UiT The Arctic University of Norway

Faculty of Health Sciences – Department of Community Medicine

The educational gradient in intake of energy, macro- and micronutrients in the Tromsø Study 2015-2016

Linn Nilsen

Master thesis in Public Health …. HEL-3950 …. May 2020
Supervisor: Marie W. Lundblad[1], PhD student, MPH
Co-supervisor and project leader: Laila A. Hopstock[1], researcher PhD
Co-supervisor: Guri Skeie[1], professor PhD
[1]Department of Community Medicine, UiT The Arctic University of Norway

Acknowledgement

Almost two years have passed since I left a full-time job in favor of a master´s degree in public health at UiT the Arctic University of Norway. I decided to return to the school bench because I wanted to explore something new and to increase the number of opportunities on the work market, and I have not regretted for a minute. The master in public health-program has been interesting, rewarding, challenging and has broadened my horizon. I have learned about several aspects of public health and about myself. I have found myself enjoying learning new things and to get the opportunity to deep dive into specific topics, like the master thesis.

The master thesis has been a journey, from the birth of an idea to the final product in my hands today. Throughout the whole process I have been very lucky having excellent and caring supervisors. Already during my first semester of the master program, PhD student Marie W. Lundblad offered herself to be my supervisor. Together with Marie, researcher/PhD Laila A. Hopstock was happy co-supervise and professor Guri Skeie could serve as the nutrition expert. Throughout the whole process I have known that my supervisors have been only a few clicks on the keyboard, or a few steps at MH, away – and I have always gotten the help or advise I needed, when I needed it. Even during the corona-outbreak, with home-kindergarten, home-schooling and home-office at the same time, my supervisors have always taken the time to read the thesis, answer my emails and to meet me digitally in Teams. A viral outbreak, or toddlers who really (!) wants to jump in the bed (which is currently the location of the home-office) during digital supervision in Teams, can´t stop these ladies! I am amazed by the capacity, brilliance and knowledge of these superwomen and I am forever grateful for the help, care and supervision I have gotten from them.

The master program has also given me the opportunity to get to know wonderful and interesting people. I have co-students from different corners of the world and have, besides learning about public health, learnt so much about different cultures and traditions. There has not been a single boring lunch with this wonderful gang, and I am grateful for the friendships I have made. I have really appreciated the conversations we have had and the numbers of hours we have spent together in group-rooms preparing for exams or writing the master thesis. Discussing thoughts and ideas together with someone makes everything easier, and I have really missed this opportunity during the corona-outbreak.

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At the very end of the master program in public health I find myself carrying more knowledge and having new interests that I did not have two years ago. I have grown more and more fond of deep diving into topics and explore relevant questions and would love for the opportunity to continue this by taking a PhD. I am grateful for the experience this master program and thesis have given me, and hope I get the opportunity to attain more.

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Abstract

Background: Socioeconomic status is associated with inequalities in health worldwide. In Norway, women and men with tertiary education live 5-6 years longer than persons with primary education. Unhealthy diet is a risk factor for several non-communicable diseases, and socioeconomic inequalities exists also in diet. The current literature on socioeconomic status and diet in Nordic countries have been inconsistent.

Aim: To investigate the relationship between educational level and the intake of total energy, macro- and micronutrients.

Participants: 11 302 women and men aged 40-96 years from the municipality of Tromsø, Norway.

Methods: I used data from the seventh wave of the Tromsø Study, conducted in 2015-2016. All inhabitants in Tromsø municipality aged 40 years and older (n = 32 591) were invited to Tromsø 7. A total of 21 083 participants aged 40-99 years attended, resulting in an attendance of 65 %. Diet was assessed using a comprehensive and validated food-frequency questionnaire (FFQ) developed at the University of Oslo. Participants who answered less than 90 % of the FFQ, the 1 % with the highest and lowest energy intake and participants with missing data on education level were excluded from the final sample. To investigate the relationship between education level and the intake of energy, macro- and micronutrients, linear and logistic regression analysis were used. All analysis were performed in women and men separate in strata of educational level, and adjusted for potential covariates (age, body mass index, physical activity level and smoking status). The intake of macro- and micronutrients was compared with the Nordic Nutrition Recommendations.

