kosttilskudd som inneholder selen? ☐ ☐

Hvilken type(r) kokekar/stekepanne bruker du til matlaging?

	daglig	ukentlig	sjeldnere
aluminium	☐	☐	☐
rustfritt stål	☐	☐	☐
jern	☐	☐	☐
teflon	☐	☐	☐
emaljert	☐	☐	☐

RØYKEVANER

JA NEI

Røyker du i dag? ☐ ☐

Hvis Ja, røyker du sigaretter daglig? ☐ ☐

Hvis Ja, hvor mange sigaretter per dag? ☐ stk

Røyker du;
- filtersigaretter ☐
- hjemmerullede sigaretter u/filter. ☐
- sigarillo/sigarer ☐
- pipe ☐
- papyrosa ☐

Hvor gammel var du da du begynte å røyke? ☐ år

JA NEI

Dersom du ikke røyker i dag, røykte du tidligere? ☐ ☐

Dersom du røyker eller har røykt sigaretter daglig, ber vi deg om å fylle ut for hver ti-årsperiode i livet hvor mange sigaretter du antar at du i gjennomsnitt røykte per dag i den perioden. (Ta med både filtersigaretter og hjemmerullede).

Antall sigaretter hver dag

Alder	0	1-4	5-9	10-14	15-19	20-24	25+
-19	☐	☐	☐	☐	☐	☐	☐
20-29	☐	☐	☐	☐	☐	☐	☐
30-39	☐	☐	☐	☐	☐	☐	☐
40-49	☐	☐	☐	☐	☐	☐	☐
50-59	☐	☐	☐	☐	☐	☐	☐
60-69	☐	☐	☐	☐	☐	☐	☐

Hvis du røyker pipe, hvor mange pakker tobakk (50 gram) bruker du i pipa per uke (oppgi gjennomsnittlig antall)? ☐ pakker

FYSISK AKTIVITET

Hvor ofte er du fysisk aktiv i din fritid av minst 20 minutters varighet som fører til at du blir svett eller andpusten?

- Sjelden eller aldri ☐
- Ukentlig ☐
- Flere ganger i uka ☐
- Daglig ☐

ANDRE FORHOLD

Er du bekymret for forurensningssituasjonen i din kommune?
- ☐ Mye
- ☐ Noe
- ☐ Ikke

Er du i såfall bekymret for:
- Svoveldioksyd ☐
- Nikkel ☐
- Radioaktivitet ☐
- Høyspentledninger ☐

JA NEI

Tror du at forurensningen har gitt deg sykdom? ☐ ☐

Hvis Ja, hvilken sykdom? _____

JA NEI

Plages du av mørketida eller midnattsola? ☐ ☐

Hvis Ja, angi hva slags plager:

	MØRKETID	MIDNATTSOL
Depresjon	☐	☐
Søvnproblemer	☐	☐
Annet, angi _____	☐	☐

JA NEI

Har du bodd på skoleinternat? ☐ ☐

Hvis ja, hvor gammel var du? Fra ☐ år til ☐ år

JA NEI

Har en eller flere av besteforeldrene hatt finsk som hjemmespråk? ☐ ☐

Er en eller flere av dine besteforeldre av finsk slekt? ☐ ☐

Har en eller flere av besteforeldrene hatt samisk som hjemmespråk? ☐ ☐

Er en eller flere av dine besteforeldre av samisk slekt? ☐ ☐

SVANGERSKAP

Fyll ut for hvert barn opplysninger om fødselsår og fødsels-vekten (fylles ut også for dødfødte eller for barn som er døde senere i livet). Dersom du ikke har født barn fortsetter du med neste spørsmål.

Barn	Fødselsår	Barnets fødselsvekt
1	76	
2		
3		
4		
5		
6		

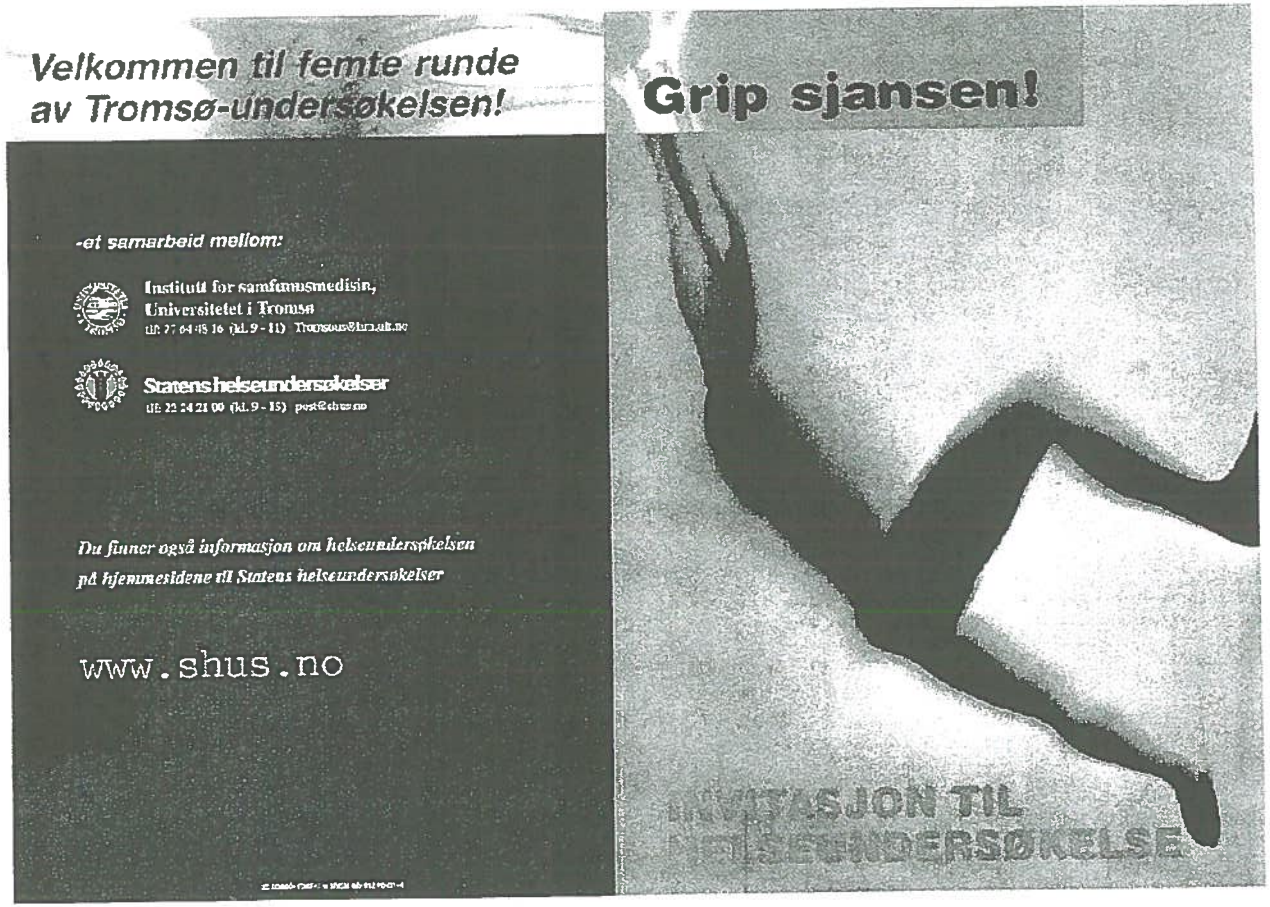
JA NEI

Har du hatt noen svangerskap som varte mindre enn seks måneder, dvs. spontan abort? ☐ ☐

Hvis Ja, hvor gammel var du ved første spontanabort? ☐ år

Hvor mange spontanaborter har du hatt i alt? ☐ antall

Appendix 3
Questionnaire the Tromsø study 2001
Original Norwegian version


Velkommen til femte runde
av Tromsø-undersøkelsen!
-et samarbeid mellom:
Institutt for samfunnsmedisin,
Universitetet i Tromsø
tlf: 77 64 48 16 (kl. 9 - 11) Tromsous@ism.uit.no
Statens helseundersøkelser
tlf: 22 24 21 00 (kl. 9 - 15) post@shus.no
Du finner også informasjon om helseundersøkelsen
på hjemmesidene til Statens helseundersøkelser
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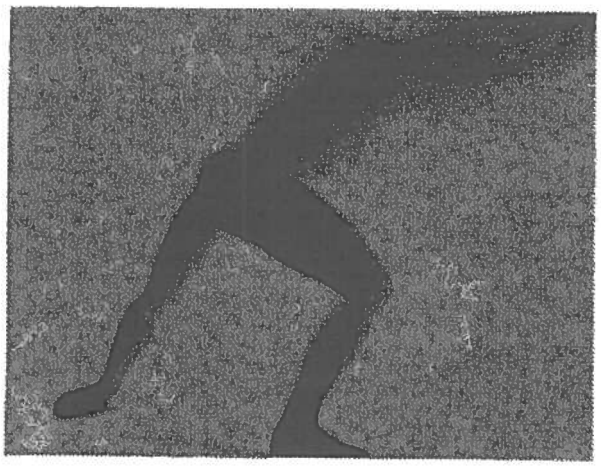
Grip sjansen!

Vil du være med på femte runde av Tromsø-undersøkelsen?

Hvorfor en ny runde med Tromsø-undersøkelsen?



Det ble gjennomført store helse-undersøkelser i Tromsø i 1974, 1979-80, 1986-87, og 1994-95. Disse undersøkelsene har gitt viktig kunnskap om hjerte-karsykdom og andre alvorlige sykdommer, slik som kreft.

Hovedhensikten med en ny Tromsø-undersøkelse er å se på endring i helsen til befolkningen siden forrige gang. Vi ser på opplysningene vi har om den enkelte, både data og resultater fra analyser på nedfrosset blod, og sammenholder det med eventuell sykdom som har oppstått. På den måten lærer vi mer om hvordan hjerte- og karsykdom, kreft og andre store folkesykdommer oppstår, og hvordan de kan forebygges.

Hvorfor spør vi deg om å delta?

Vi spør alle som møtte fram til spesialundersøkelsene i Tromsø-undersøkelsen i 1994-95 og et utvalg av andre over 29 år.

Alle som møtte fram til spesialundersøkelsene i 1994-95, får tilbud om en ny spesialundersøkelse. Denne undersøkelsen gir blant annet en bedre beskrivelse av hjertet og hovedpulsåren på halsen og i magen, og sier mer om tendensen til beinskjørhet. Denne undersøkelsen foregår også på Elisabeth-senteret i Tromsø sentrum. Du får time til denne undersøkelsen og opplysninger om den når du møter fram til helseundersøkelsen.

Spørreskjemaene

Med brevet som du har fått i posten nå, er det et spørreskjema. Vi ber deg om å fylle ut dette skjemaet hjemme og ta det med deg når du møter fram til undersøkelsen.

Hvis du er i tvil om hvordan du skal svare på noen av spørsmålene, lar du det stå åpent. Personalet på undersøkelsen kan hjelpe deg med utfyllingen.

Alle som møter fram til helseundersøkelsen, får et tilleggsskjema, med spørsmål om ulike forhold som kan ha betydning for helsa. Dette skjemaet fyller du ut hjemme og sender til Statens helseundersøkelser i den frankerte svarkonvolutten som du får utlevert.

Fremtidig analyse av blod

Det blodet som fryses ned, skal bare brukes til medisinsk forskning for å finne årsak til sykdom. Dette betyr i de fleste tilfeller at vi sammenligner data fra de som får en sykdom med data fra de som ikke får sykdommen. Vi vil da sammenligne data som allerede er samlet inn med data fra nye analyser av det nedfryste blodet.

Det kan også være aktuelt å analysere deler av arvestoffet som finnes i de nedfryste blodcellene. Siden arvestoffet er viktig for regulering og utvikling av mennesket, må vi ha kunnskap om arvestoff for å forstå hvorfor enkelte får sykdom. Slike analyser blir bare gjort etter at saken er forelagt Datatilsynet og den regionale komité for medisinsk forskningsetikk ikke har innvendinger mot analysen.

Hvor skal du møte opp?

Undersøkelsen vil for de aller fleste foregå på Elisabeth-senteret i Tromsø sentrum. For noen av ytterområdene i kommunen vil undersøkelsen foregå lokalt. De det gjelder, får beskjed i dette brevet.

På forsiden av spørreskjemaet som du får i dette brevet, står åpningstidene for helseundersøkelsen og når du har fått time til undersøkelsen. Kan du ikke komme på dette tidspunktet, er du velkommen til en annen tid i åpningstiden for undersøkelsen. Du behøver ikke å gi oss beskjed om dette – bare møt opp når vi holder åpent.

Hva går undersøkelsen ut på?

Tromsø-undersøkelsen er i første rekke et forskningsprosjekt. Ved å følge opp så mange som mulig fra undersøkelsen i 1994-95 får vi mange verdifulle opplysninger om helse og sykdom i Tromsøs befolkning.

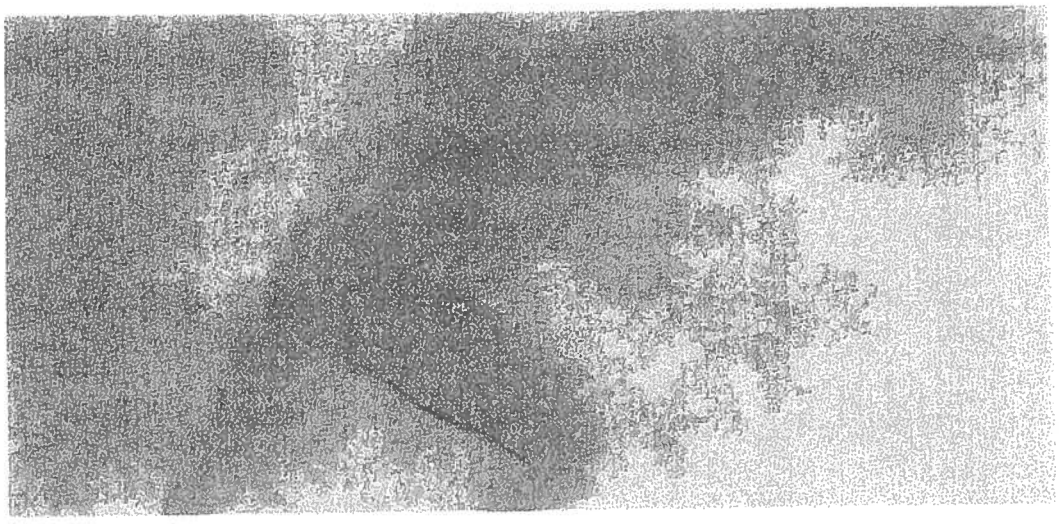
Du som møter får i tillegg sjekket helsen din i forhold til visse sykdommer og risikoforhold. Har du høy risiko for hjerte-karsykdom, vil du få melding om dette.

Når du møter fram, vil personalet veilede deg gjennom helseundersøkelsen og svare på spørsmål. De måler høyde, vekt og livvidde, de tar blodprøve av deg og måler blodtrykket. De måler også lungekapasiteten din, tar en enkel syns- og styrketest, og måler beinskjørhet.
Blodprøven kan senere bli analysert på fettstoffer i blodet, blodsukker,markører for betennelsesreaksjoner, kosthold, hormoner, lever- og nyrefunksjon samt beinmarkører.

Når kommer resultatene dine?

Cirka fire uker etter at du møtte fram til undersøkelsen, får du et svarbrev i posten. Der får du blant annet vite dine verdier for kolesterol, blodtrykk og blodsukker. Du får også mer informasjon om de ulike risikofaktorene.

Personer med særlig høy risiko for hjerte-karsykdommer og diabetes vil bli anbefalt videre kontroll hos egen lege.



Vi trenger din tillatelse

Når du møter fram til helseundersøkelsen, vil du bli bedt om å undertegne et samtykke der du sier deg enig i disse seks punktene:

- At vi kan kontakte deg med anbefaling om oppfølging, behandling eller for å forebygge sykdom.
- At vi kan be deg om å delta i lignende undersøkelser i framtida.
- At vi kan bruke resultatene i medisinsk forskning.
- At resultatene (etter godkjenning fra Datatilsynet) kan settes sammen med opplysninger om deg i andre registre til bruk i forskning. Det kan være registre om helse, trygd og sykdom. Det kan også være registre om inntekt, utdanning og yrke, samt opplysninger fra de tidligere helseundersøkelser i Tromsø. Eksempler på registre er Kreftregisteret, Dødsårsaksregisteret og folketellingene. I disse tilfellene blir navnet og personnummeret ditt fjernet når dataene blir analysert.
- At blodprøven kan lagres og brukes i medisinsk forskning. All bruk av denne prøven vil bare skje etter godkjenning fra Datatilsynet og dersom den regionale komité for medisinsk forskningsetikk ikke har innvendinger mot det.
- At blodprøven også kan brukes til analyse av arvestoff.

Selv om du sier ja til dette nå, kan du senere ombestemme deg, og be om å bli slettet fra registeret. Blodprøven blir da tilintetgjort. Du kan også si nei til ett eller flere av punktene. Datatilsynet har godkjent denne femte runden av Tromsø-undersøkelsen. Den regionale komité for medisinsk forskningsetikk har heller ingen innvendinger. Vi behandler resultatene dine på en fortrolig og sikker måte. Alle som arbeider med undersøkelsen, har taushetsplikt.

Helse-
undersøkelsen

Personlig innbydelse

Ikke skriv her:
E13 (Kommune) (Fylke) (Land) E15 (Merke)

E1. EGEN HELSE

Hvordan er helsen din nå? *(Sett bare ett kryss)*

Dårlig	Ikke helt god	God	Svært god
☐ 1	☐ 2	☐ 3	☐ 4

Har du, eller har du hatt?:

	JA	NEI	Alder første gang
Astma	☐	☐	
Kronisk bronkitt/emfysem	☐	☐	
Diabetes (sukkersyke)	☐	☐	
Benskjørhet (osteoporose)	☐	☐	
Fibromyalgi/kronisk smertesyndrom	☐	☐	
Psykiske plager som du har søkt hjelp for	☐	☐	
Hjerteinfarkt	☐	☐	
Angina pectoris (hjertekrampe)	☐	☐	
Hjerneslag/hjerneblødning	☐	☐	

	JA	NEI
Får du smerter eller ubehag i brystet når du: Går i bakker, trapper eller fort på flat mark?	☐	☐

Hvis du får slike smerter, pleier du da a:

Stoppe?	Saktne farten?	Fortsette i samme takt?
☐ 1	☐ 2	☐ 3

	JA	NEI
Dersom du stopper, forsvinner smertene da etter mindre enn 10 minutter?	☐	☐
Kan slike smerter opptre selv om du er i ro?	☐	☐

E2. SYKDOM I FAMILIEN

Har en eller flere av dine foreldre eller søsken hatt:

	JA	NEI	Vet ikke
Hjerteinfarkt (sår på hjertet) eller angina pectoris (hjertekrampe)?	☐	☐	☐

Kryss av for de slektningene som har eller har hatt noen av sykdommene: *(Sett kryss for hver linje)*

	Mor	Far	Bror	Søster	Barn	Ingen av disse
Hjerneslag eller hjerneblødning	☐	☐	☐	☐	☐	☐
Hjerteinfarkt før 60 års alder	☐	☐	☐	☐	☐	☐
Astma	☐	☐	☐	☐	☐	☐
Kreftsykdom	☐	☐	☐	☐	☐	☐
Diabetes (sukkersyke)	☐	☐	☐	☐	☐	☐

Hvis noen slektninger har diabetes, i hvilken alder fikk de diabetes (hvis for eks. flere søsken, før opp den som fikk det tidligst i livet):

Vet ikke, ikke aktuelt	Mors alder	Fars alder	Brors alder	Søsters alder	Barns alder
☐					

E3. PLAGER

Under finner du en liste over ulike problemer.
Har du opplevd noe av dette den siste uken (til og med i dag)?
(Sett ett kryss for hver linje)

	Ikke plaget	Litt plaget	Ganske mye	Veldig mye
Plutselig frykt uten grunn	☐	☐	☐	☐
Føler deg redd eller engstelig	☐	☐	☐	☐
Matthet eller svimmelhet	☐	☐	☐	☐
Føler deg anspent eller oppjaget	☐	☐	☐	☐
Lett for å klandre deg selv	☐	☐	☐	☐
Søvnproblemer	☐	☐	☐	☐
Nedtrykt, tungsindig	☐	☐	☐	☐
Følelse av å være unyttig, lite verd	☐	☐	☐	☐
Følelse av at alt er et slit	☐	☐	☐	☐
Følelse av håpløshet mht. framtida	☐	☐	☐	☐
	1	2	3	4

E4. TENNER, MUSKEL OG SKJELETT

Hvor mange tenner har du mistet/trukket? *Antall tenner*
(Se bort fra melketenner og visdomstenner)

Har du vært plaget med smerter og/eller stivhet i muskler og ledd i løpet av de siste 4 ukene?

	Ikke plaget	En del plaget	Alvorlig plaget
Nakke/skuldre	☐	☐	☐
Armer, hender	☐	☐	☐
Øvre del av ryggen	☐	☐	☐
Korsryggen	☐	☐	☐
Hofter, ben, føtter	☐	☐	☐
Andre steder	☐	☐	☐

Har du noen gang hatt:

	JA	NEI	Alder siste gang
Brudd i håndledd/underarm?	☐	☐	
Lårhalsbrudd?	☐	☐	

Har du falt i løpet av det siste året? *(Sett bare ett kryss)*

Nei	Ja, 1-2 ganger	Ja, mer enn 2 ganger
☐ 1	☐ 2	☐ 3

E5. MOSJON OG FYSISK AKTIVITET

Hvordan har din fysiske aktivitet vært det siste året?
Tenk deg et ukentlig gjennomsnitt for året.
Besvar begge spørsmålene.

	Timer pr. uke: Ingen	Under 1	1-2	3 og mer
Lett aktivitet *(ikke svett/andpusten)*	☐	☐	☐	☐
Hard fysisk aktivitet *(svett/andpusten)*	☐ 1	☐ 2	☐ 3	☐ 4

E6. VEKT

Anslå din vekt da du var 25 år gammel: hele kg

E7 UTDANNING

Hvor mange års skolegang har du gjennomført? *Antall år*
(Ta med alle år du har gått på skole eller studert)

E8 MAT OG DRIKKE

Hvor ofte spiser du vanligvis disse matvarene?
(Sett ett kryss for hver linje)

	Sjelden /aldri	1-3 g. pr.mnd	1-3 g. pr.uke	4-6 g. pr.uke	1-2 g. pr.dag	3 g. el. mer pr.dag
Frukt, bær	☐	☐	☐	☐	☐	☐
Ost *(alle typer)*	☐	☐	☐	☐	☐	☐
Poteter	☐	☐	☐	☐	☐	☐
Kokte grønnsaker	☐	☐	☐	☐	☐	☐
Rå grønnsaker/salat	☐	☐	☐	☐	☐	☐
Feil fisk *(f.eks. laks, ørret, makrell, sild)*	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

Bruker du kosttilskudd:	Ja, daglig	Iblant	Nei
Tran, trankapsler, fiskeoljekapsler	☐	☐	☐
Vitamin- og/eller mineraltilskudd	☐	☐	☐

Hvor mye drikker du vanligvis av følgende?
(Sett ett kryss for hver linje)

	Sjelden /aldri	1-6 glass pr.uke	1 glass pr.dag	2-3 glass pr.dag	4 glass el. mer pr.dag
Helmelk, kefir, yoghurt	☐	☐	☐	☐	☐
Lettmelk, cultura, lettyoghurt	☐	☐	☐	☐	☐
Skummet melk (sur/søt)	☐	☐	☐	☐	☐
Ekstra lettmelk	☐	☐	☐	☐	☐
Fruktjuice	☐	☐	☐	☐	☐
Vann	☐	☐	☐	☐	☐
Brus, mineralvann	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Hvor mange kopper kaffe og te drikker du daglig? *Antall kopper*
(Sett 0 for de typene du ikke drikker daglig)

Filterkaffe .....

Kokekaffe/trykkanne .....

Annen kaffe .....

Te .....

Omtrent hvor ofte har du i løpet av det siste året drukket alkohol? *(Lettøl og alkoholfritt øl regnes ikke med)*

Har aldri drukket alkohol ☐ 1	Har ikke drukket alkohol siste år ☐ 2	Noen få ganger siste år ☐ 3	Omtrent 1 gang i måneden ☐ 4
2-3 ganger pr. måned ☐ 5	ca. 1 gang i uka ☐ 6	2-3 ganger i uka ☐ 7	4-7 ganger i uka ☐ 8

Til dem som har drukket siste år:
Når du har drukket alkohol, hvor mange glass eller drinker har du vanligvis drukket? *Antall*

Omtrent hvor mange ganger i løpet av det siste året har du drukket så mye som minst 5 glass eller drinker i løpet av ett døgn? *Antall ganger*

E9 RØYKING

Hvor lenge er du vanligvis daglig tilstede i et røykfylt rom? *Antall hele timer*

	JA	NEI
Røykte noen av de voksne hjemme da du vokste opp?	☐	☐
Bor du, eller har du bodd, sammen med noen dagligrøykere etter at du fylte 20 år?	☐	☐

	Ja, nå	Ja, tidligere	Aldri
Har du røykt/røyker du daglig?	☐	☐	☐

Hvis du ALDRI har røykt daglig;
Hopp til spørsmål E11 (FUNKSJON OG TRYGGHET)

Hvis du røyker daglig nå, røyker du:	JA	NEI
Sigaretter?	☐	☐
Sigarer/sigarillos?	☐	☐
Pipe?	☐	☐

Hvis du har røykt daglig tidligere, hvor lenge er det siden du sluttet? *Antall år*

Hvis du røyker daglig nå eller har røykt tidligere:

Hvor mange sigaretter røyker eller røykte du vanligvis daglig? *Antall sigaretter*

Hvor gammel var du da du begynte å røyke daglig? *Alder i år*

Hvor mange år til sammen har du røykt daglig? *Antall år*

E10 FUNKSJON OG TRYGGHET

Ville du følt deg trygg ved å ferdes alene på kveldstid i nærområdet der du bor?

Ja	Litt utrygg	Svært utrygg
☐ 1	☐ 2	☐ 3

Når det gjelder forlighet, syn og hørsel, kan du:
(Sett ett kryss for hver linje)

	Uten problemer	Med litt problemer	Med store problemer	Nei
Gå en 5 minutters tur i noenlunde raskt tempo?	☐	☐	☐	☐
Lese vanlig tekst i aviser, evt. med briller?	☐	☐	☐	☐
Høre hva som blir sagt i en normal samtale?	☐ 1	☐ 2	☐ 3	☐ 4

Har du på grunn av varige helseproblemer vansker med å: *(Sett ett kryss for hver linje)*

	Ingen vansker	Noen vansker	Store vansker
Bevege deg rundt i egen bolig?	☐	☐	☐
Komme deg ut av boligen på egen hånd?	☐	☐	☐
Delta i foreningsliv eller andre fritidsaktiviteter?	☐	☐	☐
Bruke offentlige transportmidler?	☐	☐	☐
Utføre nødvendige daglige ærend?	☐	☐	☐

E11. BRUK AV HELSETJENESTER

Hvor mange ganger de siste 12 månedene har du selv brukt:
(Sett ett kryss for hver linje)

	Ingen	1-3 ganger	4 eller flere
Allmennpraktiserende lege	☐	☐	☐
Spesialist *(privat eller på poliklinikk)*	☐	☐	☐
Legevakt *(privat eller offentlig)*	☐	☐	☐
Sykehusinnleggelse	☐	☐	☐
Hjemmesykepleie	☐	☐	☐
Fysioterapeut	☐	☐	☐
Kiropraktor	☐	☐	☐
Kommunal hjemmehjelp	☐	☐	☐
Tannlege	☐	☐	☐
Alternativ behandler	☐	☐	☐

Er du trygg på at du kan få hjelp av helseog hjemmetjenesten hvis du trenger det?

JA	NEI	Vet ikke
☐ 1	☐ 2	☐ 3

E12. FAMILIE OG VENNER

Bor du: Hjemme? ☐ 1 Institusjon/bolellesskap? ☐ 2

Bor du sammen med:

	JA	NEI
Ektefelle/samboer?	☐	☐
Andre personer?	☐	☐

Hvor mange gode venner har du?
Regn med de du kan snakke fortrolig med og som kan gi deg hjelp når du trenger det. Tell ikke med de du bor sammen med, men ta med barn og andre slektninger.
Antall venner .....

Hvor stor interesse viser folk for det du gjør?
(Sett bare ett kryss)

Stor interesse	Noe interesse	Litt interesse	Ingen interesse	Usikkert
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Hvor mange foreninger, lag, grupper, kirkesamfunn e.l. deltar du i ?
(Skriv 0 hvis ingen)
Antall

E13. OPPVEKST OG TILHØRIGHET

Hvor lenge har du samlet bodd i fylket? ..... år

Hvor lenge har du samlet bodd i kommunen? ..... år

Hvor bodde du det meste av tiden før du fylte 16 år?
(Kryss av for ett alternativ og spesifiser)

Samme kommune ..... ☐ 1

Annen kommune i fylket ..... ☐ 2 Hvilken: _____

Annet fylke i Norge ..... ☐ 3 Hvilket: _____

Utenfor Norge ..... ☐ 4 Land: _____

Har du flyttet i løpet av de siste fem årene?

Nei	Ja, en gang	Ja, flere ganger
☐ 1	☐ 2	☐ 3

E14. BRUK AV MEDISINER

Med medisiner mener vi her medisiner kjøpt på apotek. Kosttilskudd og vitaminer regnes ikke med her.

Bruker du?
(Sett ett kryss for hver linje)

	Nå	Før, men ikke nå	Aldri brukt
Medisin mot høyt blodtrykk	☐	☐	☐
Kolesterolsenkende medisin	☐	☐	☐
Medisin mot osteoporose (benskjørhet)	☐	☐	☐
Insulin	☐	☐	☐
Tabletter mot sukkersyke	☐	☐	☐

Hvor ofte har du i løpet av de siste 4 ukene brukt følgende medisiner?
(Sett ett kryss for hver linje)

	Ikke brukt siste 4 uker	Sjeldnere enn hver uke	Hver uke, men ikke daglig	Daglig
Smertestillende uten resept	☐	☐	☐	☐
Smertestillende på resept	☐	☐	☐	☐
Sovemedisin	☐	☐	☐	☐
Beroligende medisin	☐	☐	☐	☐
Medisin mot depresjon	☐	☐	☐	☐
Annen medisin på resept	☐ 1	☐ 2	☐ 3	☐ 4

Angi navnet på de medisinene du bruker nå, og hva grunnen er til at du tar medisinene (sykdom eller symptom):
(Kryss av for hvor lenge du har brukt medisinen)

Navn på medisinen: (ett navn pr. linje):	Grunn til bruk av medisinen:	Hvor lenge har du brukt medisinen? Inntil 1 år	Ett år eller mer
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐

Dersom det ikke er nok plass her, kan du fortsette på eget ark som du legger ved.

E15. RESTEN AV SKJEMAET SKAL BARE BESVARES AV KVINNER

Hvor gammel var du da du fikk menstruasjon aller første gang?
Alder i år .....

Hvor gammel var du da menstruasjonen sluttet?
Alder i år .....

Hvor mange barn har du født?
Antall barn .....

Bruker du, eller har du brukt østrogenmedisin?

	Aldri	Før	Nå	*I antall år totalt*
Tabletter eller plaster	☐	☐	☐	
Krem eller stikkpiller	☐	☐	☐	

Hvis du bruker østrogen; hvilket merke bruker du nå?

Har du noen gang brukt P-pille?

JA	NEI
☐	☐

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Helse-
undersøkelsen

Personlig innbydelse

Ikke skriv her:

5.3 (Kommune) (Fylke) (Land)

9.3 (Virksomhet) 9.4 (Yrke) 14.7 (Merke)

1. EGEN HELSE

1.1 Hvordan er helsen din nå? *(Sett bare ett kryss)*

Dårlig	Ikke helt god	God	Svært god
☐ 1	☐ 2	☐ 3	☐ 4

1.2 Har du, eller har du hatt?:

	JA	NEI	Alder første gang
Astma	☐	☐	
Høysnue	☐	☐	
Kronisk bronkitt/emfysem	☐	☐	
Diabetes (sukkersyke)	☐	☐	
Benskjørhet (osteoporose)	☐	☐	
Fibromyalgi/kronisk smertesyndrom	☐	☐	
Psykiske plager som du har søkt hjelp for	☐	☐	
Hjerteinfarkt	☐	☐	
Angina pectoris (hjertekrampe)	☐	☐	
Hjerneslag/hjerneblødning	☐	☐	

	JA	NEI
1.3 Har du merket anfall med plutselig endring i pulsen eller hjerterytmen siste året?	☐	☐
1.4 Får du smerter eller ubehag i brystet når du:	JA	NEI
Går i bakker, trapper eller fort på flat mark?	☐	☐

1.5 Hvis du får slike smerter, pleier du da å:

Stoppe?	Saktne farten?	Fortsette i samme takt?
☐ 1	☐ 2	☐ 3

	JA	NEI
1.6 Dersom du stopper, forsvinner smertene da etter mindre enn 10 minutter?	☐	☐
1.7 Kan slike smerter oppstå selv om du er i ro?	☐	☐

2. MUSKEL OG SKJELETTPLAGER

2.1 Har du vært plaget med smerter og/eller stivhet i muskler og ledd i løpet av de siste 4 ukene?
(Varighet angis bare hvis du har hatt plager)

	Ikke plaget	En del plaget	Sterkt plaget	Varighet: Inntil 2 uker	Varighet: 2 uker eller mer
Nakke/skuldre	☐	☐	☐	☐	☐
Armer, hender	☐	☐	☐	☐	☐
Øvre del av ryggen	☐	☐	☐	☐	☐
Korsryggen	☐	☐	☐	☐	☐
Hofter, ben, føtter	☐	☐	☐	☐	☐
Andre steder	☐	☐	☐	☐	☐
	1	2	3	1	2

	JA	NEI	Alder siste gang
2.2 Har du noen gang hatt:			
Brudd i håndledd/underarm?	☐	☐	
Lårhalsbrudd?	☐	☐	

3. ANDRE PLAGER

3.1 Under finner du en liste over ulike problemer. Har du opplevd noe av dette den siste uken (til og med i dag)?
(Sett ett kryss for hver plage)

	Ikke plaget	Litt plaget	Ganske mye	Veldig mye
Plutselig frykt uten grunn	☐	☐	☐	☐
Føler deg redd eller engstelig	☐	☐	☐	☐
Matthet eller svimmelhet	☐	☐	☐	☐
Føler deg anspent eller oppjaget	☐	☐	☐	☐
Lett for å klandre deg selv	☐	☐	☐	☐
Søvnproblemer	☐	☐	☐	☐
Nedtrykt, tungsindig	☐	☐	☐	☐
Følelse av å være unyttig, lite verd	☐	☐	☐	☐
Følelse av at alt er et slit	☐	☐	☐	☐
Følelse av håpløshet mht. framtida	☐	☐	☐	☐
	1	2	3	4

4. BRUK AV HELSETJENESTER

4.1 Hvor mange ganger de siste 12 månedene har du selv brukt:
(Sett ett kryss for hver linje)

	Ingen	1-3 ganger	4 eller flere
Allmennpraktiserende lege	☐	☐	☐
Bedriftslege	☐	☐	☐
Psykolog eller psykiater *(privat eller på poliklinikk)*	☐	☐	☐
Annen spesialist *(privat eller på poliklinikk)*	☐	☐	☐
Legevakt *(privat eller offentlig)*	☐	☐	☐
Sykehusinnleggelse	☐	☐	☐
Hjemmesykepleie	☐	☐	☐
Fysioterapeut	☐	☐	☐
Kiropraktor	☐	☐	☐
Tannlege	☐	☐	☐
Alternativ behandler	☐	☐	☐

5. OPPVEKST OG TILHØRIGHET

5.1 Hvor lenge har du samlet bodd i fylket? år
(Sett 0 hvis mindre enn et halvt år)

5.2 Hvor lenge har du samlet bodd i kommunen? år
(Sett 0 hvis mindre enn et halvt år)

5.3 Hvor bodde du det meste av tiden før du fylte 16 år?
(kryss av for ett alternativ og spesifiser)

- ☐ 1 Samme kommune
- ☐ 2 Annen kommune i fylket — Hvilken: _____
- ☐ 3 Annet fylke i Norge — Hvilket: _____
- ☐ 4 Utenfor Norge — Land: _____

5.4 Har du flyttet i løpet av de siste fem årene?

Nei	Ja, en gang	Ja, flere ganger
☐ 1	☐ 2	☐ 3

6. VEKT

6.1 Anslå din vekt da du var 25 år gammel: hele kg

7. MAT OG DRIKKE

7.1 Hvor ofte spiser du vanligvis disse matvarene?
(Sett ett kryss pr. linje)

	Sjelden /aldri	1-3 g pr.mnd	1-3 g. pr.uke	4-6 g. pr.uke	1 2 g pr.dag	3 g el.mer pr.dag
Frukt, bær	☐	☐	☐	☐	☐	☐
Ost *(alle typer)*	☐	☐	☐	☐	☐	☐
Poteter	☐	☐	☐	☐	☐	☐
Kokte grønnsaker	☐	☐	☐	☐	☐	☐
Rå grønnsaker/salat	☐	☐	☐	☐	☐	☐
Feit fisk *(f.eks. laks, ørret, makrell, sild)*	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

7.2 Hva slags fett bruker du oftest? *(Sett ett kryss pr. linje)*

	Bruker ikke	Meieri-smør	Hard margarin	Myk/lett margarin	Olje	Annet
På brødet	☐	☐	☐	☐	☐	☐
I matlagingen	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

7.3 Bruker du følgende kosttilskudd:

	Ja, daglig	Iblant	Nei
Tran, trankapsler, fiskeoljekapsler?	☐	☐	☐
Vitamin- og/eller mineraltilskudd?	☐	☐	☐

7.4 Hvor mye drikker du vanligvis av følgende?
(Sett ett kryss pr. linje)

	Sjelden /aldri	1-6 glass pr.uke	1 glass pr.dag	2-3 glass pr.dag	4 glass el.mer pr.dag
Helmelk, kefir, yoghurt	☐	☐	☐	☐	☐
Lettmelk, cultura, lettyoghurt	☐	☐	☐	☐	☐
Skummet melk (sur/søt)	☐	☐	☐	☐	☐
Ekstra lettmelk	☐	☐	☐	☐	☐
Fruktjuice	☐	☐	☐	☐	☐
Vann	☐	☐	☐	☐	☐
Farris, Ramløsa e.l.	☐	☐	☐	☐	☐
Cola-holdig leskedrikk	☐	☐	☐	☐	☐
Annen brus/leskedrikk	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

7.5 Drikker du vanligvis brus/cola: Med sukker ☐ 1 Uten sukker ☐ 2

7.6 Hvor mange kopper kaffe og te drikker du daglig? *Antall kopper*
(Sett 0 for de typene du ikke drikker daglig)

Filterkaffe .....

Kokekaffe/trykkanne .....

Annen kaffe .....

Te .....

7.7 Omtrent hvor ofte har du i løpet av det siste året drukket alkohol?
(Lettøl og alkoholfritt øl regnes ikke med)

Har aldri drukket alkohol	Har ikke drukket alkohol siste år	Noen få ganger siste år	Omtrent 1 gang i månedon
☐ 1	☐ 2	☐ 3	☐ 4

2-3 ganger pr. måned	ca. 1 gang i uka	2-3 ganger i uka	4-7 ganger i uka
☐ 5	☐ 6	☐ 7	☐ 8

Til dem som har drukket siste år:

7.8 Når du har drukket alkohol, hvor mange glass eller drinker har du vanligvis drukket? *Antall*

7.9 Omtrent hvor mange ganger i løpet av det siste året har du drukket så mye som minst 5 glass eller drinker i løpet av ett døgn? *Antall ganger*

7.10 Når du drikker, drikker du da vanligvis: *(Sett ett eller flere kryss)*

Øl ☐ Vin ☐ Brennevin ☐

8. RØYKING

8.1 Hvor lenge er du vanligvis daglig tilstede i røykfylt rom? *Antall hele timer*

	JA	NEI
8.2 Røykte noen av de voksne hjemme da du vokste opp?	☐	☐
8.3 Bor du, eller har du bodd, sammen med noen dagligrøykere etter at du fylte 20 år?	☐	☐

	Ja, nå	Ja, tidligere	Aldri
8.4 Har du røykt/røyker du daglig?	☐	☐	☐

Hvis ALDRI: Hopp til spørsmål 9 (UTDANNING OG ARBEID)

	JA	NEI
8.5 Hvis du røyker daglig nå, røyker du:		
Sigaretter?	☐	☐
Sigarer/sigarillos?	☐	☐
Pipe?	☐	☐

8.6 Hvis du har røykt daglig tidligere, hvor lenge er det siden du sluttet? *Antall år*

8.7 Hvis du røyker daglig nå eller har røykt tidligere:

Hvor mange sigaretter røyker eller røykte du vanligvis daglig? *Antall sigaretter*

Hvor gammel var du da du begynte å røyke daglig? *Alder i år*

Hvor mange år til sammen har du røykt daglig? *Antall år*

9. UTDANNING OG ARBEID

9.1 Hvor mange års skolegang har du gjennomført? *Antall år*
(Ta med alle år du har gått på skole eller studert)

9.2 Er du i inntektsgivende arbeid?

Ja, full tid ☐ 1 Ja, deltid ☐ 2 Nei ☐ 3

9.3 Beskriv virksomheten på det arbeidsstedet (avdelingen) der du utførte inntektsgivende arbeid i lengst tid de siste 12 mnd. *(F.eks. regnskapsbyrå, ungdomsskole, barneavd. på sykehus, snekkerverksted, bilverksted, bank, dagligvarehandel e.l.)*

Virksomhet: _____

Hvis pensjonert, skriv tidligere hovedvirksomhet og yrke. Gjelder også 9.4

9.4 Hvilket yrke/tittel har eller hadde du på dette arbeidsstedet? *(F.eks. sekretær, lærer, industriarbeider, barnepleier, møbelsnekker, avdelingsleder, selger, sjåfør e.l.)*

Yrke: _____

9.5 Arbeider du i ditt hovedyrke som selvstendig, som ansatt eller som familiemedlem uten fast avtalt lønn?

Selvstendig ☐ Ansatt ☐ Familiemedlem ☐

	JA	NEI
9.6 Mener du at du står i fare for å miste ditt nåværende arbeid eller inntekt de nærmeste 2 årene?	☐	☐

	JA	NEI
9.7 Mottar du noen av følgende ytelser?		
Sykepenger (er sykmeldt)	☐	☐
Alderstrygd, førtidspensjon (AFP) eller etterlattepensjon	☐	☐
Rehabiliterings-/attføringspenger	☐	☐
Uførepensjon (hel eller delvis)	☐	☐
Dagpenger under arbeidsledighet	☐	☐
Sosialhjelp/-stønad	☐	☐
Overgangsstønad for enslige forsørgere	☐	☐

10. MOSJON OG FYSISK AKTIVITET

10.1 Hvordan har din fysiske aktivitet i fritiden vært det siste året?
Tenk deg et ukentlig gjennomsnitt for året.
Arbeidsvei regnes som fritid. Besvar begge spørsmålene.

	Timer pr. uke			
	Ingen	Under 1	1-2	3 og mer
Lett aktivitet *(ikke svett/andpusten)*	☐	☐	☐	☐
Hard fysisk aktivitet *(Svett/andpusten)*	☐ 1	☐ 2	☐ 3	☐ 4

10.2 Angi bevegelse og kroppslig anstrengelse i din fritid. Hvis aktiviteten varierer meget f.eks. mellom sommer og vinter, så ta et gjennomsnitt. Spørsmålet gjelder bare det siste året.
(Sett kryss i den ruta som passer best)

Leser, ser på fjernsyn eller annen stillesittende beskjeftigelse? ☐ 1

Spaserer, sykler eller beveger deg på annen måte minst 4 timer i uka? ☐ 2
(Her skal du også regne med gang eller sykling til arbeidsstedet, søndagsturer m.m.)