Results: A positive educational gradient was found for fiber, alcohol, vitamin C, folate and iron, and a negative educational gradient was found for carbohydrates, added sugar and iodine in both women and men. A positive educational gradient was also found for energy, total fat, monounsaturated fatty acids and vitamin D in women, and a negative educational gradient was found for saturated fatty acids in men. Compared to participants with primary education, those with long tertiary education had higher odds of being compliant with seven out of eighteen nutrient recommendations presented in this study.

Conclusion: There is an educational gradient in diet in the Tromsø 7 Study, and in most cases the participants with higher education level were considered healthier.

Keywords

Abbreviations

BMI	Body mass index
CI	Confidence Interval
E%	Percentage of total energy intake
FFQ	Food frequency questionnaire
g	Grams
HDL	High density lipoprotein
KBS	Kostberegningssystemet
LCHF	Low-carbohydrate-high-fat
LDL	Low density lipoprotein
mg	Milligrams
MJ	Megajoule
MUFAs	Monounsaturated fatty acids
NCD	Non-communicable disease
NNR 2012	Nordic Nutrition Recommendations 2012
PUFAs	Polyunsaturated fatty acids
RAE	Retinol activity equivalents
REC	The Regional Committee of Medical and Health Research Ethics
SD	Standard deviation
SES	Socioeconomic status
SFAs	Saturated fatty acids
UiO	University of Oslo
WHO	World Health Organization
µg	Micrograms

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1 Background

1.1 Socioeconomic status and health

World Health Organization (WHO) states that "*health and well-being outcomes are determined by the conditions in which people are born, grow, live, work and age, genetic and biological determinants, as well as the social determinants of health – the political, social, economic, institutional and environmental factors which shape the conditions of daily life*" (1 p. 4). Socioeconomic status (SES) is the social position of an individual, and can be measured by among others education, occupation, income or a combination of these (2). Inequalities in social and economic factors like education, income and neighborhood are causing inequalities in health worldwide (3). Studies from Europe have shown that those with lower SES have higher overall mortality, morbidity and prevalence of risk factors like smoking, diabetes and obesity compared to persons with a higher SES (3-8). The explanation for this social gradient in health is complex and not fully understood. A plausible mechanism is that factors like education and income influence health-related behaviors like dietary habits, physical activity level and smoking status (3, 6). Education level has shown to be a good indicator for SES in studies of different outcomes (9-12). To reduce social inequalities is a central goal in health strategies around the globe, among others in WHO Europe´s policy framework "HEALTH 2020" and in the Norwegian Public Health Report (Folkehelsemeldinga) (8, 13).

1.2 Non-communicable diseases

Non-communicable diseases (NCDs) are the worldwide leading cause of death and were estimated to contribute to 73 % of all deaths globally in 2017 (14). The rate of deaths from NCDs worldwide has increased from 494 to 538 per 100 000 in only 10 years and represents a consequence of the epidemiological transition – the shift from communicable to non-communicable diseases - we have observed during the last decades (14, 15). In 2017, 27 % of these deaths were attributable to (preventable) dietary risk factors (16). Among the dietary factors, low intake of fruits and whole grains and a high intake of sodium were found to be the leading risk factors for death and disability-adjusted-life-years (DALYs) in a systematic analysis from The Global Burden of Disease Study 2017 (16). Other dietary factors have also shown to play a persistent role in the development of NCDs. The balance between the intake of saturated fatty acids (SFAs) versus monounsaturated fatty acids (MUFAs) and polyunsaturated fatty acids (PUFAs) has shown to have an important role in the development of coronary heart disease (17), and there is moderate to strong evidence that consumption of

fruit, berries, vegetables, wholegrain and PUFAs from fish can reduce the risk of several NCDs including type-2 diabetes and cancer (18).

1.3 Socioeconomic status and diet

A social gradient is observed also in diet. The relationship between SES and diet has been investigated during the last decade, but the results were somewhat inconsistent. A systematic review from 2010 (19) included 47 studies on socioeconomic inequalities in dietary intakes associated with weight gain and overweight/obesity in European adults. Main findings were; trends along SES-groups for energy intake are inconsistent, strong trend for lower consumption of fruit and vegetables and a weaker trend for higher intake of total fat and lower intake of fiber in the lower SES-groups compared to the higher SES-groups (19). Studies from the Nordic countries have among others found that educational level is positively associated with consumption of fruit and vegetables and inversely associated with intake of red meat (20), and that higher educational level is a significant determinant for a lower intake of SFA in men and a higher intake of PUFA in women (21). In addition, higher levels of education is associated with lower intake of total fat and higher intake of fiber, vitamin C and beta-carotene compared to those with lower level of education (22).