Driver mosjonsidrett, tyngre hagearbeid e.l.? ☐ 3
(Merk at aktiviteten skal være minst 4 timer i uka)

Trener hardt eller driver konkurranseidrett regelmessig og flere ganger i uka? ☐ 4

11. FAMILIE OG VENNER

11.1 Bor du sammen med:

	JA	NEI
Ektefelle/samboer?	☐	☐

11.2 Hvor mange gode venner har du? *Antall venner*

Regn med de du kan snakke fortrolig med og som kan gi deg hjelp dersom du trenger det. Tell ikke med de du bor sammen med, men ta med andre slektninger.

11.3 Hvor stor interesse viser folk for det du gjør?
(Sett bare ett kryss)

Stor interesse	Noe interesse	Litt interesse	Ingen interesse	Usikkert
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

11.4 Hvor mange foreninger, lag, grupper, kirkesamfunn e.l. deltar du i på fritiden? *Antall*
(Skriv 0 hvis ingen)

11.5 Føler du at du kan påvirke det som skjer i lokalsamfunnet der du bor? *(Sett bare ett kryss)*

Ja, i stor grad	Ja, en del	Ja, i liten grad	Nei	Har ikke forsøkt
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

12. SYKDOM I FAMILIEN

12.1 Har en eller flere av dine foreldre eller søsken hatt hjerteinfarkt (sår på hjertet) eller angina pectoris (hjertekrampe)?

	JA	NEI	VET IKKE
	☐	☐	☐

12.2 Kryss av for de slektningene som har eller har hatt noen av sykdommene: *(Sett kryss for hver linje)*

	Mor	Far	Bror	Søster	Barn	Ingen av disse
Hjerneslag eller hjerneblødning	☐	☐	☐	☐	☐	☐
Hjerteinfarkt før 60 års alder	☐	☐	☐	☐	☐	☐
Astma	☐	☐	☐	☐	☐	☐
Kreftsykdom	☐	☐	☐	☐	☐	☐
Diabetes (sukkersyke)	☐	☐	☐	☐	☐	☐

12.3 Hvis noen slektninger har diabetes, i hvilken alder fikk de diabetes (hvis for eks. flere søsken, før opp den som fikk det tidligst i livet):

Vet ikke, ikke aktuelt	Mors alder	Fars alder	Brors alder	Søsters alder	Barns alder
☐					

13. BRUK AV MEDISINER

Med medisiner mener vi her medisiner kjøpt på apotek. Kosttilskudd og vitaminer regnes ikke med her.

13.1 Bruker du?

	Nå	Før, men ikke nå	Aldri brukt
Medisin mot høyt blodtrykk	☐	☐	☐
Kolesterolsenkende medisin	☐	☐	☐

13.2 Hvor ofte har du i løpet av de siste 4 ukene brukt følgende medisiner? *(Sett ett kryss pr. linje)*

	Ikke brukt siste 4 uker	Sjeldnere enn hver uke	Hver uke, men ikke daglig	Daglig
Smertestillende uten resept	☐	☐	☐	☐
Smertestillende på resept	☐	☐	☐	☐
Sovemedisin	☐	☐	☐	☐
Beroligende medisin	☐	☐	☐	☐
Medisin mot depresjon	☐	☐	☐	☐
Annen medisin på resept	☐ 1	☐ 2	☐ 3	☐ 4

13.3 For de medisinene som du har krysset av for i pkt. 13.1 og 13.2, og som du har brukt i løpet av de siste 4 ukene:

Angi navnet og hvilken grunn det er til at du tar/har tatt disse (sykdom eller symptom):
(Kryss av for hvor lenge du har brukt medisinen)

Navn på medisinen: *(ett navn pr. linje):*	Grunn til bruk av medisinen:	Hvor lenge har du brukt medisinen? Inntil 1 år	Ett år eller mer
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐

Dersom det ikke er nok plass her, kan du fortsette på eget ark som du legger ved.

14. RESTEN AV SKJEMAET SKAL BARE BESVARES AV KVINNER

14.1 Hvor gammel var du da du fikk menstruasjon eller første gang? *Alder i år*

14.2 Hvis du ikke lenger får menstruasjon, hvor gammel var du da den sluttet? *Alder i år*

14.3 Er du gravid nå?

Ja	Nei	Usikker	Over fruktbar alder
☐ 1	☐ 2	☐ 3	☐ 4

14.4 Hvor mange barn har du født? *Antall barn*

14.5 Bruker du, eller har du brukt? *(Sett ett kryss for hver linje)*

	Nå	Før, men ikke nå	Aldri
P-pille/minipille/p-sprøyte	☐	☐	☐
Hormonspiral *(ikke vanlig spiral)*	☐	☐	☐
Østrogen *(tabletter eller plaster)*	☐	☐	☐
Østrogen *(krem eller stikkpiller)*	☐	☐	☐

14.6 Hvis du bruker/har brukt reseptpliktig østrogen:
Hvor lenge har du brukt dette? *Antall år*

14.7 Hvis du bruker p-pille, minipille, p-sprøyte, hormonspiral eller østrogen; hvilket merke bruker du?

IE 050000 - 1042-1 - 24.000 Beyer Hecos 02 01

Tilleggsspørsmål til helseundersøkelsen i Troms og Finnmark 2001-2002

Hovedformålet med Helseundersøkelsen er å skaffe ny kunnskap om hjerte-karsykdommer for å kunne forebygge dem. I tillegg skal undersøkelsen øke kunnskapen om kreftsykdommer og plager som f.eks allergier, smerter i muskulatur og nervøse lidelser. Vi ber deg derfor svare på noen spørsmål om forhold som kan ha betydning for risikoen for disse og andre sykdommer.
Skjemaet er en del av Helseundersøkelsen som er godkjent av Datatilsynet og forelagt Regional komité for medisinsk forskningsetikk. Svarene brukes bare til forskning og behandles strengt fortrolig.

Opplysningene kan senere bli sammenholdt med informasjon fra andre offentlige helseregistre etter de regler som Datatilsynet og Regional komité for medisinsk forskningsetikk gir.

Hvis du er i tvil om hva du skal svare, sett kryss i den ruten du synes passer best.

Det utfylte skjemaet sendes i vedlagte svarkonvolutt. Portoen er betalt. På forhånd takk for hjelpen!

Med vennlig hilsen
Institutt for samfunnsmedisin Statens helseundersøkelser
Universitetet i Tromsø

Hvis du ikke ønsker å besvare dette spørreskjemaet, sett kryss i ruten under og returner skjemaet. Da slipper du å bli purret på!

Jeg ønsker ikke å besvare spørreskjemaet ☐

Dato for utfylling:
Dag Måned År

T1. LOKALMILJØ OG BOLIG

1.1 I hvilken kommune bodde du da du fylte 1 år?
(Hvis du ikke bodde i Norge, oppgi hvilket land i stedet for kommune)

_____

1.2 Hvilken type bolig bor du i? *(Sett bare ett kryss)*

- Enebolig/villa ☐ 1
- Gårdsbruk ☐ 2
- Blokk/terrasseleilighet ☐ 3
- Rekkehus/2-4 mannsbolig ☐ 4
- Institusjon/omsorgsbolig ☐ 5
- Annen bolig ☐ 6

1.3 Hvor stor er din boenhet? *kvm (brutto)*

1.4 Er du plaget av: *(Sett ett kryss for hver linje)*

	Ikke plaget	En del plaget	Sterkt plaget
Fukt, trekk eller kulde i din bolig	☐	☐	☐
Andre former for dårlig inneklima	☐	☐	☐
Trafikkstøy (biltrafikk eller fly)	☐	☐	☐
Annen støy (bedrift, byggeplass e.l.)	☐	☐	☐
Nabostøy	☐	☐	☐
Dårlig drikkevann	☐	☐	☐
Luftforurensning fra trafikk	☐	☐	☐
Luftforurensning fra ved-, oljefyring, fabrikk e.l.	☐	☐	☐

1.5 Hvilket hjemmespråk hadde dine besteforeldre?
(Kryss av for ett eller flere alternativ)

	Norsk	Samisk	Kvensk/ finsk	Annet språk
Mormor	☐	☐	☐	☐
Morfar	☐	☐	☐	☐
Farmor	☐	☐	☐	☐
Farfar	☐	☐	☐	☐

T1. LOKALMILJØ OG BOLIG (forts.)

1.6 Hva regner du deg selv som?
(Kryss av for ett eller flere alternativ)

Norsk	Samisk	Kvensk/ finsk	Annet
☐	☐	☐	☐

1.7 Føler du at du har nok gode venner? JA ☐ NEI ☐

1.8 Hvor ofte tar du vanligvis del i foreningsvirksomhet som f.eks. syklubb, idrettslag, politiske lag eller andre foreninger?
(Sett bare ett kryss)

- Aldri, eller noen få ganger i året ☐ 1
- 1-3 ganger i måneden ☐ 2
- Omtrent 1 gang i uken ☐ 3
- Mer enn en gang i uken ☐ 4

T2. LØNNET OG ULØNNET ARBEID

2.1 Hvis du er i lønnet eller ulønnet arbeid, hvordan vil du beskrive ditt arbeid? *(Sett bare ett kryss)*

- For det meste stillesittende arbeid? *(f.eks. skrivebordsarbeid, montering)* ☐ 1
- Arbeid som krever at du går mye? *(f.eks. ekspedilørarb., lett industriarb., undervisning)* ☐ 2
- Arbeid hvor du går og løfter mye? *(f.eks. postbud, pleier, bygningsarbeider)* ☐ 3
- Tungt kroppsarbeid? *(f.eks. skogsarb., tungt jordbruksarb., tungt bygn.arb.)* ☐ 4

2.2 Kan du <u>selv</u> bestemme hvordan arbeidet ditt (lønnet eller ulønnet) skal legges opp? *(Sett bare ett kryss)*

- Nei, ikke i det hele tatt ☐ 1
- I liten grad ☐ 2
- Ja, stort sett ☐ 3
- Ja, det bestemmer jeg selv ☐ 4

2.3 Har du skiftarbeid, nattarbeid eller går vakter? JA ☐ NEI ☐

T3. TOBAKK

3.1 Røyker du?

Ja, daglig ☐ 1 | Ja, av og til ☐ 2 | Nei, aldri ☐ 3

Hvis "Ja, av og til", Hva røyker du?

☐ Sigaretter ☐ Pipe ☐ Sigar/sigarillos

3.2 Har du brukt, eller bruker du snus daglig?

Ja, nå ☐ | Ja, tidligere ☐ | Aldri ☐

Hvis JA:
Hvor mange år har du til sammen brukt snus? ____ år

T4. ALKOHOL

	JA	NEI
4.1 Er du totalavholdsmann/-kvinne?	☐	☐

4.2 Hvor mange ganger i måneden drikker du vanligvis alkohol? ____ *Antall ganger*
(Regn ikke med lettøl.
Sett 0 hvis mindre enn 1 gang i måneden)

4.3 Hvor mange glass øl, vin eller brennevin drikker du vanligvis i løpet av 2 uker?

Øl	Vin	Brennevin

(Regn ikke med lettøl.
Sett 0 hvis du ikke drikker alkohol)

4.4 I omtrent hvor mange år har ditt alkoholforbruk vært slik du har svart i spørsmålene over? ____ år

4.5 Har du i en eller flere perioder de siste 5 årene drukket så mye alkohol at det har hemmet deg i yrkeslivet eller sosialt?

Ja, i yrkeslivet ☐ 1 | Ja, sosialt ☐ 2 | Ja, både i yrkeslivet og sosialt ☐ 3 | Nei, aldri ☐ 4

T5. MAT OG KOSTTILSKUDD

	JA	NEI
5.1 Spiser du vanligvis frokost hver dag?	☐	☐

5.2 Hvor mange ganger i uken spiser du varm middag? ____ *ganger*

5.3 Hvor stor vekt legger du på å ha et sunt kosthold?

Stor ☐ 1 | Middels ☐ 2 | Liten ☐ 3 | Ingen ☐ 4

5.4 Bruker du følgende kosttilskudd?

	Ja, daglig	Iblant	Nei
Jerntabletter	☐	☐	☐
Kalk eller benmel	☐	☐	☐
Vitamin D	☐	☐	☐
Tran	☐	☐	☐

T6. VEKTEN

6.1 Gjør du for tiden noe forsøk på å endre kroppsvekten din?

Nei ☐ 1 | Ja, jeg forsøker å legge på meg ☐ 2 | Ja, jeg forsøker å slanke meg ☐ 3

6.2 Hvilken vekt vil du være tilfreds med (din "trivselsvekt")? ____ kg

T7. SYKDOMMER OG SKADER

7.1 Har du noen gang hatt:
Sett ett kryss for hvert spørsmål. Oppgi også alderen ved hendelsen. Hvis det har skjedd flere ganger, hvor gammel var du siste gang?

	JA	NEI	Alder siste gang
Alvorlig skade som førte til sykehusinnleggelse	☐	☐	____ år
Ankelbrudd	☐	☐	____ år
Magesår	☐	☐	____ år
Magesår-operasjon	☐	☐	____ år
Operasjon på halsen	☐	☐	____ år
Prostata-operasjon	☐	☐	____ år

7.2 Har du, eller har du hatt?
(Sett ett kryss for hvert spørsmål)

	JA	NEI
Kreftsykdom	☐	☐
Psoriasis	☐	☐
Stoffskiftesykdom (skjoldbruskkjertel)	☐	☐
Grønn stær	☐	☐
Grå stær	☐	☐
Slitasjegikt (artrose)	☐	☐
Krokete fingre	☐	☐
Hudstramninger i håndflatene	☐	☐
Nyrestein	☐	☐
Blindtarmsoperasjon	☐	☐
Brokkoperasjon	☐	☐
Operasjon/behandling for urinlekkasje	☐	☐
Epilepsi	☐	☐
Poliomyelitt ("Polio")	☐	☐
Parkinsons sykdom	☐	☐
Migrene	☐	☐
Leggsår	☐	☐
Allergi og overfølsomhet:	JA	NEI
Atopisk eksem (f.eks. barneeksem)	☐	☐
Håndeksem	☐	☐
Matvareallergi	☐	☐
Annen overfølsomhet (ikke allergi)	☐	☐

	JA	NEI
7.3 Har du hatt forkjølelse, influensa, "ræksjuka" eller lignende siste 14 dager?	☐	☐
7.4 Har du i løpet av de siste 3 ukene vært forkjølet, hatt influensa, bronkitt, lungebetennelse, bihulebetennelse eller annen luftveisinfeksjon?	☐	☐
7.5 Har du noen gang hatt bronkitt eller lungebetennelse?	☐	☐

7.6 Har du i løpet av de siste 2 årene hatt bronkitt eller lungebetennelse? *(Sett bare ett kryss)*

Nei ☐ 1 | 1-2 ganger ☐ 2 | Mer enn 2 ganger ☐ 3

T8. SYMPTOMER

8.1 Har du de siste to ukene følt deg: *(Sett ett kryss for hvert spørsmål)*

	Nei	Litt	En god del	Svært mye
Nervøs og urolig	☐	☐	☐	☐
Plaget av angst	☐	☐	☐	☐
Trygg og rolig	☐	☐	☐	☐
Irritabel	☐	☐	☐	☐
Glad og optimistisk	☐	☐	☐	☐
Nedfor/deprimert	☐	☐	☐	☐
Ensom	☐ 1	☐ 2	☐ 3	☐ 4

	JA	NEI
8.2 Hoster du omtrent daglig i perioder av året?	☐	☐
Hvis JA: Er hosten vanligvis ledsaget av oppspytt?	☐	☐
Har du hatt slik hoste så lenge som i en 3 måneders periode i begge de to siste år?	☐	☐
8.3 Har du hatt episoder med piping i brystet?	☐	☐
Hvis JA: Har dette oppstått: *(Sett ett kryss for hvert spørsmål)*	JA	NEI
Om natten	☐	☐
Ved luftveisinfeksjon	☐	☐
Ved fysisk anstrengelse	☐	☐
Ved sterk kulde	☐	☐
8.4 Får du smerter i tykkleggen når du går	☐	☐

Hvis JA:
Hvor langt kan du gå før du får smerter? ..... *meter*

8.5 Blir du tungpusten i følgende situasjoner? *(Sett ett kryss for hvert spørsmål)*

	JA	NEI
Når du går hurtig på flatmark eller svak oppoverbakke	☐	☐
Når du spaserer i rolig tempo på flatmark	☐	☐
Når du vasker deg eller kler på deg	☐	☐
Når du er i hvile	☐	☐
8.6 Må du stoppe på grunn av tung pust når du går i eget tempo på flatmark?	☐	☐
8.7 Har du i løpet av det siste året vært plaget med smerter og/eller stivhet i muskler og ledd som har vart i minst 3 måneder sammenhengende?	☐	☐
Hvis JA: Har plagene ført til redusert aktivitet i fritida?	☐	☐

Hvor lenge har plagene vart totalt?

ca. *år og* *måneder*

Har plagene redusert din arbeidsevne det siste året? *(Gjelder også hjemmearbeidende og pensjonister. (Sett ett kryss)*

Nei/Ubetydelig	I noen grad	I betydelig grad	Vet ikke
☐ 1	☐ 2	☐ 3	☐ 4

	JA	NEI	Ikke i arbeid
Har du vært sykmeldt pga. disse plagene det siste året?	☐	☐	☐

T8. SYMPTOMER (fortsettelse)

8.8 Hvor ofte er du plaget av søvnløshet? *(Sett bare ett kryss)*

- Aldri, eller noen få ganger i året ☐ 1
- 1-3 ganger i måneden ☐ 2
- Omtrent 1 gang i uken ☐ 3
- Mer enn en gang i uken ☐ 4

8.9 Hvis du er plaget av søvnløshet månedlig eller hyppigere, når på året er du mest plaget?

- Ingen spesiell tid ☐ 1
- Særlig i mørketiden ☐ 2
- Særlig i midnattsoltiden ☐ 3
- Særlig vår og høst ☐ 4

	JA	NEI
8.10 Har du det siste året vært plaget av søvnløshet slik at det har gått ut over arbeidsevnen?	☐	☐
8.11 Pleier du sove om dagen?	☐	☐

8.12 Hvor ofte har du ufrivillig urinlekkasje?

- Aldri ☐ 1
- Ikke mer enn en gang i måneden ☐ 2
- To eller flere ganger i måneden ☐ 3
- Ukentlig eller oftere ☐ 4

	JA	NEI
8.13 Kan du gå ned 10 trappetrinn uten å holde deg i noe (f.eks. et gelender)	☐	☐
8.14 Bruker du briller?	☐	☐
8.15 Bruker du høreapparat?	☐	☐

8.16 Hvordan er hukommelsen? *(Sett ett kryss for hvert spørsmål)*

	JA	NEI
Glemmer du ting du akkurat har hørt eller lest?	☐	☐
Glemmer du hvor du har lagt ting?	☐	☐
Er det vanskeligere å huske nå enn før?	☐	☐
Skriver du huskelapper oftere nå enn før?	☐	☐
Hvis "JA" på ett av disse spørsmålene; Er det et problem i hverdagen?	☐	☐

T9. MEDISINER

9.1 Bruker du, eller har du brukt noen av følgende medisiner:

	Nå	Før, men ikke nå	Alder ved bruk 1. gang	Aldri brukt
Medisin mot osteoporose (benskjørhet)	☐	☐	år	☐
Tabletter mot sukkersyke	☐	☐	år	☐
Tabletter mot lavt stoffskifte (thyroxin)	☐	☐	år	☐

	JA	NEI
9.2 Bruker du noen medisin som du får som sprøyte (injeksjon)?	☐	☐

Hvis JA:
Oppgi navn på medisinen (til sprøyte): *(ett navn pr. linje):*

T

_____

_____

T10. SYKDOM I FAMILIEN

10.1 Kryss av for de slektningene som har eller har hatt noen av sykdommene: *(Sett kryss for hver linje)*

	Mor	Far	Bror	Søster	Barn	Ingen av disse
Hjerteinfarkt (sår på hjertet)	☐	☐	☐	☐	☐	☐
Angina pectoris (hjertekrampe)	☐	☐	☐	☐	☐	☐
Høyt blodtrykk	☐	☐	☐	☐	☐	☐
Utvidet hovedpulsåre i magen	☐	☐	☐	☐	☐	☐
Mage-/tolvfingertarm-sår	☐	☐	☐	☐	☐	☐
Lårhalsbrudd	☐	☐	☐	☐	☐	☐
Psykiske plager	☐	☐	☐	☐	☐	☐
Allergi	☐	☐	☐	☐	☐	☐
Slitasjegikt (artrose)	☐	☐	☐	☐	☐	☐
Aldersdemens	☐	☐	☐	☐	☐	☐

10.2 Hvor mange søsken og barn har du?

	Brødre	Søstre	Barn
Antall			

10.3 Fører sykdom e.l. hos noen i nær familie til at du vanligvis utfører ekstra omsorgsarbeid?

Ja, stor sett daglig ☐ 1 Ja, av og til ☐ 2 Nei ☐ 3

10.4 Har du/din familie hjemmehjelp eller hjemmesykepleie? ..... JA ☐ NEI ☐

	JA	NEI	Evt. alder ved død
10.5 Lever din mor?	☐	☐	..... år
10.6 Lever din far?	☐	☐	..... år

T11. MOBILTELEFON

11.1 Disponerer du (eier, leier e.l.) mobiltelefon?

Ja, hele tiden ☐ 1 Ja, av og til ☐ 2 Nei ☐ 3

Hvis JA:
Hva bruker du mobiltelefonen til, og hvor ofte bruker du den? *(Sett ett kryss for hver linje)*

	Antall ganger per døgn				
	30 eller flere	10-29	2-9	1 eller mindre	Aldri
Samtaler	☐	☐	☐	☐	☐
Tekstmeldinger	☐	☐	☐	☐	☐
	1	2	3	4	5

T12. RESTEN BESVARES BARE AV KVINNER

12.1 Hvis du har født barn, fyll ut hvert barns fødselsår, og hvor mange måneder du ammet etter fødselen.

(Hvis du ikke ammet, skriv 0)

Barn:	*Fødselsår:*	*Antall mnd med amming:*
1. barn		
2. barn		
3. barn		
4. barn		
5. barn		
6. barn		

(Hvis flere barn, bruk ekstra ark)

T12. RESTEN BESVARES BARE AV KVINNER

12.2 Hvis du fremdeles har menstruasjon eller er gravid: Hvilken dato startet din siste menstruasjon?

Dag ..... Måned ..... År .....

12.3 Hvis du ikke lenger har menstruasjon; hvorfor mistet du menstruasjonen? *(Sett ett kryss)*

Den stoppet av seg selv ☐ 1
Operasjon på livmoren ☐ 2
Opererte bort begge eggstokkene ☐ 3
Annen grunn (f.eks. stråling, cellegift-behandling) ☐ 4

12.4 Bruker du eller har du brukt reseptpliktig østrogen (tabletter eller plaster)? JA ☐ NEI ☐

Hvis JA:
Hvor gammel var du da du begynte med østrogen? ..... år

Hvis du har sluttet å bruke østrogen, Hvor gammel var du da du sluttet med østrogen? ..... år

12.5 Bruker du eller har du brukt p-piller? .. JA ☐ NEI ☐

Hvis JA:
Hvor gammel var du da du begynte med p-piller? ..... år

Hvor mange år har du til sammen brukt p-piller? .....*Antall år*

Dersom du har født:
Hvor mange år brukte du p-piller før første fødsel? .....*Antall år*

Hvis du sluttet å bruke p-piller:
Hvor gammel var du da du sluttet? ..... år

12.6 Når du ser bort fra svangerskap og barselsperiode, har du noen gang vært blødningsfri i minst 6 måneder? JA ☐ NEI ☐

Hvis JA:
Hvor mange ganger? ..... *ganger*

12.7 Hvordan er blødningsforholdene for deg nå?

Jeg har ikke hatt blødninger det siste året ☐ 1
Jeg har regelmessige blødninger ..... ☐ 2
Jeg har uregelmessige blødninger ..... ☐ 3

12.8 Da du var i 25-29 årsalderen, hvor mange dager var det vanligvis mellom starten på to blødninger?

Minimum	Maksimum	Vet ikke
dager	*dager*	☐

Pågikk selve blødningen omtrent like mange dager hver gang? ..... JA ☐ NEI ☐

Hvor mange dager varte en typisk menstruasjonsblødning? ..... *dager*

Takk for hjelpen!
Husk å postlegge skjemaet i dag!

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Appendix 4
International Classification of disease, ninth and tenth revision

Main ICD- 9 codes

275.0	Hereditary haemochromatosis
482	Bacterial pneumonia
e.g 482.9	Pneumonia unspecified
490	Bronchitis
571. 0-9	Chronic liver disease and cirrhosis
573. 0-9	Other disorders of liver
e.g 573.3	Hepatitis, toxcis
584	Acute renal failure
e.g 584.9	Renal failure, acute, unspecified

ICD-10 code

E 83.1	Hereditary haemochromatosis

Appendix 5
Geographic areas in SAMINOR

Inland areas; municipalities and smaller districts

Røros (Brekken district)
Snåsa (Vinje district)
Røyrvik
Namskogan (Trones og Furuly districts)
Narvik (Vassdalen district)
Grane (Majavatn district)
Hattfjelldal (Hattfjelldal district)
Kautokeino
Karasjok
Tana (Sirma, Polmak, Tana Bru og Alleknjarg districts)

Coast areas; municipalities and smaller districts

Tysfjord
Evenes
Skånland
Lavangen
Lyngen
Storfjord
Kåfjord
Kvænangen
Alta
Loppa
Kvalsund
Porsanger
Lebesby
Nesseby
Tana (Austre Tana og Boftsa districs)

Paper I

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ORIGINAL ARTICLE

Iron status in a multiethnic population (age 36–80 yr) in northern Norway: the SAMINOR study

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Abstract

Objectives: Northern Norway consists of a multiethnic population of Sámi and non-Sámi. We evaluated iron status in these two groups with respect to gender, age and residence. *Methods:* In 2002–2004, a cross-sectional study of health and living conditions in areas with both Sámi and Norwegian populations, SAMINOR, was performed in northern Norway. In total, 16 538 men and women between the age of 36 and 79 yr, participated. Response rate was 60.9%. Information about ethnic belonging, s-ferritin and transferrin saturation were available in 14 873 persons (54.8% of the invited sample). A questionnaire delivered at attendance had several questions on family background language and self-perceived ethnicity. *Results:* Sámi men and women living in the inland areas had significantly higher mean s-ferritin than non-Sámi living in the same area ($P < 0.0001$). The inland Sámi also had significantly higher s-ferritin than the coastal Sámi and non-Sámi populations, both genders ($P < 0.013$). S-ferritin increased with increasing age for all women, while the opposite was true for men. Lifestyle factors had impact on s-ferritin level. Also mean transferrin saturation was higher at the inland residents but significant only for the male participants. *Conclusion:* The results from our analyses indicate that individuals living at the inland areas have higher s-ferritin and transferrin saturation than the coastal population. There were also differences in iron levels between Sámi and non-Sámi groups at the inland areas. Iron levels are influenced by lifestyle factors. The observed differences in iron levels might therefore be explained by nutritional habits.

Key words ferritin; transferrin saturation; iron status; Sámi; Norwegian; epidemiology

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The Norwegian government has ratified the Sámi as the indigenous people in Norway (1). The Sámi live in the northern regions of Fennoscandia in what today comprises the northern area of Norway, Sweden, Finland and Russia's Kola Peninsula. No exact overview over the total number of Sámi exists. The size of the Sámi population has been reckoned to be approximately 75 000–100 000, but estimates vary in accordance with criteria used such as genetic heritage, mother tongue and sense of belonging to the Sámi. In Norway, research to understand health issues specifically for the Sámi peoples has been lacking. This situation is now changing.

Iron deficiency is one of the most severe and important nutritional deficiencies in the world today, both in industrialised as well as developing countries (2–4). In normal subjects, the total daily loss of iron is balanced by an equivalent amount of iron absorbed from the diet. When this equilibrium is disturbed, iron deficiency or overload is established. Iron deficiency is caused by several factors such as menstrual losses in fertile women, occult bleeding or a diet low in iron (5). Iron deficiency affects several body functions even when anaemia has not developed (6). Immune status and morbidity of all age groups are adversely affected by iron deficiency. On the other hand, iron overload can cause organ damage in severe cases (7). Inheritance e.g. hereditary haemochromatosis, thalassaemia major and blood transfusion can cause severe iron accumulation.

In Norway, iron has been added to food products since 1972. In 2002, this supplementation was removed because of concerns about iron overload in that part of the population with hereditary haemochromatosis. Recent data describing the iron status in a Norwegian population has not been collected. Our study in northern Norway, with focus on different ethnic categories, is therefore the first to clarify iron status in a Sámi vs. non-Sámi population.

The aim of this study was i) to evaluate the iron status in an ethnically diverse population in northern Norway, with focus on geographic residence and ethnicity and ii) investigate whether iron status was influenced by lifestyle.

Material

A cross-sectional population-based study of health and living conditions in areas with a mixed Sámi and non-Sámi population, the SAMINOR study, was carried out in Mid- and northern Norway in 2003–2004. The SAMINOR study was the responsibility of the Centre for Sámi Health Research, Institute of Community Medicine at the University of Tromsø, in collaboration with the National Screening Program for Cardiovascular Diseases, SHUS, now incorporated into the National Institute of Public Health. The material was collected from January 2003 to April 2004. The study is described in detail by Lund *et al.* (8).

Subjects

In total, 16 538 men and women aged 36–79 yr participated in the SAMINOR study and gave informed consent to medical research, a response rate of 60.9%. Participation rates at the coast and in inland areas were 59.6% and 65.5% respectively. More women than men participated in the survey, 65.6% vs. 56.6%. In total, 15 612 contributed with blood samples and gave consent to their blood being used in medical research. Information about ethnic belonging, s-ferritin and transferrin saturation were available in 14 873 persons (54.8% of the invited sample). Sámi affiliation was reported in 5141 people (35%).

Screening

Body weight (in kg, one decimal) and height (in cm, one decimal) was measured with electronic height and weight Scales. Body mass index (BMI) was based on measurements of weight and height, and calculated as body weight in kg/body height in m^2.

Non-fasting blood samples were obtained at admission. Blood samples were drawn by venopuncture at normal venous pressure in sitting position. Serum was separated immediately and s-ferritin, s-iron and transferrin were measured directly. S-ferritin was measured on a Hitachi Modular P analyser from Roche Diagnostics, Mannheim, Germany. All reagents were purchased from the same company. S-ferritin was measured with a turbidimetric assay, and calibrated using Cfas Proteins catalogue no 1661400 with several Lot numbers in the period 2003–2004. In an effort to harmonise s-ferritin levels within Norway at the time, the laboratory used a factor of 0.76 in the period of August 2002–November 2003, a factor of 0.79 in the period of November 2003–February 2004 and, a factor of 0.75 in the period of February 2004–January 2004. The Cfas Protein catalogue no 1355279 is calibrated against the WHO International Ferritin Standard. The ferritin method is standard against NIBSC Reagents for ferritin (human spleen – 80/578). CV inter-assay was 4.2%. CV intra-assay, 3.9%.

Transferrin was reported in g/L, and serum TIBC (total iron binding capacity) was calculated as s-TIBC μmol/L = 25.1× s-transferrin. Transferrin saturation (%) was calculated as 100× (serum-iron/TIBC).

Moderate iron overload is defined as s-ferritin > 500 μg/L and transferrin saturation > 60% according to the haemochromatosis action programme by the Norwegian Society of Haematology (9). Severe iron overload is defined as s-ferritin > 1000 μg/L and transferrin saturation > 70%. Iron depletion is defined as s-ferritin < 13 μg/L, which is corresponding to the WHO standard and earlier surveys (3, 10, 11).

C-reactive protein (CRP) concentrations were measured with a turbidimetric assay. The method was standardised against 470 (RPPHS – reference preparation for proteins in human serum).

Consumption of alcohol

The questionnaire contained eight questions about how frequently alcohol was consumed. We chose to merge the answers into three categories in the analysis: 'abstainer/-not this year', 'seldom to once a week' and 'two or more times a week'.

Smoking habit

Questions about smoking habits were divided into three categories: 'daily smoker', 'former smoker' and 'never smoked'.

Ethnicity

We performed stratified analyses for i) Sámi I (Sámi language for three generations); ii) Sámi II (at least one

Sámi indicator, language or ethnicity); and iii) the remaining population, non-Sámi. Each of these groups was divided into inland and coastal domiciles.

Ethics

The study was accredited by the Regional Board of Research Ethics in northern Norway and is in accordance with the Helsinki Declaration of 1975. The National Data Protection Authority (Datatilsynet) gave approval for storing of individuals' information and for later linkages.

Statistical analyses

Analyses were stratified for gender, ethnic groups and geographic residences. The Sharpiro–Wilk test was utilised to examine the normal distribution of data. Distributions for s-ferritin showed positive skewness, therefore s-ferritin values were logarithmically transformed and hence replaced by log e (ferritin). S-ferritin values were log – normally distributed. Transferrin saturation was normally distributed.

S-ferritin was presented as geometric mean and corresponding 95% confidence interval. Transferrin saturation was presented as mean and corresponding 95% confidence interval. Analyses of variance (ANOVA) were used to test for differences in iron levels between geographic residences, adjusted for age groups and ethnicity. Correlation between CRP and s-ferritin was assessed by Pearson's correlation coefficient (r). S-ferritin was the dependent variable in a predefined multiple regression model and analyses were performed separately for each gender.

We used the SAS statistical software package version 9.1 (SAS Institute Inc., Cary, NC, USA).

Results

Table 1 shows sex-specific characteristics at screening, stratified for the different ethnic groups and geographic areas. For men, daily smoking was most pronounced among the Sámi I group both in the inland and at the coast, about 36% and 34%, respectively. Consumption of alcohol was more common among non-Sámi individuals compared with the Sámi I group. Moreover,

Table 1 Age, BMI, prevalence of smoking and alcohol consumption in men and women stratified for ethnicity and geographic residences. The SAMINOR survey (n = 14 873)[1]

	Inland			Coast		
	Sámi I	Sámi II	Non-Sámi	Sámi I	Sámi II	Non-Sámi
Men (n)	452	217	690	365	1430	4001
Age (yr)[2]	54 [54–55]	52 [51–53]	56 [56–57]	59 [58–60]	55 [54–55]	54 [54–55]
BMI (kg/m^2)[2,3]	28 [28–28]	29 [28–29]	28 [28–28]	28 [27–28]	28 [27–28]	28 [27–28]
Smoking habit in percent[4]						
Daily smoker	36.0	30.7	21.5	34.2	32.4	32.3
Former smoker	40.5	36.0	42.1	41.7	41.4	40.4
Never smoked	23.5	33.3	36.5	24.1	26.2	27.3
Alcohol consumption in percent[4]						
Abstainer/not this year	18.3	8.9	7.3	20	11.5	9.8
Seldom to once a week	75.6	77.8	80.7	74.4	76.6	75.5
>Two times weekly	6.1	13.3	12.0	5.6	11.9	14.7
Women (n)	516	218	793	329	1405	4457
Age (yr)[2]	54 [53–55]	52 [50–53]	55 [54–56]	58 [57–59]	54 [53–54]	54 [54–55]
BMI (kg/m^2)[2,3]	29 [29–30]	28 [27–28]	28 [28–28]	28 [28–29]	28 [28–28]	27 [27–27]
Smoking habit in percent[4]						
Daily smoker	28.1	37.1	24.7	29.0	35.2	32.6
Former smoker	25.5	27.4	25.3	30.8	32.1	31.5
Never smoked	46.4	35.5	50.0	40.2	32.7	35.9
Alcohol consumption in percent[4]						
Abstainer/not this year	43.8	24.1	17.2	41.9	22.2	18.5
Seldom to once a week	54.9	69	77	56.6	72.6	72.5
>Two times weekly	1.3	6.9	5.9	1.6	5.2	9

[1] Subgroups may not total to 14 873, due to missing values.
[2] Mean [95% confidence interval].
[3] Body mass index (kg/m^2).
[4] Per cent of participants.

Table 2 S-ferritin in 14 873 participants in SAMINOR survey in northern Norway.

S-ferritin (µg/L)							
	Inland			Coast			
	Sámi I	Sámi II	Non-Sámi	Sámi I	Sámi II	Non-Sámi	*P*-value[1]
Men (*n*)	452	217	690	365	1430	4001	
Age (yr)							
36–39	157 [129–191]	129 [106–158]	119 [98–145]	121 [93–158]	98 [88–109]	111 [105–118]	<0.0001
40–49	148 [131–169]	117 [98–139]	128 [116–141]	100 [79–127]	108 [101–115]	107 [103–111]	
50–59	136 [121–152]	124 [100–154]	122 [110–136]	104 [93–116]	108 [101–115]	107 [103–111]	
60–69	108 [92–126]	109 [77–155]	95 [83–107]	79 [67–95]	80 [73–88]	87 [83–92]	
70–79	88 [67–116]	77 [52–114]	70 [60–82]	67 [55–81]	66 [58–77]	63 [59–69]	
P-value[2]	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
Women (*n*)	516	218	793	329	1405	4457	
Age (yr)							
36–39	30 [23–38]	43 [35–52]	26 [21–32]	24 [15–38]	26 [23–30]	28 [26–30]	0.0019
40–49	35 [31–40]	28 [23–34]	30 [26–34]	25 [21–31]	26 [24–29]	26 [25–28]	
50–59	61 [53–70]	52 [42–65]	49 [44–55]	51 [43–60]	51 [47–55]	50 [48–52]	
60–69	97 [84–111]	74 [57–95]	62 [56–69]	72 [60–86]	59 [54–65]	61 [58–64]	
70–79	79 [63–99]	39 [24–65]	56 [47–66]	58 [46–73]	46 [41–52]	55 [51–59]	
P-value[2]	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	

Values are presented as mean [95% confidence interval].
[1] Test for differences between geographic areas adjusted for age and ethnicity.
[2] Test for differences between age groups.

women in general drank less than men in all ethnic categories (<0.0001).

Population distribution of s-ferritin and transferrin saturation

Both mean s-ferritin and mean transferrin saturation were significantly higher for men than for women independent of ethnic affiliation. Mean s-ferritin levels by age group, ethnicity and geographic category (both genders) are shown in Table 2. Regardless of ethnicity, s-ferritin levels for men, declined with advancing age after the 60th yr of age. In contrast to the male participants, s-ferritin increased significantly between the ages of 50 and 70 yr for women. After the 70th yr of age s-ferritin levels also decreased in women.

Transferrin saturation showed less variation than s-ferritin both among men and women. Age groups are therefore merged into two groups, before and after the age of 50 (Table 3). However, significant differences in mean transferrin saturation between geographic areas were demonstrated in both genders, adjusted for age and ethnicity.

Iron overload

Moderate iron overload was shown in two men at the inland and eight men at the coast. One woman at the inland had moderate overload and none at the coast. S-ferritin >1000 µg/L was found in six men, between the ages of 41 and 57 yr. Three of these participants had transferrin saturation higher than 70%. One woman, aged 76 yr, was observed with s-ferritin 1014 µg/L and transferrin saturation 33%.

Iron depletion

Figure 1 present the prevalence of depleted iron stores for men and women according to ethnicity and geographic residence. The prevalence of iron depletion was in general low in the male population. Women had higher prevalence of iron depletion than men. Differences between groups are small when stratified for gender, ethnicity and geographic residence.

CRP

In total, seven men (0.09%) and five women (0.06%) had CRP >100. None of them had s-ferritin >300 µg/L. The linear association between CRP and s-ferritin was weak but significant ($r = 0.06$, $P < 0.0001$). All seven individuals with s-ferritin >1000 µg/L had CRP < 10.

Other elements that influence iron levels

Table 4 presents the relative changes of s-ferritin by age, ethnic groups, geographic area, BMI, smoking and alcohol consumption from the multiple linear regression analysis. The Sámi I group had significantly higher mean

Table 3 Transferrin saturation in 14 873 participants in the SAMINOR survey in northern Norway

Transferrin saturation (%)							
	Inland			Coast			
	Sámi I	Sámi II	Non-Sámi	Sámi I	Sámi II	Non-Sámi	*P*-value[1]
Men (*n*)	452	217	690	365	1430	4001	
Age (yr)							
36–49	30 [29–32]	31 [29–33]	31 [29–32]	28 [26–31]	29 [28–29]	29 [29–30]	<0.0001
50–79	30 [29–31]	29 [27–31]	31 [30–32]	29 [27–30]	29 [28–29]	29 [29–30]	
P-value[2]	0.47	0.11	0.70	0.87	0.97	0.69	
Women (*n*)	516	218	793	329	1405	4457	
Age (yr)							
36–49	25 [24–27]	28 [25–30]	27 [26–29]	24 [22–26]	25 [24–26]	26 [26–27]	0.04
50–79	27 [25–28]	28 [26–30]	27 [26–28]	27 [26–28]	26 [25–27]	27 [27–27]	
P-value[2]	0.18	0.72	0.92	0.028	0.06	0.02	

Values are presented as mean [95% confidence interval].
[1] Test for differences between geographic areas adjusted for age and ethnicity.
[2] Test for differences between age groups.

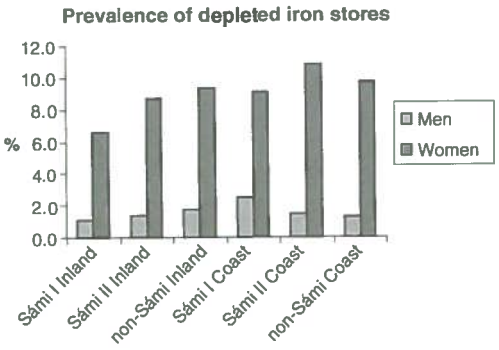

Figure 1 Prevalence of depleted iron stores.

s-ferritin levels than the non-Sámi group (both genders). Also participants living at the inland had significantly higher s-ferritin than individuals at the coast. For men, age was negatively associated with s-ferritin after the 60th yr of age. For women s-ferritin was positively associated with increasing age after the 50th yr of age.

For both genders, being underweight (<18.5 kg/m^2) had no impact on s-ferritin. Being overweight (25–29 kg/m^2) or obese (>30 kg/m^2) was positively associated with s-ferritin levels when compared with reference group (18.5–25 kg/m^2) for both men and women.

For men, present and previous smoking was negatively associated with s-ferritin levels when compared with no smoking. In women, smoking had no impact on s-ferritin. Alcohol shows considerable positive association to s-ferritin levels in men and women. The effect increased with increasing consumption. Coffee consumption, and for women the number of childbirths, were considered (as confounders), but were not added to the model as they did not change the associations presented in Table 4.

Discussion

The subjects available for iron analyses were all participants in a population-based study, SAMINOR, with both Sámi and non-Sámi participants. The survey consists of a large number of participants, of which the Sámi group account for over 5000 individuals in total, which strengthens our study. The present analysis did show significant differences with regard to iron levels between the groups. The Sámi people living in the inland areas and speaking Sámi through three generations had the highest mean levels of s-ferritin. At the inland, participants had higher mean transferrin saturation than individuals at the coast, independent of ethnicity.

In northern Norway, there has been substantial interaction between the Sámi and non-Sámi population for several decades. However, Sámi language is almost exclusively spoken by persons with Sámi affiliation. The use of Sámi language is therefore a good indicator of Sámi heritage. The Sámi people have their own culture with many different traditions. Nutrition is to a great extend affected by habits and culture. In relation to occupational expansion, traditions are changing, which affect the dietary patterns. Socioeconomic development and general health status do also influence on iron status (12–14). Previous studies have reported considerable differences in iron status between the indigenous Greenland population and the Danish population, mainly because of differences in dietary iron intake (15).