1.4 The situation in Norway

Norway is considered one of the best countries in the world to live in and was ranked as number one in the United Nations Human Development Index in 2017 (23). Education is free, and 34 % of the adult population had higher tertiary education in 2018 (24). The annual average wage of 50 956 US dollars is among the highest in the world and 71 % of the population aged 16 years or older are employed or under education (25, 26). Despite this, social inequalities in health exist also in Norway. Compared to individuals with primary education, Norwegian men and women with tertiary education lives 5-6 years longer, have lower prevalence of several NCDs, smoke less and are more physically active (5, 27). Cardiovascular risk factors like high body mass index (BMI), high blood cholesterol and hypertension have shown to have persistently higher prevalence in individuals with lower education compared to those with higher education (4, 5).

Dietary habits have also been found to differ between levels of SES (22, 28-31). The national dietary survey NORKOST 3 from 2010-2011 (n=1787) found a higher intake of grain products, vegetables, fruit and berries, juice, tea, wine, fiber, vitamin B6, folate, vitamin C and magnesium in both women and men with tertiary education compared to those with

primary/secondary education (29). In women they found a higher intake of energy, protein, fat, MUFAs, PUFAs and iron, and in men they found a higher intake of alcohol among those with the highest education compared to the lowest education (29). A study from 1998 (using a nation-wide random sample of Norwegian women aged 45-69 years) found that educational level was negatively associated with proportion of total energy intake (E%) from fat and positively associated with dietary fiber density and intake of fruits, vegetables and potatoes (32). A study from 2000-2001 (on adults aged 30-60 years in Oslo) found that those with tertiary education had the lowest likelihood of having a "Western" food pattern (high factor loadings for french fries, hot dogs, hamburgers, bearnaise sauce, coleslaw, pizza, potato salad/mashed potatoes, crisps, mayonnaise and soft drinks with sugar), and the highest likelihood of having a "prudent" food pattern (based on fruit, vegetables, dishes with fish, beans/lentils, shellfish, oil, oil-based dressings and sour cream) (33).

1.5 The situation in Troms and Finnmark

The recent online public health survey that was conducted among adults (18+ years) in Norway´s northernmost county Troms and Finnmark in 2019 (n=21 761, response 44%, mean age=47 years) found an educational gradient in line with results from other studies (34). Compared to participants with lower education, those with higher education reported to have lower BMI, were more physically active, smoked less, had better self-reported health and were more satisfied with their life (34). A higher proportion of participants reported daily intake of vegetables, fruit and berries and weekly (or more) intake of fish among those with tertiary education compared to those with primary education (34). The participants with tertiary education did, however, also have a higher intake of alcohol and sugar-sweetened soft drinks (34). Women, higher educated participants and the age-group 45-65 years were overrepresented in the survey (34). A study from the fourth wave of the Tromsø Study (1994-1995) found that educational level was negatively associated with the intake of total fat, SFAs and PUFAs, and positively associated with the intake of alcohol, dietary fiber, beta-carotene and vitamin C in both women and men (22).

1.6 Dietary recommendations and strategies in Norway

The Norwegian National Action Plan for a Healthier Diet (2017-2021) (28) is in line with WHO´s Global Action Plan for the Prevention and Control of Non-communicable diseases 2013-2020 (35), and aims to achieve "*a healthy and varied diet for the entire population, regardless of gender, age, geographical location, socioeconomic status, cultural background, level of ability, religion and life philosophy*" (36 p. 8). To reduce the social gradient in diet is

a central goal, and it is highlighted that research is needed in order to understand and reduce it. Frameworks for meals in kindergartens, schools, workplaces and in healthcare, and information and education regarding a healthy diet are among the strategies mentioned in order to reach the goals. The plan contains quantitative goals regarding population-level consumption of food groups as vegetables, fruits, berries and fish and nutrients as added sugar and saturated fat, that is sought to be reached within 2021 (28).