The s-ferritin level is the most specific biochemical test that correlates with total body iron stores. S-ferritin has been used as key parameter in several epidemiological

Table 4 Effect on serum ferritin by age, ethnicity, geography and lifestyle factors

	Women (n = 7356)			Men (n = 6928)		
	Relative effect on ferritin[1]	95% CI[2]	P-value	Relative effect on ferritin[1]	95% CI[2]	P-value
Age groups						
36–39	Reference group					
40–49	0.97	0.91–1.04	0.44	0.99	0.93–1.04	0.88
50–59	1.79	1.67–1.91	<0.0001	0.99	0.93–1.06	0.76
60–69	2.28	2.12–2.45	<0.0001	0.80	0.74–0.85	<0.0001
70–79	1.99	1.83–2.16	<0.0001	0.65	0.60–0.70	<0.0001
Non-Sámi	Reference group					
Sámi II	1.01	0.94–1.03	0.70	0.99	0.96–1.04	0.78
Sámi I	1.17	1.09–1.25	<0.0001	1.11	1.05–1.18	0.0002
Coast	Reference group					
Inland	1.09	1.04–1.15	<0.0008	1.14	1.12–1.20	<0.0001
BMI (kg/m^2)						
18.5–25	Reference group					
<18.5	0.88	0.66–1.16	0.35	0.76	0.53–1.09	0.14
25–29	1.08	1.04–1.13	0.0002	1.15	1.10–1.20	<0.0001
30+	1.28	1.22–1.35	<0.0001	1.37	1.30–1.43	<0.0001
No smoking	Reference group					
Smoking-present	1.04	0.99–1.09	0.15	0.89	0.86–0.93	<0.0001
Smoking-before	1.01	0.98–1.03	0.67	0.97	0.95–0.99	0.0035
No alcohol	Reference group					
Low intake[3]	1.16	1.11–1.22	<0.0001	1.28	1.21–1.35	<0.0001
High intake[4]	1.37	1.26–1.49	<0.0001	1.45	1.36–1.57	<0.0001

[1] Mutually adjusted for each of the other variables, men and women separately.
[2] 95% confidence interval.
[3] Low intake (seldom to once a week).
[4] High intake (2–3 times or more per week).

studies where iron status has been measured (11, 14–16). A low s-ferritin level reflects depleted iron stores, while high s-ferritin can reflect iron overload, infection or inflammation. Interpretation of s-ferritin levels is thus problematic in populations in which the incidence of infection or inflammation is high, which is not the case in Norway. Thorough information about health status was not available in this study. However, CRP was available and is included in the analysis. S-ferritin measurement is the preferred method for detecting depleted iron stores, but is of limited usefulness during pregnancy because it diminishes late in pregnancy. However, the majority of the women were older than 40 yr and at the end of fertile age, only 10% of the total female population was in the age group 36–39 yr.

We also used transferrin saturation, because elevated s-ferritin levels can be affected by acute diseases more than transferrin saturation when prevalence of high iron stores and depletion was calculated.

Iron status

The present study showed significant gender differences for s-ferritin and transferrin saturation in all ethnic groups. The decline in s-ferritin level in the oldest age groups, is also reported in an earlier iron study in a multiethnic population with inhabitants of Norwegian, Finnish and Sámi origin in northern Norway (17). Similar variations have been reported for haemoglobin in elderly men in a population survey from Tromsø municipality, northern Norway (18). These results are in contrast to previous studies on iron markers in indigenous Greenlanders, which reported that s-ferritin levels continue to increase with age in the Greenlandic hunter population (15). This is explained by high consumption of high bioavailable iron. We do not know the reason for the decline in s-ferritin and haemoglobin with age in northern Norway, especially for men. However, both s-ferritin and haemoglobin are influenced by nutritional sources containing vitamin C such as vegetables. In general, there is traditionally low consumption of fruit and vegetables among inhabitants in the northernmost part of Norway, especially among the elderly (19).

Influence of lifestyle factors

The traditional inland diet, is rich in meat from reindeer and elk with high iron content of 3.8 mg/100 g wet weight for reindeer and 2.5 mg/100 g wet weight for elk (20). At the same time changes from the traditional dietary pat-

terns towards a more Western diet are prevalent in the youngest part of the population, especially among the coastal adolescents (21). The diet do influence on BMI. Mean BMI was above the WHO classification of overweight in all ethnic groups, for both genders. Previous studies have reported that s-ferritin increases, and transferrin saturation decreases, with increasing BMI (17, 22). Our study reports a positive association between BMI and s-ferritin when BMI exceeds 25 kg/m^2, which is defined as obesity by WHO (23). This association is described in earlier cross-sectional studies and may be due to liver cell damage (22). Present smoking has a significant positive association on s-ferritin, but only for men. Alcohol intake increases mean s-ferritin and may be due to increased iron absorption or liver damage (11). However, high mean s-ferritin level among the Sámi groups can not be explained by high alcohol consumption among the Sámi participants. The proportion of abstainers is more prevalent among the Sámi I than the non-Sámi group. Frequent use of alcohol (two or more time a week) is also higher in the non-Sámi population. Our results are consistent with earlier publications from the same study (24). Another study among indigenous and non-indigenous adolescents in northern Norway has found same tendency in drinking patterns, as among adults (25). Acute infection or inflammation was not prevalent in the study population. This strengthens our hypothesis that dietary habits at the inland have high content of heam rich meat.

Finally, the observed variation in s-ferritin can also be explained by other factors not taken into account in this survey.

Conclusions

The results from our analyses indicate that iron levels in rural areas in northern Norway are to a considerably extent influenced by lifestyle factors. It is only at inland that differences in iron levels between Sámi and non-Sámi groups are visible. The differences in s-ferritin levels can therefore be explained by continuous high consumption of high bioavailable iron for the inland Sámi I group. At the coastal settlements, sea fish are still the traditional diet for all inhabitants, which explain the lack of difference in iron levels between the ethnic categories. Further analyses on nutritional habits are necessary to confirm these findings. There is no reason to believe that the Sámi as a group of people have different iron metabolism than the non-Sámi.

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Paper II

Original Article

Traditional food patterns protect against iron deficiency in a multiethnic population in mid and northern Norway. The SAMINOR study

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Traditional food patterns protect against iron deficiency in a multiethnic population in mid and northern Norway. The SAMINOR study

Objectives

To evaluate the association between s-ferritin as a marker of iron status and dietary patterns, in connection with ethnicity, geographic settlement and some lifestyle factors.

Methods

In 2003-2004 a cross sectional study of health and living conditions, SAMINOR, was performed in northern Norway. A total of 16 323 men and women between the ages of 36 – 79 yr participated. Blood samples were obtained at admission. A questionnaire had among other things, questions about ethnicity and food habits. Principal component analysis was utilized to assess the association variables. Seven principal components were then used as input in a cluster analysis. Among the food component, five dietary patterns were identified and labelled "reindeer", "fish", "average", "fruit and vegetables", and "westernized, traditional marine". These dietary patterns are used to assess the effect of food habits on iron stores.

Results

The dietary pattern labelled "reindeer" had significantly higher mean s-ferritin. This pattern was highly represented by subjects with three generations of Sámi language (Sámi I). The prevalence of depleted iron stores, s-ferritin < 13 µg/l, was lowest in the reindeer pattern in both genders. Obesity was positively associated with s-ferritin in both genders.

Conclusions

The differences in iron levels between inland Sámi and non-Sámi can be explained by food habits, age and obesity. In men, traditional food habits with intake of reindeer meat eliminate the association of ethnicity. In women food habits reduce the association between s-ferritin and ethnicity. Traditional food with high levels of bioavailable iron, seem to protect against depleted iron stores in both genders.

Key words: Ferritin, iron status, Sámi, Norwegian, diet, traditional food, SAMINOR

Traditional food patterns protect against iron deficiency in a multiethnic population in mid and northern Norway. The SAMINOR study

Introduction

The Norwegian government has ratified the Sámi people as the indigenous people in Norway. The Sámi live in the northern part of Scandinavia and the Kola Peninsula in Russia. Norway has the greatest proportion of the total Sámi population. Iron status is, among other factors, affected by dietary habits. Previous studies have reported considerable differences in iron status between the indigenous Greenland population and the Danish population, mainly because of differences in dietary iron intake [1]. A study from areas with both Sámi and non-Sámi inhabitants in mid and northern Norway, described differences in iron levels between Sámi and non-Sámi populations [2]. The inland Sámi had significantly higher s-ferritin than the coastal Sámi and non-Sámi populations, in both genders. Also, mean transferrin saturation was higher for the inland residents especially for the male participants.

In northern Norway there has been substantial interaction between the Sámi and the non-Sámi populations for several generations. However, some special characteristics in dietary traditions have influenced the Sámi dietary habits, such as high consumption of reindeer meat for the Sámi at inland domiciles, and frequently consumed sea fish at the coast.

The s-ferritin level is the most specific biochemical test that correlates with total body iron stores. S-ferritin has been used as key parameter in several epidemiological studies where iron status has been measured [2-5]. S-apoferritin is a part of measured s-ferritin, and is an acute-phase reactant protein elevated in infectious, inflammatory and malignant diseases. However, the recent study [2] on iron levels in SAMINOR proved that acute infection or inflammation was not prevalent in the study population. High mean iron levels among the Sámi groups could not be explained by high alcohol consumption among the Sámi participants, who consumed less alcohol than the non-Sámi participants. The most obvious explanation of

differences in iron levels between the different ethnic groups is therefore differences in dietary habits.

The aim of this study was to investigate whether dietary habits are the main cause of differences in iron levels between the Sámi and Norwegian participants in the SAMINOR survey.

Methods

The SAMINOR study

A cross-sectional population based study of health and living conditions in areas with a mixed Sámi and non-Sámi population, the SAMINOR study, was carried out in mid- and northern Norway in 2003-2004. The SAMINOR study covered the population in municipalities in Norway where more than 5 to 10 % of the population reported to be Sámi in the 1970 Census [6]. In addition, some selected districts were included from municipalities with an overall lower proportion of subjects with Sámi ethnicity. The SAMINOR study was the responsibility of Centre for Sámi Health Research, Institute of Community Medicine at the University of Tromsø, in collaboration with the National Screening Program for Cardiovascular Diseases, SHUS, now incorporated into the National Institute of Public Health. The material was collected from January 2003 till April 2004. The study is described in detail by Lund et al [7].

Subjects

Inhabitants with an age in the range of 30 yr and 36 to 79 yr were invited, with a total of 27,987 individuals. Participants aged 30 years were excluded in the analyses, due to small sample size and low participation rate. In total 16 538 men and women aged 36-79 yr participated in the SAMINOR study and gave informed consent to medical research, a response rate of 61 %. Participation rates at the coast and in inland areas were 59.6 % and 65.5 %, respectively. More women than men participated in the survey, 65.6 % versus 56.6 %, respectively. Information about ethnicity, and iron status were available from 14630 persons.

Screening

Non-fasting blood samples were obtained at admission. Blood samples were drawn by venopuncture at normal venous pressure in sitting position. Serum was separated immediately

and s-ferritin, s-iron and transferrin were measured directly. S-ferritin was measured on a Hitachi Modular P analyser from Roche Diagnostics, Germany. All reagents were purchased from the same company. S-ferritin was measured with a turbidimetric assay, and calibrated using Cfas Protein catalogue no. 1661400 with several lot numbers in the period 2003 - 2004. In an effort to harmonize s-ferritin levels within Norway at the time, the laboratory used a factor of 0.76 in the period of August 2002 - November 2003, a factor of 0.79 in the period of November 2003 - February 2004 and, a factor of 0.75 in the period of February 2004 - January 2004. The Cfas Protein catalogue no. 1355279 is calibrated against the WHO International Ferritin Standard. The ferritin method is standard against the NIBSC Reagents for ferritin (human spleen – 80/578). CV Interassay was 4.2 %. CV Intra Assay, 3.9 %.
In our further analyses we chose only s-ferritin as a measure of iron levels when association with independent variables was performed. Iron depletion is defined as s-ferritin < 13 µg/l consistent with earlier surveys [3, 8]. The WHO define s-ferritin < 15 µg/l as iron depletion [9]. Body mass index (BMI) was based on measurements of weight and height, and calculated as body weight in kilograms/(body height in metres)^2. According to WHO underweight is defined as BMI < 18.5 kg/m^2 [10], standard weight as between 18.5 – 24.9 kg/m^2, overweight as between 25 – 29.9 kg/m^2 and obese as > 30 kg/m^2.

Dietary habits

Information concerning consumption of different foods, both modern and traditional, was obtained through questionnaires with a food frequency design. The food questionnaire has been described in detail by Brustad et al. [11]. Based on factor and cluster analyses from 56 different food variables, Brustad et al. defined five different dietary patterns; "reindeer", "fish", "average", "fruit and vegetables", and "westernized, traditional marine". The reindeer pattern was characterised by the most frequent consumption of reindeer meat and other reindeer products, in addition to moose meat and cured/salted fish. The use of boiled (non-

filtered) coffee was also frequent in this cluster. The second pattern was named "fish" because it consisted of subjects with frequent use of all marine food items in the questionnaire. Pattern three was labelled "average" and characterised by average intakes of most food items, except whole milk, and processed fish (smoked or cured/salted), which were significantly higher in this group. In addition, this pattern showed a high intake of both boiled (non-filtered) and "other" coffee, as well as sausages, pork, and mutton. The fourth pattern was labelled "fruits and vegetables" due to the frequent intake of these items in addition to water, tea, pasta, and chicken. The last pattern was named "western, traditional marine". This was dominated by westernised products such as hamburgers, pizza, sausages, casseroles, pork, and beef. This pattern also had the highest frequency of the traditional food fish liver and hard roe, in addition to whale meat and filtered coffee. These dietary patterns are used to assess the effect of food habits on iron stores.

Ethnicity

The sample was divided into three ethnic groups: 1. Sámi I - Sámi language for three generations (all grandparents, both parents and the participants used Sámi as home language) 2. Sámi II - mixed group with Sámi and non-Sámi affiliation (at least one Sámi indicator as Sámi language, ethnic background or self-perceived ethnicity) and 3.The remaining population, non - Sámi. Each of these groups were divided into inland and coastal domiciles.

Ethics

The study was accredited by the Regional Board of Research Ethics in Northern Norway and the Sámi consultant at the Board. The survey is in accordance with the Helsinki Declaration of 1975. The National Data Protection Authority (Datatilsynet) gave approval for storing of individuals' information and for later linkages.

Statistical analyses

Analyses were stratified for gender. Distributions for s-ferritin showed positive skewness. Therefore s-ferritin values were logarithmically transformed and hence replaced by log e (ferritin). S-ferritin values were log – normally distributed.

S-ferritin was presented as geometric mean and corresponding 95 % confidence interval. Differences in iron levels across ethnic groups were tested by analysis of variance (ANOVA), stratified for geographic residence and two age groups (36-49 and 50-79 years). The Tukey-Kramer test was used for pair-wise comparisons. Analyses of covariance (ANCOVA) were used to test for differences in iron levels between geographic residences, adjusted for age groups and ethnicity. Age adjusted effects of ethnicity, BMI and dietary habits on log-ferritin were modelled by multiple linear regressions, for inland residents only. Finally, log-ferritin was the dependent variable in a predefined multiple regression model mutually adjusting for ethnicity, age groups, BMI and dietary habits. We used the SAS statistical software package version 9.1 (SAS Institute Inc., Cary, NC, USA).

Results

Table 1 shows selected characteristics of the study sample. Sámi affiliation was reported in 4932 participants (34%) where s-ferritin was available. Almost 80 % of the individuals had BMIs higher than 24.9 kg/m^2. The portion of individuals with a BMI higher than 24.9 kg/m^2 was approximately equally distributed between men and women. Mean s-ferritin for men and women were 99 µg/l (95% CI; 97-101) and 42 µg/l (95% CI; 41-43), respectively.

Distribution of s-ferritin

Mean s-ferritin was significantly higher for men than for women independent of ethnic affiliation. Mean s-ferritin levels by age group, ethnic and geographic categories (both genders), are presented in Table 2. Age groups are merged into two groups, before and after the age of 50, which we consider as the mean age of menopause for women. Regardless of ethnicity, s-ferritin levels for men declined with advancing age, while they increased after the age of 50 yr for women. There was a significantly higher s-ferritin level among inland participants compared to residents at the coast (both genders). For inland men, the Sámi I group aged 36 – 49 yr, had significantly higher mean s-ferritin than the Sámi II group, (Tukey-Kramer test). In the age group 50 – 79 yr the Sámi I group had significantly higher mean s-ferritin than the non-Sámi group (Tukey-Kramer test). For inland women, the Sámi I group after the age of 50 had significantly higher mean s-ferritin than the Sámi II and non-Sámi groups (Tukey-Kramer test). At the coastal settlements there were no differences in mean s-ferritin between ethnic categories; hence further analyses were limited to the inland participants, in total 2850 individuals.

Iron levels influenced by dietary patterns

Table 3 presents the effects on s-ferritin by age, ethnic groups at inland domicile, different dietary patterns, and BMI from multiple linear regression analyses, stratified by gender. In

these models age and ethnic category, age and dietary patterns and finally, age and BMI were mutually adjusted for each other. For both genders Sámi I, reindeer pattern and obesity (> 30 kg/m²) were positively associated with log-ferritin compared to the reference groups. In a final model all independent variables were mutually adjusted for each of the other variables, with women and men processed separately (Table 4). For women, Sámi I was still positively associated with s-ferritin, but the effect was smaller than in the first model. The reindeer pattern showed a tendency towards higher s-ferritin, but this was not significant. In men the effect of Sámi ethnicity disappeared. The reindeer pattern did still show a positive association with s-ferritin. Also, a BMI higher than 29.9 kg/m^2 was still strongly positively associated with s-ferritin, in both genders.

Other lifestyle factors, such as light/ hard physical activity and, for women, the number of childbirths, were considered (as confounders), but were not added to the model as they did not change the associations presented in Table 4.

Iron depletion

Figure I present the prevalence of depleted iron stores for men according to dietary patterns and age groups. The prevalence of iron depletion was in general low among men. In all dietary patterns, except in the reindeer group, the depletion was higher after the 50 years of age. The highest prevalence of iron depletion (2.2 %) was among participants over 50 yr in the fish pattern. The reindeer pattern was characterised by few individuals with depleted iron stores, only 0.8% in the youngest age group and none over the age of fifty. In total, 88 % of the participants with s-ferritin < 13 µg/l, were women. In contrast to men, women in the age group 36 – 49 yr had a higher prevalence of low s-ferritin than the older age group. The lowest prevalence of depleted iron stores among the youngest individuals was in the reindeer pattern with 10.5%. The average, the fruits and vegetables and the westernized, traditional marine patterns had highest prevalence of depleted iron stores with 19.0%, 17.8% and 17.5 %,

respectively. The differences between the reindeer pattern and each of the other three patterns were significant. There were no differences between the reindeer pattern and the fish pattern for the youngest age group. For women over the age of fifty there were no differences in the prevalence of depleted iron stores between different dietary patterns.

Discussion

This cross-sectional survey of Sámi and non- Sámi participants in northern Norway indicates that participants who frequently consume reindeer meat and other reindeer products have higher iron levels than individuals with other dietary patterns.

An extensive screening program of iron levels and iron deficiency in northern Norway has not been done before. Nor has such a comprehensive survey been carried out previously in a multiethnic population in Scandinavia. Other studies on iron levels in Norway have been done in areas with no or few Sámi participants or in more limited geographic areas with fewer individuals [12-13]. The Sámi traditional residences are to some extent concentrated in geographic settlements, but in many rural districts Sámi and non-Sámi populations have lived side by side for generations. These settlement patterns have affected, among other things, nutritional habits in both the indigenous and non- indigenous populations.

Nutrition

Dietary traditions are important markers for cultural identity, but in relation to occupational expansion from different primary trades towards service professions, traditions are changing which again affect the dietary patterns. In addition, increased access to many different food products also establish new food habits. These changes are global and are described, among others, by Kuhnlein et al. in artic indigenous peoples in Canada [14]. The traditional diet consists of food harvested from the local environment. International research on diet among the indigenous people in Canada has demonstrated that traditional food has a high nutrient density i.e. as various vitamins, folate, calcium, iron and magnesium [14]. As an example, traditional food has significantly higher iron content than market food [14]. In the SAMINOR survey the consumption frequency was estimated, but the questionnaire did not cover a total diet in order not to make it too comprehensive and thereby decrease the response rate further.

The analyses of food patterns instead of single nutrients are considered as a better way to focus on dietary exposure and different health outcomes, mainly because dietary exposure is highly interrelated [15-16]. In our analyses, food patterns predicted s-ferritin level. Brustad et al. have published dietary patterns analyses from the SAMINOR survey, which demonstrated that ethnicity did not play a major role in predicting dietary patterns except for the reindeer pattern at the inland areas [11]. At the coastal settlements Sámi and non-Sámi individuals have coexisted for centuries and both sea fish and different types of meats have been the main nutrition for both ethnic groups [17].

Iron status

The prevalence of depleted iron stores was in general low in men, especially in the reindeer pattern. In this food pattern depleted iron stores did not exist among participants older than 50 years. This is the dietary pattern that has the highest proportion of individuals with Sámi I ethnicity, inland residence and obesity [11]. High intake of high bioavailable iron reduces the risk of iron depletion. The highest prevalence of depleted iron stores was found among the oldest age group in the fish pattern group. Accordingly, the fish pattern was characterised by high age [11]. Age has a major impact on s-ferritin levels and haemoglobin. Several studies have reported that s-ferritin and haemoglobin decline with advancing age for men [13, 18-19]. Different factors may explain this decrease in iron levels, such as dietary habits, different lifestyle factors and inflammation. Current data about iron levels in the male population from other parts of Norway are not present.

The prevalence of depleted iron stores was significantly higher in women compared with men. The lowest prevalence of depleted iron stores was found among women over 50 yr. In women s-ferritin and haemoglobin are highest seven to ten years after menopause and decline among the oldest individuals [5, 13, 20]. Also in women, in the youngest age group, lowest prevalence of depleted iron stores was found in the reindeer group. The average, fruits and

vegetables and finally westernized, traditional marine patterns had the highest prevalence of iron depletion. The age composition in these three patterns was about the same, 36% to 39%, in the age group 36 – 49 yr in each of the patterns [11]. The fish pattern had only 18% of individuals in the same age group and the majority lived at the coastal areas. Except for the reindeer pattern, women in this survey aged 35 – 49 yr have iron depletion consistent with results from other iron studies done in Norway, in comparable age groups [12]. In the Nord-Trøndelag Health Study the prevalence of s-ferritin < 12 μg/l in the age groups 30 – 39 yr, 40 – 49 yr and 50 – 55 yr were 16.1%, 18.1% and 10.6% respectively. It is therefore reasonable to conclude that women participating in the SAMINOR survey had a rather satisfactory iron intake, especially women in the reindeer pattern.

Influence of dietary patterns and lifestyle factors in s-ferritin

Sámi I ethnicity has a positive association with s-ferritin when adjusted for age in both genders. However, this effect is only visible inland. It is therefore unlikely to believe that genetic inheritance does explain these differences between ethnic groups. In men the effect on s-ferritin by Sámi I disappears when age, ethnicity, dietary patterns and BMI are mutually adjusted. In women however, food habits reduce the effects of ethnicity, but not all the effects by Sámi I, disappear. One explanation can be that the food frequency questionnaire covers food habits among men better than among women. Foods rich in sugar such as cakes, desserts, and syrup are not sufficiently covered in the form. An incomplete food list may affect the estimation of food intake. Food patterns and health related behaviours such as the level of physical activity may confound an association with s-ferritin. Several studies on dietary habits have been done in Norway. In a 1993-94 survey of the adult population, a quantitative food frequency questionnaire was used to evaluate dietary habits and to relate these to other life style factors [21]. This survey showed that daily total intake of thiamine,

riboflavin, calcium, and iron was higher in the youngest age groups compared to the older participants, both genders included. In women intake of vitamin C was highest in the oldest age groups. Women, however, did not have adequate intake of vitamin D and iron regardless of age in this study. Another study in 1996, of breast cancer among Norwegian female citizens, analysed dietary habits from a food frequency questionnaire in approximately 10 000 women [22]. Also in this study older women had a more vitamin C dense diet than the younger participants, most probably because of increased orange and carrot intake. These surveys are national but did not focus especially on ethnic categories or geographic settlements. A smaller study performed in a Sámi population living in traditional reindeer herding areas in northern Norway concluded that there is traditionally low consumption of fruit and vegetables among inhabitants in northern Norway, especially among the elderly [23]. The sample sizes are however small. Brustad et al. demonstrated that participants in the reindeer pattern consumed the same quantity of fruit and berries as in the fish, average and western/traditional marine patterns [11]. Only participants in the fruits and vegetables pattern consumed more. Coffee inhibits iron absorption [8, 24]. The habit of coffee consumption is prevalent in the reindeer pattern, but it has no negative association on s-ferritin. To some extent this can be explained by a high consumption of high bioavailable iron in reindeer meat. As documented, reindeer meat has high iron content of 3.8 mg/100g wet weight [25].

A relation between s-ferritin and obesity has been found in several cross-sectional studies, and may be due to liver cell damage [26]. In both genders, obesity had a significant impact on s-ferritin and this effect did not disappear when adjusted for the other variables such as age, ethnicity and dietary patterns.

Conclusion

The differences in iron levels described earlier between inland Sámi and non-Sámi can be explained by several factors such as food habits, age and obesity. In men, traditional food

habits with intake of reindeer meat eliminate the association of ethnicity. In addition being overweight and obese also influences s-ferritin levels. In women food habits reduce the association between s-ferritin and ethnicity, but there is still some effect left. One explanation can be that the food frequency questionnaire covers food habits among men better than among women. In any case, traditional food with high bioavailable iron seems to protect against depleted iron stores in both genders. It is reasonable to conclude that traditional food provides essential nutrients in the diet such as an extra iron supplement, and thus its use should be encouraged.

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Table 1 ***Selected characteristics of the study sample (n=14630)*** [1]

Characteristcs	Women		Men	
	%	N	%	N
Age groups				
36 – 39 yr	10.1	765	8.6	606
40 – 49 yr	27.4	2068	26.1	1843
50 – 59 yr	30.0	2270	31.8	2253
60 – 69 yr	20.4	1539	21.5	1524
70 – 79 yr	12.1	916	12.0	846
Ethnicity				
Sámi I	11.2	845	11.5	817
Sámi II	21.5	1623	23.3	1647
Non-Sámi	67.3	5090	65.2	4608
BMI (kg/m²)				
< 18.5	0.5	40	0.2	16
18.5 – 24.9	24.5	1851	15.9	1121
25-29.9	53.5	4030	66.5	4697
≥ 30	21.5	1618	17.4	1228
Dietary patterns				
Reindeer	5.8	370	6.4	376
Fish	15.2	980	11.9	705
Average	21.9	1404	28.9	1710
Fruit/vegetables	26.0	1667	11.8	700
Western/marine	31.1	1999	41.0	2422
Ethnicity by geographical area				
Sámi Inland	9.7	734	9.4	669
Sámi Coast	22.9	1734	24.4	1795
Norwegian Inland	10.2	769	9.6	678
Norwegian Coast	57.2	4321	55.6	3930

[1] Subgroups may not total to 14630 for all variables, due to missing values.

Table 2 ***S-ferritin in 14630 participants in the SAMINOR survey in northern Norway. Geometric mean and 95% confidence interval [ ]***

S-ferritin (µg/l) [1]

	Inland			Coast		
	Sámi I	Sámi II	Non-Sámi	Sámi I	Sámi II	Non-Sámi
Men	N 452	N 217	N 690	N 365	N 1430	N 4001
Age (yr)						
36-49	151 [135-168] [2,3]	120 [105-138] [2,3]	128 [118-140] [2,3]	104 [86-127] [2,3]	105 [99-111] [2,3]	108 [105-111] [2,3]
50-79	118 [107-129] [2,3]	113 [96-134] [2,3]	98 [90-105] [2,3]	85 [78-93] [2,3]	90 [85-95] [2,3]	92 [89-94] [2,3]
Women	N 516	N 218	N 793	N 329	N 1405	N 4457
Age (yr)						
36-49	34 [30-38] [2,3]	32 [27-37] [2,3]	29 [26-32] [2,3]	25 [21-30] [2,3]	26 [24-28] [2,3]	27 [26-28] [2,3]
50-79	73 [67-81] [2,3]	55 [47-65] [2,3]	55 [51-59] [2,3]	59 [53-66] [2,3]	52 [49-55] [2,3]	54 [53-56] [2,3]

[1] Geometric mean
[2] Test for differences , ANOVA, between ethnic groups. Stratified for gender, geographic domicile and age groups.
[3] Test for differences, ANCOVA, between geographic areas adjusted for age and ethnicity. Stratified for gender.

Table 3 ***Effect on logferritin by ethnicity, dietary patterns and BMI adjusted for age. The inland residence. N= 2850***

	Women		**Men**	
	β coeff	95% CI [1]	β coeff	95% CI [1]
Age groups	Intercept 3.29		Intercept 4.86	
36 - 39	Reference group			
40 - 49	0.04	-0.12 – 0.21	-0.02	-0.18 – 0.14
50 - 59	0.58	0.42 – 0.74	-0.07	-0.23 – 0.09
60 - 69	0.90	0.73 – 1.08	-0.30	-0.47 – -0.13
70 -79	0.73	0.54 – 0.92	-0.57	-0.75 – -0.39
Ethnic groups				
Non Sámi	Reference group			
Sámi II	0.08	-0.05 – 0.20	0.004	-0.11 – 0.12
Sámi I	0.26	0.16 – 0.35	0.14	0.05 – 0.24
Age groups	Intercept 3.35		Intercept 4.87	
36 - 39	Reference group			
40 - 49	0.05	-0.11 – 0.21	-0.01	-0.17 – 0.15
50 - 59	0.59	0.42 – 0.75	-0.06	-0.22 – 0.10
60 - 69	0.91	0.73 – 1.08	-0.30	-0.47 – -0.13
70 - 79	0.73	0.54 – 0.92	-0.56	-0.74 – -0.38
Dietary patterns				
Average	Reference group			
Reindeer	0.24	0.11 – 0.36	0.18	0.07 – 0.29
Fish	0.01	-0.14 – 0.15	0.05	-0.10 – 0.20
Fruits/vegetables	-0.05	-0.16 – 0.07	0.0008	-0.13 – 0.13
Western/marine	-0.01	-0.15 – 0.14	-0.04	-0.16 – 0.07
Age groups	Intercept 3.35		Intercept 4.74	
36 - 39	Reference group			
40 - 49	0.04	-0.12 – 0.21	-0.02	-0.18 – 0.14
50 - 59	0.56	0.39 – 0.72	-0.06	-0.22 – 0.10
60 - 69	0.84	0.66 – 1.01	-0.28	-0.45 – -0.11
70 -79	0.65	0.46 – 0.84	-0.56	-0.74 – -0.38
BMI (kg/m^2)				
18.5-24.9	Reference group			
< 18.5	-0.10	-0.79 – 0.58	-0.22	-0.90 – 0.45
24.9 – 29.9	-0.01	-0.11 – 0.09	0.11	0.006 – 0.21
≥ 30	0.25	0.14 – 0.36	0.34	0.24 – 0.46

[1] 95 % confidence interval

Table 4 ***Effect on logferritin by age, ethnicity, dietary patterns and BMI at the inland residence. Mutually adjusted for each of the others variables. N= 2850.***

	Women		**Men**	
	β coeff	95% CI [1]	β coeff	95% CI [1]
Age groups (yr)	Intercept 3.27		Intercept 4.67	
36 - 39	Reference group			
40 - 49	0.03	-0.14 – 0.19	-0.02	-0.18 – 0.14
50 - 59	0.55	0.39 – 0.71	-0.06	-0.22 – 0.10
60 - 69	0.85	0.67 – 1.02	-0.28	-0.45 – -0.11
70 -79	0.66	0.47 – 0.85	-0.55	-0.73 – -0.37
Ethnic groups				
Non Sámi	Reference group			
Sámi II	0.04	-0.09 – 0.17	-0.04	-0.16 – 0.18
Sámi I	0.17	0.06 – 0.28	0.08	-0.03 – 0.18
Dietary patterns				
Average	Reference group			
Reindeer	0.13	-0.003 – 0.27	0.15	0.03 – 0.27
Fish	0.03	-0.12 – 0.17	0.04	-0.11 – 0.19
Fruits/vegetables	-0.02	-0.14 – 0.10	0.02	-0.11 – 0.15
Western/marine	0.01	-0.13 – 0.16	-0.05	-0.17 – 0.07
BMI (kg/m^2)				
18.5-24.9	Reference group			
< 18.5	-0.15	-0.83 – 0.53	-0.24	-0.91 – 0.43
24.9 – 29.9	-0.01	-0.11 – 0.09	0.13	0.03 – 0.23
≥ 30	0.22	0.11 – 0.33	0.36	0.25 – 0.47

[1] 95 % confidence interval

Figure I. Prevalence of depleted iron stores by age and dietary pattern in men

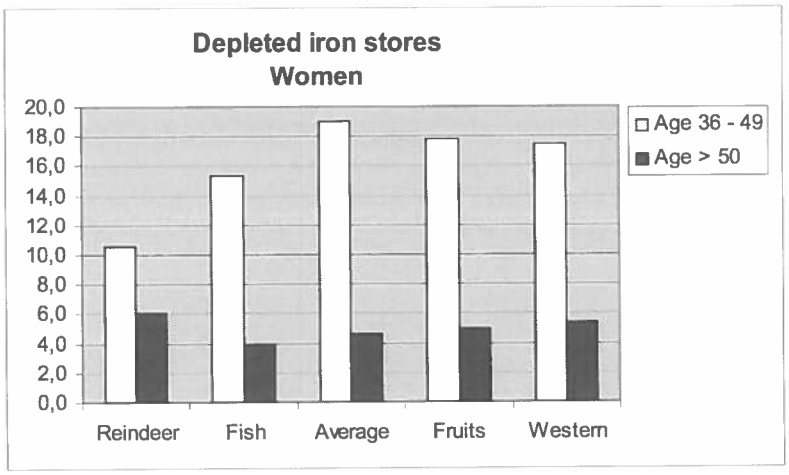

Figure II. Prevalence of depleted iron stores by age and dietary pattern in women

Paper III

ORIGINAL RESEARCH

SERUM LEVELS OF IRON IN SØR-VARANGER, NORTHERN NORWAY – AN IRON MINING MUNICIPALITY

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ABSTRACT

Objectives. The purpose of this study was to investigate iron status in a population with a high proportion of miners in the northernmost part of Norway.
Study Design. Cross-sectional, population-based study performed in order to investigate possible health effects of pollution in the population living on both sides of the Norwegian-Russian border.
Methods. All individuals living in the community of Sør-Varanger were invited for screening in 1994. In 2000, blood samples from 2949 participants (response rate 66.8 %), age range 30-69 years, were defrosted. S-ferritin and transferrin saturation were analysed in samples from 1548 women and 1401 men. About 30 % (n = 893) were employed in the iron mining industry, 476 of whom were miners and 417 had other tasks in the company. Type and duration of employment and time since last day of work at the company were used as indicators of exposure.
Results. Both s-ferritin levels and transferrin saturation were higher in men than in women. S-ferritin increased with increasing age in women, while the opposite was true for men. Iron deficiency occurred with higher frequencies in women (16 %) than in men (4 %). Iron overload was uncommon in both sexes. Adjustment for smoking and self-reported pulmonary diseases did not show any effect on iron levels.
Miners had non-significant higher mean s-ferritin and transferrin saturation than non-miners. Neither duration, nor time since employment in the mine, had any impact on iron status.
Conclusions. Our analyses did not show any associations between being a miner in the iron mining industry and serum iron levels compared to the general population.
(*Int J Circumpolar Health 2006;65(5):432-442.*)

Keywords: ferritin, transferrin saturation, miners, non-miners, industry, Sør-Varanger

INTRODUCTION

Sixty years ago, investigators claimed that adults and children living north of the Artic Circle had lower haemoglobin levels than in the rest of the country (1). Different causes were suggested. The theory was that haemoglobin levels could be influenced by the intensity of sunlight, as well as by nutritional factors, such as shortage of meat and vegetables in the spring time. As a consequence, vitamin C and iron would be insufficient, or suboptimal, in the late winter and spring seasons. In the 1960s, Natvig published a study showing that the daily supply of vitamin C and iron in the diet was adequate for the population in the municipality of Kirkenes (2). The iron industry was the major employer in the local society. Natvig and coworkers also collected data from a voluntary national industrial health service program, which showed that haemoglobin levels were higher in male wage-earners in the iron and mechanical industries (3). These studies did not measure iron status in the general population. With this background, we wanted to test if geographic localization and iron mining could affect iron status in a population living in the arctic.

In normal subjects, the total average daily loss of iron is about 1- 2 mg. These losses are balanced by an equivalent amount of iron absorbed from the diet. Iron is absorbed by the intestinal mucosal cells, which also regulates this absorption. In the plasma, iron is bound to a transport protein, transferrin, which provides the main means of iron transport. S-ferritin and transferrin saturation values are the two most widely used biochemical markers of body iron status. S-ferritin concentration significantly correlates with body iron stores in normal subjects, but s-ferritin is also an acute-phase reactant, elevated during infection, chronic inflammation and liver disease (4).

We had the possibility to use blood samples from a screening study carried out in the Sør-Varanger municipality in 1994, namely the Norwegian-Russian Health Study (5-8). At the time of the screening, A/S Sydvaranger was still the main employer in the municipality.

The aims of this study were (1) to evaluate the iron status in a multiethnic population in the east of Finnmark county in northern Norway, and (2) to investigate whether the iron status of miners was influenced by their work in an iron mine.

MATERIAL AND METHODS

Study location and background

The Sør-Varanger municipality of Finnmark County is situated in the north-eastern part of Norway, north of the Artic Circle at the 70th parallel, close to the common border between Norway and Russia (Fig. 1). In 1994, about 9800 people lived in Sør-Varanger. There has been a mining and iron smelting industry in Kirkenes for the last hundred years, but the mine closed in 1997. The city of Kirkenes was established because of the mining activity. The mine was in Bjørnevatn, and the ore was transported approximately 12 miles to Kirkenes, where iron-pellets were produced and, thereafter, exported by sea. The peak production period was in the 1980s, with an annual production of 24 million tons of iron mineral.

The Norwegian-Russian Health Study focused on possible health effects of nickel pollution from the Russian smelters in Nikel and Zapolyarny, located about 6 and 25 miles from the Norwegian border, respectively (5-7). The study collected information about different diseases, smoking habits and social conditions from questionnaires. Because the original study did not include iron measurements, the questionnaire did not contain questions about vitamin C or iron consumption.

Screening

The Sør-Varanger municipality consists of a multicultural population, with inhabitants of Norwegian, Finnish and Sámi origin. In 1994, all adults in Sør-Varanger between 18 and 69 years were invited to participate (n = 6822). In total, 3721 people participated, corresponding to a participation rate of 60.2 %. Participation was higher among women (67.5 %) than men (52.2 %), and increased with increasing age. The response rate for participants in the age range between 30 – 69 years was 66.8 % (5-8), which we regarded as an adequate participation rate for this study. Subjects younger than 30 years have hence been excluded (Figure 2).

Iron status was measured in a total of 1401 men and 1548 women. Among these participants, 893 (30.3 %) were employed at A/S Sydvaranger, of whom 476 were miners and 417 were wage earners with different tasks in the company. We performed stratified analyses for 1) miners, 2) other industry workers at A/S Sydvaranger, and 3) the remaining population. We did not demonstrate any differences in iron levels between the two non-mining groups (group 2 and 3), and they were therefore merged and used as a control.

In 1993, The Sør-Varanger study was accredited by the Regional Board of Research Ethics, and the Norwegian Data Inspectorate

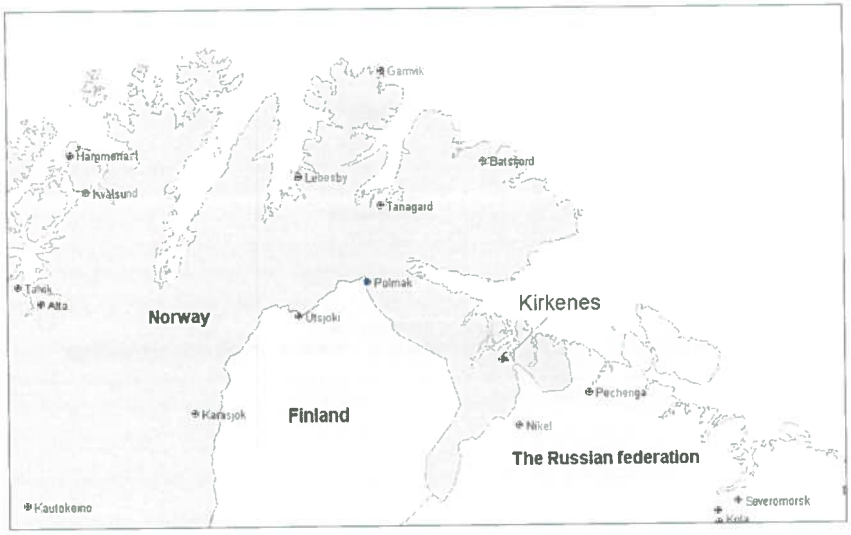


Figure 1. Map of the study area.

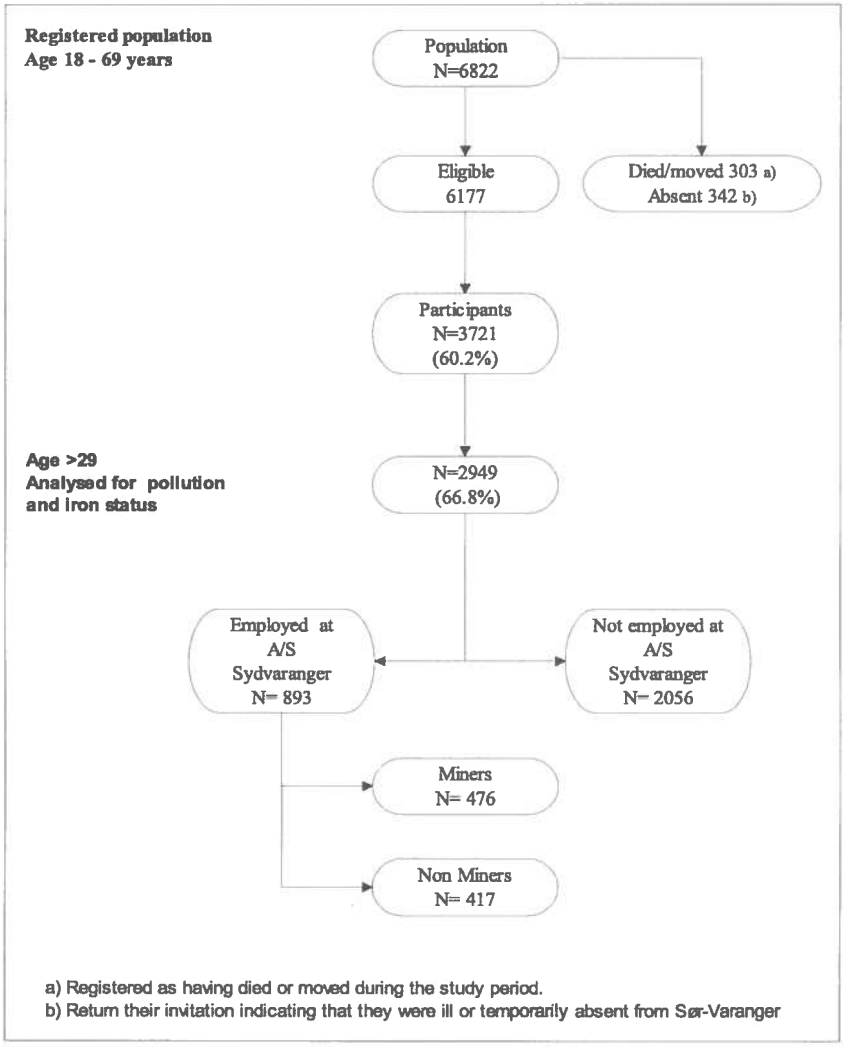


Figure 2. Flow-chart of survey participants.

gave permission to store personal information about the participants. In relation to the extension of the study in 1999, both the Regional Board of Research Ethics and the Norwegian Data Inspectorate gave new approvals.

All participants gave written, informed consent prior to the screening. They also gave informed consent to link information to hospital databases and the register of death certificates in statistics of Norway.

Non-fasting blood samples were obtained at admission. Serum was stored at -20 ° C. S-ferritin, iron and transferrin were measured on a Hitachi 917 analyser from Boehringer Mannheim, Germany. All reagents were purchased from the same company. Iron was measured with a ferrozine method, and calibrated using Cfas (catalogue Nº. 759350, lot Nº. 199462). Transferrin was measured with a turbidimetric assay, and calibrated using Cfas Proteins (catalogue Nº. 1355279, lot Nº. 196610). S-ferritin was measured with a turbidimetric assay, and calibrated using Cfas Proteins (catalogue Nº. 1355279, lot Nº. 196610). In an effort to harmonize s-ferritin levels within Norway at the time, the laboratory used a factor of 0.82 for s-ferritin analysis. Transferrin was reported in g/L, and serum TIBC (total iron-binding capacity) was calculated as s-TIBC μmol/L = 25.1 x s-transferrin. Transferrin saturation (%) was calculated as 100 x (serum-iron/TIBC). Moderate iron overload is defined as s-ferritin > 200 μg/l for men, and s-ferritin > 110 μg/l for women, according to limits used by the Nord-Trøndelag Health Study (9). S-ferritin levels > 699 μg/l are compatible with severe iron overload, according to previous studies (10). Iron deficiency is defined as s-ferritin < 16 μg/l or transferrin saturation < 15 %, according to WHO criteria (11-12). Body mass index (BMI) was based of measurements of weight and height, and calculated as body weight in kilograms/body height in metres ^{2}.