Norway has both food-based dietary guidelines (37) and specific recommendations on macro- and micronutrients (38), published by the Norwegian Directorate of Health. The Norwegian dietary guidelines and nutrient recommendations are based on the Nordic Nutrition Recommendations 2012 (NNR 2012) (39) and the systematic review "Diet Recommendations to Promote Public Health and Prevent Chronic Diseases" (18). NNR 2012 is a collaboration between the Nordic countries and represents the scientific foundation for recommendations, guidelines and nutritional policies in Norway, Sweden, Finland, Denmark and Iceland (39). A new edition of NNR is sought to be published in 2022 (40).

The Norwegian nutrient recommendations are meant as guidelines for policymakers, health-professionals and individuals involved in public health work. The nutrient recommendations consist of recommendations on macronutrients as E% and vitamins and minerals as recommended total intake per day (gram (g), milligram (mg) or microgram (μg) per day) (Table 1) (38). For micronutrients, NNR 2012 also presents levels for average requirement, lower intake level and upper intake level, in addition to recommended intake (41).

NNR 2012 recommend that micronutrient intake on group level is evaluated as risk for inadequate or excessive intake rather than average intake, because the average intake of the group not necessarily present what is adequate (41). Thus, NNR 2012 recommends to assess micronutrient intake in a group by assessing 1) the proportion of the group with minimal probability of inadequacy (intake above the recommended intake), 2) the proportion with relatively high probability of inadequate intake (intake below average requirement), 3) the proportion with very high probability of inadequate intake (intake below the lower intake level) and 4) the proportion with high probability of excessive intake (intake above the upper intake level) (41). However, several national dietary surveys, among others the Norwegian survey NORKOST 3 (29), the Swedish survey Riksmaten 2010-2011 (42) and the Finnish survey FINDIET 2012 and 2007 (43), presents the micronutrient intake of the population by the average intake. A recent study from the Tromsø Study 2015-2016 found that a low

proportion of the participants were below the lower intake and average requirement level for most of the micronutrients (44)

Table 1: Recommended intake of selected macro- and micronutrients from The Nordic Nutrition Recommendations 2012

Energy-providing macronutrients	Recommendation
Carbohydrates	45-60 E%
- Added sugar	< 10 E%
- Dietary fiber	≥ 25 g/day for women/ ≥ 35 g/per day for men
Protein	10-20 E%/15-20 E% for individuals aged 65 years and older
Fat	25-40 E%
- Saturated fatty acids	< 10 E%
- Monounsaturated fatty acids	10-20 E%
- Polyunsaturated fatty acids	5-10 E%
- Trans-fat	< 1 E%
- Omega-3 and Omega-6	≥ 3 E%, minimum 0.5 E% omega-3
Alcohol	< 5 E%
Micronutrients	**Recommendation**
Vitamin A	≥ 700 RAE/day for women/> 900 RAE/day for men
Vitamin D	≥ 10 µg/day
Vitamin C	≥ 75 mg/day
Folate	≥ 300 µg/day (400 µg/day for women of reproductive age)
Iron	≥ 15 mg/day for pre-menopausal women/≥ 9 mg/day for men and postmenopausal women
Calcium	≥ 800 mg/day
Iodine	≥ 150 µg/day

Recommendations for adults ≥40 years
E%, Proportion of total energy intake. RAE, Retinol Activity Equivalents.

In addition to the food-based dietary guidelines, the nutrient recommendations and the Norwegian Action Plan for a Healthier Diet, Norway also has a national strategy for improving the health literacy of the population (45). Health literacy is defined as "*an individual´s knowledge, motivation and skills to access, understand, evaluate and apply health information* " (46 p. 5), and includes both choices regarding lifestyle, disease-preventing measures, self-management of disease and use of health care. The strategy highlights the importance of a high degree of health literacy because this among others give individuals the prerequisite to make healthy lifestyle choices, and mentions that low health literacy is associated with among others low educational level (45). There are currently no published national studies mapping the health literacy in the Norwegian population, but a national survey is being conducted in 2019-2020 and is sought to be delivered to the Ministry of Health and Care Services within 2020 (45). Examples of national activities that are relevant for health literacy include availability of information, for example through the web-portal www.helsenorge.no, and campaigns like "Bare du" (only you), published by the Directorate

of Health, to motivate individuals to change their habits regarding physical activity, diet and tobacco use (45).