Record linking

Kirkenes hospital is the only hospital in this region. The hospital database therefore covers health information for the whole population. The University Hospital is more than 800 kilometres away. In order to find participants with liver and kidney diseases, or alcohol liver damage, we linked the participant record to the Kirkenes hospital database for the years of 1993, 1994 and 1995.

Statistical analyses

Analysis was stratified for sex and mining status. The Sharpiro – Wilk test was utilised to examine the normal distribution of data. Distributions for s-ferritin showed positive skewness; therefore, s-ferritin values were logarithmically transformed and replaced by log e (ferritin). S-ferritin values were log – normally distributed. When s-ferritin was used as dependent variable, both log e and non-log-transformed s-ferritin were analysed. There were no differences in the results; therefore, non-logarithmical ferritin was preferred. Transferrin saturation was normally distributed. Analysis of variance (two-way ANOVA) was used for evaluating the changes of s-ferritin and transferrin saturation by age, sex, occupation and pulmonary diseases. The s-ferritin and transferrin saturation interval between the 2.5 and 97.5 percentiles (central 95 % interval) was estimated. We used the SAS statistical software package version (SAS Institute Inc, Cary, NC; Version 8.2).

RESULTS

Study population

Table I shows sex-specific differences in selected characteristics at screening. Both mean s-ferritin and mean transferrin saturation were significantly higher for men than for women. Until 1994, Sør-Varanger had a stable population. About 80 % of the population (both sexes) had lived in the municipality for more than 20 years. Two thirds of the participants had BMI values higher than 24 kg/m².

Population distribution of s-ferritin and transferrin saturation

The range of s-ferritin for men was 4 – 1215 μg/l, and for women it was 1 – 1172 μg/l. Figure 3a shows the percentile distributions of s-ferritin by age for men. The distribution of median s-ferritin level in different age groups showed little variation, except for the oldest participants over 60 years. There was a small tendency of decreasing s-ferritin with age for all percentiles, except for the 97.5 percentile. From 50 – 59 years there was a significant decrease in s-ferritin ($p < 0.01$). Figure 3b presents the percentile distribution of s-ferritin by age for women. The median for all women varied with age from 30 - 60 μg/l. The range of variation was largest in the age group 65 – 69 years and smallest in the age group 35 – 40 years. There was a significant increase in s-ferritin from 45 - 54 and 50 - 59 years ($p < 0.0001$). Transferrin saturation showed less variation than s-ferritin

Table I. Baseline characteristics of the study population in Sør-Varanger aged 30-69 yrs.

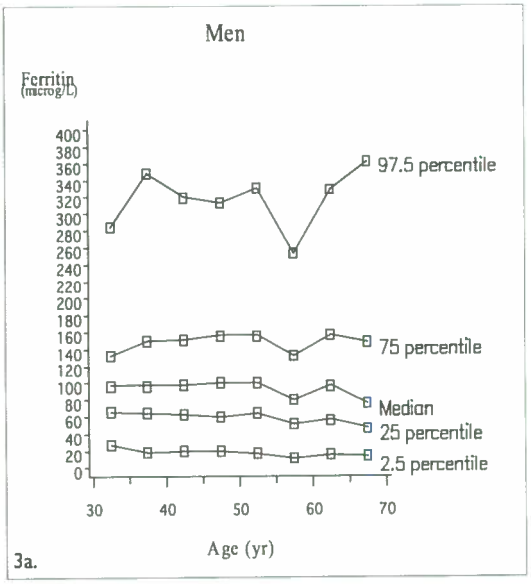
Characteristics	Men (n = 1401) Mean (95% CI) [a]	Women (n = 1548) Mean (95% CI) [a]
S-ferritin (μg/L) [b]	90 (87-94)	35 (34-37)
Transferrin saturation (%)	26 (26-27)	24 (23-24)
Age (yr)	49 (48-49)	48 (47-49)
Body mass index (kg/m²)	26.9 (26.7-27.1)	26.4 (26.2-26.7)
Smokers (%)	42.2 (39.8-45.0)	41.0 (38.6-43.5)
Percent employment in iron industry all occupations	53.8 (51.2-56.4)	13.4 (11.8-15.2)
Percent miners of total population	31.8 (29.3-34.3)	2.0 (1.4-2.8)
Duration of residence		
Percent lifelong	43.7	36.1
Percent > 10 years	88.6	87.7
Percent > 20 years	80.4	77.1

[a] 95 % Confidence interval (CI)
[b] Geometric mean

Table II. Distribution of s-ferritin in men and women in the Sør-Varanger municipality

	S-ferritin			
	Men		Women	
Age	n	Mean (95% CI) [a]	n	Mean (95% CI) [a]
30 - 39	370	94 (88-100)	441	28 (26-29)
40 - 49	404	94 (87-101)	439	25 (24-28)
50 - 59	313	87 (80-95)	344	47 (43-51)
60 - 69	314	84 (77-92)	324	58 (53-63)
Total	1401	90 (87-94)	1548	34 (34-37)

[a] 95 % Confidence interval (CI)
[b] Geometric mean



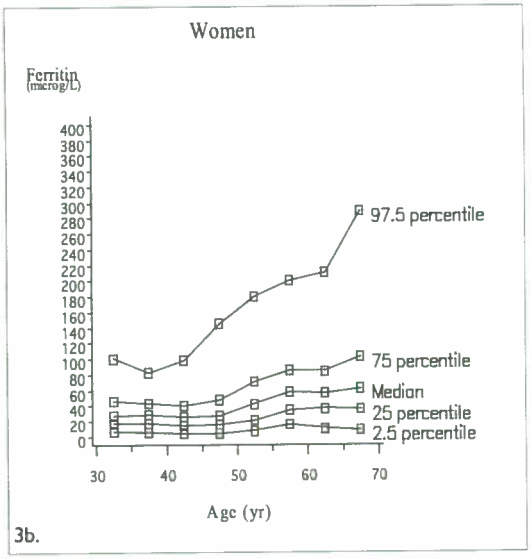


Figure 3. S-ferritin by age in men (a) and women (b).

for both men and women (data not shown).

Mean s-ferritin levels adjusted for age groups (both sexes) are shown in Table II. For men, mean s-ferritin decreased with age, and for women s-ferritin increased with age, especially after 49 years. S-ferritin increased significantly with increasing BMI for both sexes. Transferrin saturation decreased significantly for women, but not for the male population (data not shown).

General health status of the study population

The prevalence of self-reported acute pulmonary diseases is shown in Table III. In addition, the hospital database identified one person diagnosed with acute pneumonia in 1993. None of the participants were diagnosed with liver, kidney, or alcohol-associated diseases, according to the database.

Iron status in miners

The percentage of miners was 30.0, 32.7, 34.2 and 34.1 % among men aged 30 – 39, 40 – 49, 50 – 59 and 60 – 69, respectively, in total 439 men. Only 37 women were miners, which corresponded to 2 % of female population, hence we limited our analyses to men due to the low number of female miners.

Iron stores

No differences in s-ferritin were found between male miners and non-miners. S-ferritin tended to decrease with increasing age for both miners and non-miners. Mean transferrin saturation was non-significant in all age groups among miners and non-miners ($p < 0.09$). Information on smoking habits was available for 413 miners, of whom 200 (48%) were smokers, and for 804 non-miners, of whom 327 (41 %) were smokers (Table IV). There were no significant differences between s-ferritin, or transferrin saturation in these four groups.

Prevalence of high and low iron stores

The prevalence of moderate iron overload was 14 % among miners and 10 % among non-miners in the age group 30 – 49 years. Moderate iron overload increased slightly with age in men, among both miners and non-miners. In a stratified analysis, no difference in prevalence was found, RR = 1.2/ (95 % CI; 0.9 – 1.6).

S-ferritin levels > 699 μg/l were observed in two men, one miner and one non-miner. Among the women, one miner and one non-miner also had severe iron overload.

The prevalence of iron deficiency among the male population was 5.2 % for miners and 3.7 % for non-miners, respectively. RR = 1.4/ (95 % CI; 0.9 – 2.4). No age differences were demonstrated.

DISCUSSION

The subjects available for iron analyses were all participants in a population-based study, with a high proportion being industrial workers in the iron smelting industry (5-6).

Table III. Prevalence of acute diseases in relation to gender and mining.

	Women		Men	
	Miners % (95% CI) [a]	Non-miners % (95% CI) [a]	Miners % (95% CI) [a]	Non-miners % (95% CI) [a]
Pulmonary disease	9.7 (2.0-25.8)	9.8 (8.4-11.4)	7.2 (5.0-10.0)	8.9 (7.2-10.8)
Pneumonia	19.4 (7.5-37.5)	13.2 (11.5-14.9)	13.9 (10.9-17.5)	13.6 (11.5-15.9)
Bronchitis	6.5 (0.0-21.4)	5.0 (3.8-6.2)	3.6 (2.1-5.8)	3.6 (2.3-4.7)
Coughing	16.1 (5.5-33.7)	9.2 (7.8-10.8)	13.7 (10.7-17.3)	11.9 (9.9-14.2)
Allergy	19.4 (7.5-37.5)	18.3 (16.4-20.4)	12.8 (9.9-16.3)	10.6 (8.7-12.7)

[a] 95% confidence interval (CI)

Table IV. Distribution of ferritin and transferrin saturation among miners versus non-miners and smokers versus non-smokers. The data represent men aged 30 – 69 yrs.

	Non-smokers			Smokers		
	Miners n = 213 Mean (95% CI) [b]	Non-miners n = 477 Mean (95% CI) [b]	P [c]	Miners n = 200 Mean (95% CI) [b]	Non-miners n = 327 Mean (95% CI) [b]	P [c]
S-ferritin(µq/L) [a]	130 (104-156)	121 (98-144)	0.4	123 (99- 148)	115 (93- 137)	0.5
Transferrin saturation(%) [a]	25.3 (22.4-28.2)	25.7 (23.2-28.3)	0.7	26.1 (23.2-28.8)	25.6 (23.2-28.0)	0.7

[a] Multiple-adjusted for age, BMI, length of residence, pulmonary disease, pneumonia
[b] 95 % confidence interval (CI)
[c] p-value between miners and non-miners

The present analysis did not show significant differences with regard to s-ferritin and transferrin saturation levels, between miners and non-miners.

The s-ferritin level is the most specific biochemical test that correlates with total body iron stores. S-ferritin has been used as key parameter in several epidemiological studies where iron status has been measured (10,13-15). A low s-ferritin level reflects depleted iron stores, while a high s-ferritin can reflect iron overload. S-apoferritin is a part of the measured s-ferritin, and is an acute-phase reactant protein that is elevated in infectious, inflammatory and malignant diseases. Information about liver and kidney diseases and information about alcohol consumption, or medications were not available in this study. When merging the participants' records with the hospital database it was not possible to point out any differences among miners and non-miners concerning these diseases. There were no differences in self-reported pulmonary diseases between the different subgroups either, indicating that miners in general are not healthier than non-miners.

We found significant sex differences for both s-ferritin and transferrin saturation. Age had a major effect on s-ferritin in women, with values increasing from the age of 40. Previous studies have shown that it takes 7 - 10 years before a new iron balance is established in post-menopausal women (15). The Dan-Monica studies from Denmark demonstrated the same age variations (13,15,16). S-ferritin levels for men remained constant until 50 – 54 years of age, after which they declined with age. Similar variations have been reported for haemoglobin in elderly men (17).

In the present study, transferrin saturation also increased in women after 50 years of age, but not so clearly as for s-ferritin. For men, transferrin saturation remained constant into old age.

The prevalence of iron depletion was lower for men than women. The Danish study also reported considerable differences concerning the prevalence of iron deficiency between men and women, when age groups where compared (15 – 16).

In previous studies, it was reported that s-ferritin increases, and transferrin saturation decreases, with increasing BMI (18). In our study, s-ferritin increased significantly with increasing BMI as well, for both sexes. At the same time, transferrin saturation seemed to decrease, especially when BMI exceeded 29 kg/m^2, which is defined as obesity by WHO (19). There were no differences in BMI between male miners compared to non-miners.

Mining, as an occupation, had no significant influence on iron status in our study. Nor was it possible to demonstrate any effect related to smoking habits. The iron pellet factory in Kirkenes caused some environmental pollution; hence a major part of the population was, to some extent, exposed to iron-dust particles. However, we regard this exposure to be equal for all inhabitants, miners and non-miners alike.

The miners worked underground, and the slight diversity in iron stores between miner and non-miners could be explained by exposure to the iron ore. At the same time, mining is hard, physical work, and it is known that great losses of sweat during hard manual labour also lead to loss of iron (20). Only tiny amounts of iron are lost by this

route. It is not possible to document if these two effects counteract each other.

In 1994, the activity in the mine was already reduced and only a portion of the industrial workers were still working there. Therefore, it was difficult to draw any conclusions about the issue of iron dust intake and exposure. However, body iron accumulation caused by industrial exposure is not very likely, because this requires several decades of severe contamination (4).

Conclusions

In our study we found the same variations between sex and age groups concerning iron status in the general population as described in previous studies in Denmark. Natvig's finding from the 1960s, that haemoglobin level was higher among workers in iron metal industry, cannot be verified for the iron status in the same population thirty years later.

The results from this study did not indicate any relationship between iron industry and serum iron levels, neither for environmental exposure, nor for occupational exposure.

Acknowledgements

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Paper IV

Low prevalence of hereditary Haemochromatosis in multiethnic populations in northern Norway

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|Low prevalence of hereditary Haemochromatosis in multiethnic populations in northern Norway

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Summery

Hereditary haemochromatosis with the C282Y homozygosity is the most common genetic mutation in persons of northern European descent. A screen of two multiethnic populations in northern Norway was performed to investigate if the prevalence of hereditary haemochromatosis was consistent with previous results in northern Europe.

Participants in two population-based studies from Sør-Varanger and Tromsø, northern Norway, were analysed for s-ferritin and transferrin saturation. In both surveys the questionnaire had questions about ethnic affiliation, i.e. Norwegian, Sámi or Kven. Participants with transferrin saturation or s-ferritin above the reference limits in two separate blood samples were tested for three different HFE mutations, namely C282Y, H63D and S65. The estimated prevalence for C282Y/C282Y mutation in both municipalities was lower than in comparable studies in Norway. The prevalence was lowest in the Sør-Varanger population (men 0.19% and women 0.22%), which also had the highest portion of individuals with Sámi and Kven affiliation. Screening in Tromsø demonstrated that family screening and good expertise among physicians reduce the frequency of individuals with high iron levels as a result of hereditary haemochromatosis.

The prevalence of hereditary haemochromatosis is lower in multiethnic populations in northern Norway compared to previous studies from other parts of Norway. Although haemochromatosis fulfils the criteria established by the World health organization for population screening for medical condition, our study demonstrates that sufficient knowledge about this hereditable condition among physicians makes population screening unnecessary.

Key words: *Hereditary haemochromatosis, ferritin, transferrin saturation, Sør-Varanger, Tromsø, Sámi, Kven*

Low prevalence of hereditary Haemochromatosis in multiethnic populations in northern Norway

Introduction

The last ten years it has been a considerable focus on iron overload and hereditary haemochromatosis [1-3]. Iron overload can lead to progressive accumulation of iron and parenchymal damage of organs if untreated [4-5]. The inheritance pattern for haemochromatosis is autosomal-recessive. Especially homozygosis for C282Y mutation of the candidate gene for haemochromatosis (the HFE gene) is associated with increased body iron levels. However to what extent the mutation leads to phenotypic penetrance is controversial, and its presence is not always associated with iron overload and clinical disease [2]. Two other mutations, H63D and S65C, have also been associated with milder form of hereditary haemochromatosis [6].

In 1995 a comprehensive health survey programme (HUNT) was conducted in Nord-Trøndelag, a county in the middle of Norway, incorporating a large screening for hereditary haemochromatosis [7]. In total 65 717 (69.8%) people participated. The prevalence of hereditary haemochromatosis was 0.34% in women and 0.68% in men [7]. The C282Y homozygosity is a common genetic mutation, occurring in 0.3 to 0.7 % of white persons of northern European descent [8-11]. The degree of hereditary haemochromatosis is increasing northward. The northernmost part of Scandinavia consists of a multiethnic population of Sámi, Norwegian and Kvens. The Sámi people are defined as an indigenous people living in the northern part of Scandinavia and the Kola Peninsula in Russia. Norway has the greatest proportion of the total Sámi population. The Kvens is a group of Finnish descends that immigrated to northern part of Norway approximately to hundred years ago. Different ethnic groups could affect the prevalence of hereditary haemochromatosis as earlier described from studies of multiethnic populations in USA [12].

In Sweden a genetic study on three ethnic populations, Finns, Swedes and Swedish Sámi, displayed that the Sámi population differed from the Swedes with respect to all three mutant HFE alleles [13]. Sámi have lower frequencies of C282Y and H63D, whereas the frequency of S65C was highest in the Sámi. Hereditary haemochromatosis meets most of the World Health Organization criteria for population screening, the disease is relatively common, early diagnosis is possible and treating asymptomatic patients significantly prevents morbidity [14]. At the same time new techniques in molecular biology have made it possible to identify gene mutations that frequently occur in haemochromatosis. Family screening where patient's

siblings, parents and children are encouraged to measure s-ferritin and transferrin saturation is an alternative way of screening for hereditary haemochromatosis. An interesting question is therefore if family screening could be an alternative to former suggested population screenings of hereditary haemochromatosis.

The aim of this study was 1. to investigate if the prevalence of hereditary haemochromatosis in multiethnic populations in northern Norway corresponds to previous findings in Norway and northern Europe. 2. to investigate the prevalence of hereditary haemochromatosis in a Sámi, Kven and Norwegian population, respectively. 3. can previous systematic family screening by the health service, influence on the point prevalence of hereditary haemochromatosis in a population screening. The study gave us also an opportunity to observe the s-ferritin and transferrin saturation for individuals with hereditary haemochromatosis over time.

1.0 Material and methods

Subjects

Participants were recruited from two different population based studies in two town municipalities in northern Norway, namely Sør-Varanger in Finnmark county and Tromsø in Troms county. In Sør-Varanger the survey was conducted in 1994 and was a cross-sectional population-based study, which focused on possible health effects of nickel pollution from the Russian smelters in Nikel and Zapolyarny situated at 70° N, close to the common border between Norway and Russia. All adults between 18 and 69 years of age were invited to participate (n=6822). In total 3671 people participated corresponding to a participation rate of 60 %. Participation was higher among women (67.5 %) than men (52.2 %), and increased with increasing age. The study collected blood samples that were refrigerated. In 2000 blood samples were thawed and analysed from 3344 participants (61.4%), between the ages 25 - 69 years when participating. Participants younger than 25 year were not included in this study due to the fact that iron index start to elevate in the age of adult. Iron status was measured in 1787 women and 1557 men. The survey was a cooperation between, the Institute of Community medicine, University of Tromsø and The national Health Screening Service. Detailed description of the survey has previously been reported [15].

The Tromsø V study in 2001 was a population-based, prospective study of birth cohorts. Since 1974, the Institute of Community medicine, University of Tromsø, has conducted the

surveys, in cooperation with the National Health Screening Service. The subset studied consisted of those who attended a more extended examination of the 1994 – 95 survey, Tromsø IV, (all men born 1925 – 39, all women born 1925 – 44 and 5 – 10% random selection of the other age groups). In addition, all inhabitants born 1971, 1961, 1956 and 1941 were also invited in 2001. In the fifth Tromsø study 8130 subjects (78% of those invited) were investigated. Among these, 7965 gave an informed consent for later use of the data for research purposes, in total 4510 women and 3455 men, respectively. Information about s-ferritin and transferrin saturation was available in 7540 persons aged 30 – 89 years.

Classification of ethnicity

Different ethnic groups were determined by self-reported answers. The questionnaires had several questions on family background and language. The questions about ethnicity were not quite similar in the Tromsø and the Sør-Varanger surveys. In the Sør-Varanger survey, participants were asked which language was used at home for one or several of the grandparents; Sámi, Norwegian or Kven. In addition it was also asked about the ethnic affiliation to one or several of the grandparents; Sámi, Norwegian or Kven. Question about self-perceived ethnicity was not included in the questionnaire. It was possible to fill in more than one alternative. In the analysis ethnic groups were categorized based on the language or affiliation of the grandparents. The Sámi group had one or several grandparents with Sámi affiliation or language. The Kven group had had one or several grandparents with Kven affiliation or language. The Sámi/Kven group had one or several grandparents with both Sámi and Kven background. The Norwegian group had no information about Sámi or Kven affiliation or language.

In the Tromsø V survey the supplementary questionnaire had questions about each of the grandparent's language and affiliation. In the Tromsø survey, participants were asked which language was used at home for each of the grandparents; Sámi, Norwegian, Kven, Finnish or other languages (to be specified). In addition they were also asked about self-perceived ethnicity. In both surveys the participants were allowed to give more than one answer. Based on the questions, the populations were organized within the following categories; non-Sámi, Sámi, Kven and Sámi/Kven. The Sámi group had one or several grandparents with Sámi language or self-perceived Sámi ethnicity. The Kven and Finnish group were merged and called the Kven group. The Kven group had one or more grandparents with Kven/Finnish language or self-perceived Kven/Finnish ethnicity. The Norwegian group had no information about Sámi or Kven/Finnish affiliation or language.

Ethics

Both surveys were carried out in accordance with the Second Helsinki Declaration and were approved by the Regional Board of Research Ethics. Norwegian Data Inspectorate gave permission to store personal information about the participants. In relation to the extension of the Sør-Varanger study in1999, both the Regional Board of Research Ethics and the Norwegian Data Inspectorate gave a new approval.

All participants gave written, informed consent prior to screening.