1.7 Potential consequences of unfavorable intake of energy, macro- and micronutrients

NNR 2012 is among the most thoroughly documented and well-researched works within nutritional science worldwide, and is based on numerous studies and systematic reviews (39). The recommended levels for average requirements, recommended intake, upper intake level and lower intake level for the specific nutrients are based on the best available evidence on the body´s requirement, adverse or toxic effects of high intake and clinical deficiency symptoms because of low intake. To avoid potential adverse effects of unfavorable intakes and to maintain good health are important purposes of the recommendations.

Each of the macronutrients provide energy and have essential functions in the body (39). It is well documented that excess energy intake is a risk factor for weight gain/obesity, cardiovascular disease and cancer (39). Excess intake of SFAs, trans-fat and sugar is a risk factor for cardiovascular disease, cancer and caries, respectively, and insufficient intake of proteins may inhibit growth and cause sarcopenia (39). Fiber has beneficial effects on digestion, plasma lipids and blood pressure and has protective effects against cardiovascular disease and cancer (39). An intake of MUFAs and PUFAs in favor of SFAs has beneficial effects on cholesterol and may decrease the risk of cardiovascular disease (39).

Also, the micronutrients have essential functions in the body and adverse effects may occur if the intake is too high or too low. Vitamin A is essential for among others vision, immune competence and reproduction, and deficiency may cause xerophthalmia (ocular features) and impaired resistance to infections (39). Vitamin A deficiency is a public health problem in over 120 countries, but is uncommon in developed countries (39). Low intake of vitamin D is a risk factor for rickets, bone fractures and cardiovascular disease, and the intake has been found to be suboptimal in the Norwegian population (39). Vitamin C improves absorption of non-haem iron, functions as an antioxidant, and a low intake may decrease antioxidant capacity and cause fatigue, irritability or scurvy (39). Low intake of folate is a risk factor for neural tube defects during pregnancy, and an adequate intake is protective against poor cognitive function and some of the neurological disorders that tend to develop among elderly, some types of cancer and severe and subclinical cardiovascular disease outcomes (39). Iron is essential for the oxygen-binding part of haemoglobin and myoglobin, and deficiency may

cause anemia (39). Calcium is the largest compound of bones and teeth, and is essential for bone health and may decrease risk of colorectal cancer and prostate cancer (39). Iodine is essential for regulation of metabolism and deficiency presents as goiter (enlarged thyroid gland), which in turns may lead to an increase in metabolism (39).

The micronutrient intake in Tromsø 7 has been presented previously by Lundblad et al. (44). The authors found, among others, that 45 % and 40 % had an intake of vitamin D and folate, respectively, below the recommended intake (44). Additionally, 33 % and 31 % of women, and 26 % and 22 % of men had an intake of iron and calcium, respectively, below the recommended intake (44). Furthermore, 12 % of women and 22 % of men had an intake of vitamin A and vitamin C below the recommended intake, and less than 10 % had an intake of iodine below the recommended intake (44).

1.8 Rationale for the study

Population surveys and research of high quality that investigate a wide range of both nutrients and food groups are crucial in order to evaluate progress and propose measures towards the goals in The Norwegian National Action Plan for a Healthier Diet (2017-2021) (28). The most recent national population survey presenting diet in groups of SES in Norway, NORKOST 3, was conducted in 2010-2011 (29). Thus, there is a need for updated data. The Norwegian Directorate of Health publish an annual update on the development in diet in Norway, but this is based on food supply statistics and does not present numbers in groups of SES (47). Other studies on SES and diet from Nordic countries have shown somewhat inconsistent results, and have collected dietary data using food frequency questionnaires (FFQs) with relatively few questions and/or have a sample size of less than 2000 participants (20-22, 34). The National Cancer Institute suggests that questions on 80-120 food items are needed in order for an FFQ to be able to assess the total diet (48).

The present study provides updated data, has a large sample size and has assessed diet using a comprehensive FFQ. Thus, this study can contribute to valuable knowledge regarding SES and diet in Norway and may reveal associations not found in previous studies.