Screening

The screening included phenotypic/genotypic screening. The initial screening tests were transferrin saturation and s-ferritin. Non-fasting blood samples were obtained at admission by means of venipuncture. In Sør-Varanger the serum samples were stored frozen at – 20 ° C until s-ferritin, s-iron, transferrin saturation and TIBC (total iron binding capacity) levels were analysed in 2000. In the Tromsø survey the serum samples were analysed immediately after taken.

S-ferritin, iron and transferrin were measured on a Hitachi 917 analyser from Boehringer Mannheim, Germany. All reagents were purchased from the same company. Iron was measured with a ferrozine method, and calibrated using Cfas, catalogue no 759350, Lot no 199462. Transferrin was measured with a turbidimetric assay, and calibrated using Cfas Proteins catalogue no 1355279, Lot no 196610. S-ferritin was measured with a turbidimetric assay, and calibrated using Cfas Proteins catalogue no 1355279. Lot no 196610. In an effort to harmonize s-ferritin levels within Norway at the time, the laboratory used a factor of 0.82 for s-ferritin analysis.

Transferrin was reported in g/L, and serum TIBC was calculated as s-TIBC umol/L = 25.1 x s-transferrin. Transferrin saturation (%) was calculated as

100 x (serum-iron/TIBC).

Phenotypic screening for hereditary haemochromatosis is to measure s-ferritin and transferrin saturation and with elevated levels the tests are considered positive and repeated, followed by analyses of genomic DNA.

The following predefined levels of iron store variables were absolute criteria for further evaluation, and new blood samples. Transferrin saturation above 44 % in both sexes. In addition, s-ferritin higher than 199µg/L in women and 299µg/L in men, independent of transferrin saturation. Participants with iron levels above reference limit were contacted again by letter and asked to take new blood samples at their local medical office. Blood samples

were transported to the Department of Clinical Chemistry, University Hospital of Northern Norway, Tromsø to be analysed.

DNA analysis

Participants with transferrin saturation or s-ferritin above the reference limits in two separate blood samples were tested for three different HFE mutations C282Y, H63D and S65C. Genomic DNA was isolated from spots of whole blood. The haemochromatosis gene mutation analyses of Cys282Tyr and His63Asp were performed according to Mangasser-Stephan K, Tag C, Reiser A, Gressner AM. Rapid Genotyping of Haemochromatosis Gene Mutations on the LightCycler with Fluorescent Hybridization Probes [16]. The His63Asp probes in this method also detect the Ser65Cys mutation, as verified by sequencing (data not shown). Absence of all these three mutations was designated as wild type.

Identification of cases from the hospital records

Individuals with hereditary haemochromatosis already under treatment with venesectio at their local hospitals would have achieved normal s-ferritin and transferrin saturation. Therefore they would not be discovered in the screening. In order to find participants with already diagnosed hereditary haemochromatosis, invited to the population studies, we linked the participant record to the Kirkenes and the University Hospital databases for the years of 1993 too 2001. Kirkenes hospital is the only hospital in the eastern part of Finnmark county. The hospital database therefore covers health information for the whole population. The University Hospital in Tromsø is more than 800 kilometres away. The University Hospital database covers health information for the population in Tromsø.

Statistical analyses

Analyses were stratified for sex and age. Distributions for s-ferritin showed positive skewness. Therefore s-ferritin values were logarithmically transformed and hence replaced by log e (ferritin). S-ferritin values were log – normally distributed.

S-ferritin was presented as geometric mean and corresponding 95 % confidence interval. Differences in iron levels across ethnic groups were tested by analysis of variance (ANOVA), stratified for age groups. The Tukey-Kramer test was used for pair-wise comparisons. Correlation between age and s-ferritin was assessed by Pearson's correlation coefficient (r). The prevalence was calculated with the formula; Point prevalence rate = all cases/population at risk x 100% [17].

The estimated prevalence was calculated as follow; cases in the screening/cases met in the second screening x 100 = X. X x non attendants in the second screening/ 100= estimated numbers in those who did not attend.

We used the SAS statistical software package version 9.1 (SAS Institute Inc., Cary, NC, USA).

Results

Study population

Table 1 show sex-specific characteristics at screening stratified for the two municipalities. The total number of subjects included in the current analysis, both studies counted, was 6297 women and 5012 men. The mean age at baseline in Sør-Varanger was 45 years for women and 46 years for men, respectively. Age range in both genders was 25 – 69 years. In the Tromsø V study the mean age for women was 59 years and for men 60 years, respectively. Age range was 30 – 89 years. Sámi and Kven affiliation are presented in table 1. Sør-Varanger municipality had the highest proportion of Sámi and Kven affiliation compared with Tromsø municipality.

Population distribution of transferrin saturation and s-ferritin

Mean transferrin saturation for women in Sør-Varanger was 23 % (95%CI; 23-24) and in Tromsø 25 % (95%CI; 25-26). For men mean transferrin saturation in Sør-Varanger and Tromsø was 26 % (95%CI; 26-27) and 27 % (95%CI; 27 – 27), respectively (table2). Transferrin saturation did not vary appreciably with age in either men or women (data not shown). Women in Tromsø had significant higher mean s-ferritin levels compared to Sør-Varanger, after the year of 40. Mean s-ferritin in women in Sør-Varanger and Tromsø was 35µg/l (95%CI; 33-36) and 53µg/l (95%CI, 52-55), respectively.

In all age groups mean s-ferritin levels were significantly higher for men than for women. Among men, mean s-ferritin declined with advancing age both in Tromsø and Sør-Varanger ($p < .0001$). Men in Tromsø had the highest mean s-ferritin level in all age groups, compared to men in Sør-Varanger, but the differences were significant only in age group 50 – 59 yr. Mean s-ferritin for men in Sør-Varanger and Tromsø were 90µg/l (95%CI; 87-94) and 92µg/l (95%CI; 90-95), respectively. Mean s-ferritin levels by age group, ethnic and geographic categories (both genders), are presented in table 3. Age groups are merged into two groups, before and after the age of 50, which we consider as the mean age of menopause for women.

Screening

An outline of the screening results is given in table 4. High transferrin saturation and/or high s-ferritin in repeated test was present in 74 women and 94 men in Sør-Varanger. The corresponding numbers in Tromsø were 253 women and 285 men, respectively. The screening revealed seven individuals in Sør-Varanger and six individuals in Tromsø

homozygous for the C282Y mutation in Tromsø. In Sør-Varanger, the observed prevalence of C282Y/ C282Y mutation among women and men, were 0.22% and 0.19%, respectively. In the Tromsø survey, the observed prevalence among women and men were 0.05% and 0.12%, respectively. In Sør-Varanger one woman (0.06%) and one man (0.06%) were diagnosed with C282Y/H63D mutation. In total, four participants were homozygous for the H63D mutation. Homozygote mutation for S65C was not demonstrated.
Calculated or estimated prevalence due to missing follow up is also presented in table 4.

Identification of hereditary haemochromatosis from the hospital record
The University Hospital database in Tromsø identified 42 patients (16 women and 26 men) who attended the screening program, and previously had been diagnosed with hereditary haemochromatosis from 1993 to 2001. In total, 11 of the 26 men had iron levels over reference limits in the screening and were tested for three known mutations. Among these, two were C282Y homozygote and therefore already included in the screening number. Additional two were C282Y heterozygote, one was H63D heterozygote. Six had wild type/wild type, and were excluded as having hereditary haemochromatosis in further analyses. Of the 16 women identified from the hospital record, eight had iron levels above reference limits. The two women diagnosed with hereditary haemochromatosis in the screening were already found in the hospital record. In addition two were C282Y heterozygote, three were H63D heterozygote and one was wild type/wild type. These individuals were also excluded as having hereditary haemochromatosis in the analysis. The period prevalence rate of C282Y/C282Y, including the patients from the Hospital database in Tromsø, became 0.23% in women and 0.57% in men. No individuals were found diagnosed with hereditary haemochromatosis in the patient's record at the Kirkenes Hospital.
Of the 13 participants in the screening with C282Y/ C282Y mutation two individuals reported both Sámi and Norwegian affiliation, one participant reported both Kven and Norwegian affiliation and one participant reported affiliation to another ethnic group.
Iron status in the phenotypic cases
Table 5 presents s-ferritin and transferrin saturation with corresponding 95 % confidence intervals in participant's diagnosed with C282Y homozygosity in the Tromsø and Sør-Varanger surveys. In addtion individuals found in the hospital record in Tromsø are included in the table. Also estimated prevalence where both screening, hospital records and estimated prevalence in the general population are included in the table 5. In women the percentage difference of the prevalences in Tromsø and Sør-Varanger was 0.32 (CI 95 %; - 0.19 %,

0.45 %). For men the percentage differenceof between the prevalences in Tromsø and Sør-Varanger was 0.40 % (CI 95 %; - 0.10 %, 0.70 %).

Figure 1 shows s-ferritin plotted against age for the 13 participants diagnosed in the screening in the Tromsø and Sør-Varanger surveys. There was no correlation between s-ferritin and age in Tromsø ($r=-0.46$, $p= 0.356$, $n=6$). Nor in Sør-Varanger was it any correlation between s-ferritin and age($r=0.54$, $p= 0.21$, $n=7$).

Discussion

Hereditary haemochromatosis is the most common genetic condition in populations with northern European origin [7, 18-20]. This haemochromatosis survey in northern Norway is the first screening study on this hereditary condition in a multiethnic population so far north in Europe. Our study includes a large group of ethnically and geographically diverse individuals. The present analyses demonstrated in general a low prevalence of C282Y mutation in northern Norway, especially among individuals with Sámi and Kven affiliation. The HUNT study in the middle part of Norway was carried out in a population more uniform with regard to ethnicity. The south Sámi population living in the Nord-Trøndelag county is fewer in number then the Sámi population further north. Ethnicity as a variable was neither included in the HUNT study [7]. Other studies which categorize different ethnic groups were performed on the American continent [2, 12]. This is therefore the first haemochromatosis screening study, incorporating the indigenous people in northern Scandinavia and the Kven immigrants.
The overall participation rate of 61 % in Sør-Varanger can partly be explained by the fact of low response rate from individuals younger than 30 years. This is due to administration rules for registration of postal addresses to their parents domicile at the time of military service and higher education. In the Tromsø V survey the participation rate of 80 % has followed previous studies. The predominance of female participants is representative for earlier medical research studies in Norway.The differences in mean age between the two municipalities are due to younger participants in Sør-Varanger and inclusion of older age-groups in Tromsø. Both mean s-ferritin and transferrin saturation are higher in Tromsø than in Sør-Varanger which partly can be explained by higher mean age values in the Tromsø participants. For men there is a significant difference in mean s-ferritin in the age-group 50 – 59 years between Tromsø and Sør-Varanger municipalities. For women s-ferritin in Tromsø in the three age groups 40-49, 50-59 and 60-69 was significant higher than in Sør-Varanger. In women s-ferritin increased significantly after the age of 50, which is consistent with onset of menopause. It seems that s-ferritin in general was higher in Tromsø than in Kirkenes. The present analysis did not show significant differences with regard to s-ferritin between the different ethnic categories. The study samples of the Sámi and Kvens are however small, especially in the Tromsø survey. Differences in s-ferritin and transferrin saturation, have recently been reported between Sámi inland inhabitants and coastal population, due to differences in food habits and obesity [21]. If this is the case in Tromsø and Sør-Varanger remain to be investigated.

Prevalence of hereditary haemochromatosis

The C282Y genotype was not as common in our study as in previous studies from Norway [7-9]. In order to include all participants with possible hereditary haemochromatosis, the reference limits for inclusion was lowered, compared to HUNT [7]. Also the haemochromatosis action programme initiated by the Norwegian Society of Haematology has higher reference limits before genotyping are recommended [22]. If the reference limits in HUNT were to be followed this would reduced the prevalence additional in our study to 0.02% in women and 0.06 % in men for C282Y homozygosity. However, in the initial screening it was few participants with Sámi or Kven affiliation. At the same time HFE mutations was most common in the Tromsø population, with few reported participants of Sámi and Kven affiliation. The low prevalence of C282Y homozygosity in the Sør-Varanger study can most likely be explained by the multiethnic population. Another explanation can be the degree of missing on follow ups. The calculated or estimated prevalence are more in consistent with the prevalence in HUNT. However to estimate a prevalence in a population is difficult and the result most therefore be considered as guiding. Genetic- screening of the different ethnic groups would in this case give the definitive answer.

Population screening versus family screening

Andersen et al claimed that the average individual in the general population with C282Y homozygosity has a modest increase in transferrin saturation and s-ferritin during 25 years follow-up [23]. The future challenge will be to identify the few C282Y homozygotes who develop serious progressive iron accumulation leading to organ damage. Also our screening study revealed few individuals with hereditary haemochromatosis with very high iron levels. In the Tromsø population, the majority of individuals with hereditary haemochromatosis already were diagnosed and under treatment by the health care system. These individuals had achieved normal iron levels by venesectio. Another issue is that the International Classification system of Diseases (ICD) does not cover medical conditions as hyperferritinemi satisfactory which induce incorrect use of codes. In total 14 individuals diagnosed with hereditary haemochromatosis in the hospital record in Tromsø did not satisfy the diagnostic criteria for haemochromatosis.

Potential limitations of the study

A weakness of the study is the 10 % missing answers in the Tromsø survey to the questions about ethnicity. This may be due to the sensitiveness of these questions.

Another weakness is the degree of missing of follow ups. In Sør-Varanger this can partly be explained by the long time interval between the first cross-sectional study was done in 1994 and second contact in 2000.

Ethnicity in epidemiological research is used increasingly as a key variable to compare populations in terms of health and risks for diseases [24-25]. Our research is done in two separate surveys where questions about ethnic affiliation were unified, which made the ethnic categorization difficult. However, based on the knowledge of the degree of multiethnic composition in each of the two communities, it is still possible to make conclusions on health aspects as hereditary haemochromatosis viewed against ethnic groups [26].

Clinical manifestation in hereditary haemochromatosis often appears after 40 years of age, many young participants can therefore influence on the prevalence of C282Y homozygosity when phenotypic screening are performed. However, the majority of the participants were middle-aged or older in both surveys. Selection bias due to over representation of individuals with iron overload is unlikely, because both surveys were population based and included all inhabitants in the selected age groups.

Conclusion

The results from our analyses indicate that the prevalence of hereditary haemochromatosis may be lower in multiethnic populations in northern Norway compared to previous studies from other parts of Norway. Though haemochromatosis fulfils the criteria established by the World health organization for population screening for medical condition, our study demonstrates that family screening can be an alternative to population screening for hereditary haemochromatosis.

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Table I. Baseline characteristics of the participants in the Tromsø and Sør-Varanger surveys (n=7965 and n=3344)

	Tromsø		**Sør-Varanger**	
	n	%	n	%
Men	N 3455		N 1557	
Age				
25 -29			156	10.0
30 -39	278	8.1	370	23.8
40 - 49	598	17.3	404	25.9
50 - 59	359	10.4	313	20.1
60 - 69	1232	35.6	314	20.2
70 - 79	872	25.2		
80 +	116	3.4		
Ethnicity[1]				
Non – Sámi	2851	93.0	734	47.1
Sámi	108	3.5	105	6.7
Kven	60	2.0	501	32.2
Both Sámi and Kven	45	1.5	217	13.9
Women	N 4510		N 1787	
Age				
25 -29			239	13.3
30 -39	417	9.2	441	24.7
40 - 49	733	16.2	439	24.6
50 - 59	702	15.6	344	19.3
60 - 69	1434	31.8	324	18.1
70 - 79	1077	23.9		
80 +	147	3.3		
Ethnicity[1]				
Non – Sámi	3683	91.1	822	46.0
Sámi	154	3.8	121	6.8
Kven	141	3.5	565	31.6
Both Sámi and Kven	64	1.6	279	15.6

[1] Subgroups may not total to 8130 and 3344, due to missing values

Table II. Distribution of s-ferritin µg/l in women and men in the Tromsø and Sør-Varanger surveys

	Tromsø	**Sør-Varanger**
Age (yr)	Mean [95%CI] [1]	Mean [95% CI] [1]
Men		
25 -29		96 [89-104]
30 -39	99 [91-108]	94 [88-100]
40 - 49	106 [100-112]	94 [87-101]
50 - 59	109 [101-118]	87 [80-95]
60 - 69	92 [88-96]	84 [77-92]
70 - 79	79 [75-83]	
80 +	66 [56-78]	
Total	92 [90 - 95]	90 [87 - 94]
Women		
25 - 29		30 [27 -32]
30 - 39	29 [28-32]	28 [26 -29]
40 - 49	31 [29-33]	25 [24 -28]
50 - 59	62 [58-66]	47 [43 -51]
60 - 69	69 [67-72]	58 [53 -63]
70 - 79	62 [59-65]	
80 +	58 [52-66]	
Total	53 [52 - 55]	35 [33 - 36]

[1] Geometric mean [95 % confidence interval]

Table III. S-ferritin in the Tromsø and Sør-Varanger surveys stratified for ethnic groups

S-ferritin (µg/l) [1]

	Tromsø				Sør-Varanger			
	Non-sámi	Sámi	Kven	Sámi and Kven	Non-sámi	Sámi	Kven	Sámi and Kven
Men	N 2851	N 108	N 60	N 45	N 734	N 105	N 501	N 217
Age (yr)								
< 50 [2]	102 [96-108]	141 [108-185]	82[55-122]	123[81-186]	92 [87-98]	94 [81-108]	98 [91-106]	93 [84-103]
> 49 [3]	89 [86-92]	81 [67-97]	95[72-126]	77 [58-103]	88 [80-96]	87 [66-115]	83 [74-93]	81 [68-95]
Women	N 3683	N 154	N 141	N 64	N 822	N 121	N 565	N 279
Age (yr)								
< 50 [2]	30 [28-31]	18 [18-30]	28 [20-41]	31 [21-57]	28 [26-30]	25 [21-30]	26 [24-28]	27 [24-30]
> 49 [3]	66 [64-68]	56 [48-65]	60 [52-71]	48 [38-60]	53 [48-58]	51 [40-64]	64 [59-69]	50 [42-60]

[1] Values are presented as geometric mean [95% confidence interval]
[2] Age group are 30 – 49 yr in the Tromsø study and 25 – 49 yr in the Sør-Varanger study
[3] Age group are 50 – 89 yr in the Tromsø study and 50 – 69 yr in the Sør-Varanger study

Table IV. Outline of the screening results

Event	Women		Men	
	N	%	N	%
Tromsø				
Transferrin saturation/ s-ferritin measured	4266		3274	
First screening; High iron measurement *	253	5.9	285	8.7
Second screening number of participants	198	78.3	184	64.6
High iron measurement *	123	62.1	112	60.9
Genotype				
C282Y/C282Y	2	0.05	4	0.12
C282Y/H63D	2	0.05	2	0.06
H63D/H63D	0	0	1	0.06
Estimated prevalence of C282Y/C282Y	2.56	0.06	5.86	0.18
Sør-Varanger				
Transferrin saturation/ s-ferritin measured	1787		1557	
First screening; High iron measurement *	74	4.1	94	6.0
Second screening number of participants	44	59.5	54	57.4
High iron measurement *	32	72.7	40	74.1
Genotype				
C282Y/C282Y	4	0.22	3	0.22
C282Y/H63D	1	0.06	1	0.06
H63D/H63D	1	0.06	2	0.06
Estimated prevalence of C282Y/C282Y	6.72	0.38	5.22	0.34

* *Transferrin saturation > 44 % in both genders and s-ferritin > 199 µg/l in women and s-ferritin > 299 µg/l in men*

Table V. Findings in individuals diagnosed with C282Y/C282Y mutation from the Screening and individuals diagnosed with hereditary hemchromatosis in the Hospital record.

		N	Prevalence [1]	S-ferritin [2]	Transferrin saturation [3]
Men					
Tromsø	Screening	4	0.12	412 [152-1120]	74 [62-86]
	Record [4]	15	0.58	163 [87-302]	41 [30-52]
	Estimated [5]	1.86	0.64		
Sør-Varanger	Screening	3	0.22	369 [259-501]	52 [39-65]
	Record [4]	0	0.22		
	Estimated [5]	2.22	0.34		
Women					
Tromsø	Screening	2	0.05	432[350-535]	79 [69-88]
	Record [4]	8	0.23	122 [47-316]	39 [22-56]
	Estimated [5]	0.56	0.25		
Sør-Varanger	Screening	4	0.22	214 [88-520]	73 [57-87]
	Record [4]	0	0.22		
	Estimated [5]		0.38		

[1] Different prevalences
[2] Mean s-ferritin (µg/l) with corresponding 95% confidence interval
[3] Mean transferrin saturation (%) with corresponding 95% confidence interval
[4] Remaining individuals diagnosed with hereditary haemochromatosis, from University Hospital in Tromsø, whom not had been diagnosed in the screening or excluded, due negative genotyping . Prevalence is both screening and record.
[5] Prevalence is screening, record and

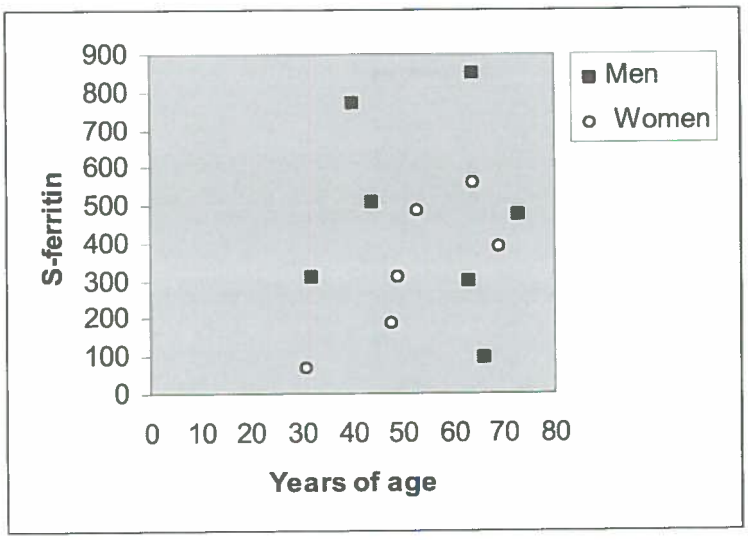

Figure 1 *S-ferritin plotted against age for the 13 individuals diagnosed with homozygous for the C282Y mutation*

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Av Anders Forsdahl, 1976. (nytt opplag 1990)

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Av Anders Forsdahl, 1977.

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