1.9 Objective and research question

The objective of this study is to investigate the educational gradient in diet in a general Norwegian population of adults and elderly through analyses of the intake of total energy, macro- and micronutrients and the compliance with NNR 2012 across educational levels and

sex. Thus, the research question is: what is the relationship between education level and the intake of total energy, macro- and micronutrients in the seventh survey of the Tromsø Study?

2 Materials and methods

2.1 The Tromsø Study

The Tromsø Study is an ongoing population-based cohort study in the municipality of Tromsø, the largest city in Northern Norway. The municipality consists of both urban and rural living areas and the population is similar to the general Norwegian population in regards to the distribution of sex, age and educational attainment (24, 49). The Tromsø Study consists of seven completed surveys (Tromsø 1-Tromsø 7), whereas the first survey was conducted in 1974 and the seventh survey was conducted in 2015-16 (50). In Tromsø 7 (2015-16) all inhabitants in Tromsø municipality aged 40 years and older (n = 32 591) were invited. A total of 21 083 participants aged 40-99 years attended, resulting in an attendance of 65 % (51).

2.1.1 Data collection

In Tromsø 7, invitations (Appendix 1) were sent by mail and included detailed information about the Tromsø Study data collection and -use, a paper version of Questionnaire 1 (Q1) (Appendix 2) and username and password to complete questionnaires online. Q1 could be filled in by hand on paper or online. At attendance, among others, height and weight were measured by trained technicians. The Tromsø 7 data collection took place between March 2015 and October 2016.

2.1.2 The food frequency questionnaire

To collect dietary data, an extensive FFQ developed at the University of Oslo (UiO) was used to measure food patterns and nutrient intake during the last year in a Norwegian context (Appendix 3). This FFQ has been validated for intake of energy, fruit, vegetables (52) and most antioxidant-rich foods (53) in representative samples of 232 and 346 Norwegian adults. The FFQ was handed out to all Tromsø 7 participants at the examination site and could be filled out at site or at home and then be returned by mail in a pre-paid envelope. The last FFQ was returned in February 2017. The FFQ consists of 13 pages with questions about 261 different food items, dishes, drinks including alcoholic beverages and meals. Dietary supplements were also included (cod-liver oil, omega-3, multi supplements, iron supplements and vitamin B, C, D, E and folate). The questionnaire included measures on frequency and amounts of food intake, in addition to open questions. Further descriptions of the FFQ, instructions given to participants and the process of checking, scanning, reading and importation of the FFQ have previously been described in detail by Lundblad et al (44). Calculation of food, macro- and micronutrient intake was performed at UiO using the food

composition database Kostberegningssystemet (KBS) AE14 and KBS software system (KBS, version 7.3.). The food database KBS AE14 is based on the Norwegian food composition tables from 2014 and 2015 (54), supplemented with data from calculated recipes and other databases. A total of 15 146 participants aged 40-96 years returned the questionnaire (response 72% for participants who attended Tromsø 7).

2.2 Study sample and exclusion criteria

In this analysis, in accordance with Lundblad et al (44), participants were excluded based on completeness of the FFQ and highly unrealistic total energy intakes. Firstly, participants that completed less than 90 % of the FFQ (n=3489), and secondly, the 1 % with the highest and lowest energy intake (below 3.95 megajoule (MJ) or above 21.3 MJ per day) (n=232) was excluded. Thirdly, all cases with missing data for education level (n=123) were excluded. Finally, a total of 11 302 participants were included in the analysis. This equals 54 % of all participants in Tromsø 7 and 75 % of all participants that returned the FFQ. Because of the exclusion criteria, there were no cases with missing values for total energy or any of the nutrients of interest.
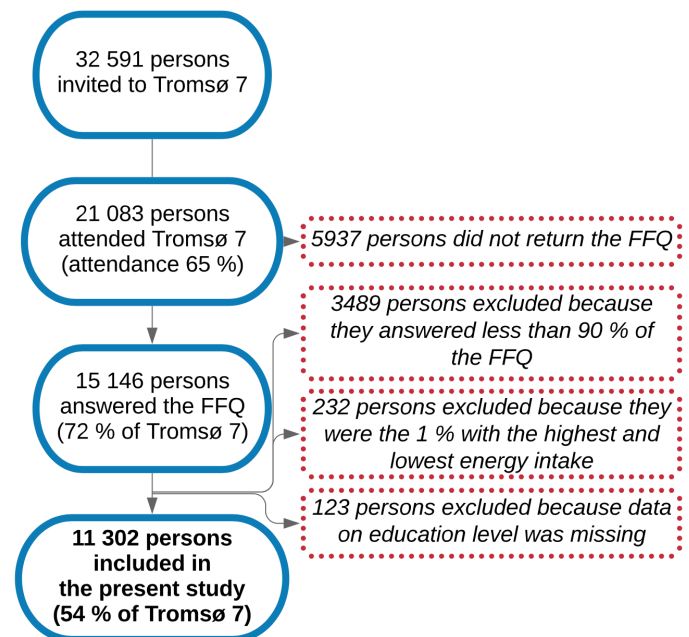
```
32 591 persons
invited to Tromsø 7
        │
        ▼
21 083 persons         ┄┄┄ 5937 persons did not return the FFQ
attended Tromsø 7
(attendance 65 %)
        │              ┄┄┄ 3489 persons excluded because
        │                  they answered less than 90 % of
        ▼                  the FFQ
15 146 persons
answered the FFQ       ┄┄┄ 232 persons excluded because they
(72 % of Tromsø 7)         were the 1 % with the highest and
        │                  lowest energy intake
        │              ┄┄┄ 123 persons excluded because data
        ▼                  on education level was missing
11 302 persons
included in
the present study
(54 % of Tromsø 7)
```

Figure 1: Flow chart of the study sample. The Tromsø Study 2015-2016

2.3 Variables

Education level (primary/upper secondary/short tertiary/long tertiary), physical activity level at leisure (sedentary/light/moderate/vigorous) and smoking status (current/previous/never) were collected from Q1 (Table 2). Education level was reported on the same four-level scale as the one used by Statistics Norway (24). Leisure-time physical activity level at leisure was reported on a four-level scale based on the Saltin and Grimby questionnaire (55). Data on BMI (kg/m^2) was calculated based on bodyweight and height measured by trained personnel at examination. BMI was divided into three groups: normal weight (BMI < 25 kg/m^2), overweight (BMI 25-29.9 kg/m^2) and obese (BMI ≥ 30 kg/m^2). Only 48 participants were underweight (BMI <18.5 kg/m^2), and these were combined/merged with the normal weight-

group. Dietary variables were calculated at UiO based on the FFQ (energy (MJ/day), carbohydrates (E%), added sugar (E%), fiber (g/day), protein (E%), total fat (E%), saturated fat (E%), monounsaturated fat (E%), polyunsaturated fat (E%), trans-fat (E%), omega-3 and omega-6 (E%), alcohol (E%), vitamin A (retinol activity equivalents (RAE)/day), vitamin D (µg/day), vitamin C (mg/day), folate (µg/day), calcium (mg/day), beta-carotene (mg/day), iron (mg/day) and iodine (µg/day)). Because all macronutrients were presented in relation to the total energy intake (E%), the same was done for the micronutrients (vitamin A, vitamin D, vitamin C, beta-carotene, folate, calcium, iron and iodine), by calculating the intake per 10 MJ for the micronutrients

Table 2: Selected questions from Questionnaire 1 in The Tromsø Study, 2015-2016

Describe your leisure-time physical activity level the last year		Have you smoked/do you smoke daily?		What is your highest level of attained education?	
1	Reading, watching TV/screen or other sedentary activity	1	Never	1	Primary/partly secondary education (up to 10 years of schooling)
2	Walking, cycling or other forms of exercise at least 4 hours a week	2	Yes, currently	2	Upper secondary education (a minimum of 3 years)
3	Participation in recreational sports, heavy gardening, snow shoveling etc. at least 4 hours a week	3	Yes, previously	3	Tertiary education, short: college/university less than 4 years
4	Participation in hard training or sports competitions, regularly several times a week			4	Tertiary education, long: college/university 4 years or more

2.4 Statistical analysis

2.4.1 Descriptive statistics

Ten-year age-groups were created (40-49 years, 50-59 years, 60-69 years, 70-79 years, 80-89 years and 90+ years). The 90+ years group had few participants (n=10) and was therefore merged with the 80-89 years group (i.e. 80-96 years). The variables age, 10-year age-groups, BMI, BMI-groups, smoking status and leisure-time physical activity level were used in descriptive analysis to describe the demographic and health characteristics of the study participants in strata of sex and education level (Table 3). Mean values and standard deviations were calculated for all continuous variables, and the proportion of participants within each group were calculated for all categorical variables. Differences across education levels in women and men were tested by one-way ANOVA (for continuous variables) and Pearson's chi-square test (for categorical variables) (Table 3).

2.4.2 Initial descriptive analysis of diet in strata of education

Descriptive analyses were used to present the median (25th-75th percentile) intake of energy, the energy providing macronutrients carbohydrates (including added sugar and fiber), proteins and fat (including subgroups SFAs, MUFAs, PUFAs, trans-fat and omega-3 + omega-6), alcohol and the micronutrients vitamin A, vitamin D, vitamin C, folate, beta-carotene, calcium, iron and iodine. The listed micronutrients were chosen based on the potential consequences of an unfavorable intake mentioned in section 1.7. In addition, beta-carotene was included because this is a common indicator used to reflect the intake of vegetables, fruits and berries (39). Because it is well documented that the intake of nutrients varies between women and men, all analyses were performed for each sex separately in order to remove the effect of sex (39). The median intake of energy, macro- and micronutrients were presented in strata of sex only (Table 4), and in strata of sex and education (Supplementary Table 1 and 2). The proportion of participants within each strata that were compliant with the respective nutrient recommendation were presented, as well as the proportion above/below recommendation in the cases where the recommendation is a range (Table 4).

2.4.3 Comparison with the Nordic Nutrition Recommendations

The intakes of macro- and micronutrients were compared with NNR 2012 where this was possible. It was decided to compare the intake only to the recommended intakes from NNR 2012, rather than the lower intake level, the average requirement, recommended intake and upper intake level combined. This was decided based on that Lundblad et al. (44) found that in general, a low proportion of the participants from the Tromsø Study 2015-2016 were below the recommended intake. In addition, the average intake was considered sufficient for ranking, in order to evaluate the educational gradient. Comparing the results to the recommended intake also made it easier to compare results with other studies. A binary variable (compliant yes/no) was created for compliance with each of the recommendations. For the recommendations given as a range (carbohydrates, proteins, fat, MUFAs and PUFAs), an additional binary variable was created for above or below recommended range. It was not created a separate binary variable for compliance with recommendation for proteins for participants aged 65 years or older (recommended intake 15-20 E%). Hence, all participants, independent of age, were considered compliant with recommendation for protein if their intake was 10-20 E%. For omega-3 and omega-6, participants were considered compliant with recommendations if the total energy intake from omega-3 and omega-6 combined was at least 3 E% and if at least 0.5 E% came from omega-3. For the sex-specific recommendation for fiber and vitamin A, a binary variable was created for each sex. Hence, women and men

were considered compliant if the intake of fiber was ≥ 25 g/day and ≥ 35 g/day, and the intake of vitamin A was ≥ 700, and ≥ 900 RAE/day, respectively. For iron and folate, there are separate recommendations for pre- and postmenopausal women. All participants were 40 years or older, and information on menopausal status was not available in the current dataset. Mean menopausal age for Norwegian women is 53 years (56), and mean age of the participating women was 57 years (Table 3). Due to the low proportion of pre-menopausal women in the sample, both women and men were considered compliant with recommendation if the intake of iron was ≥ 9 mg/day and the intake of folate was ≥ 300 μg/day.

2.4.4 Regression analysis of intake of energy and nutrients across educational levels

Multiple linear regression was used for each sex separately to find the crude and adjusted effect of educational level on intake of energy and each of the mentioned nutrients (Table 5 and Supplementary Table 3). A separate analysis was performed for each nutrient. For each analysis, the nutrient was included in the model as the dependent variable and dummy variables for education level 2, 3 and 4 (level 1 was used as reference) were included as independent variables in block 1. All potential confounders were included in additional blocks; dummy variables for age-groups (40-49 years was used as reference group) in block 2, dummy variables for BMI-groups (normal was used as reference group) in block 3, dummy variables for physical activity-level (sedentary was used as reference group) in block 4 and dummy variables for previous and current smokers (never smokers was used as reference group) in block 5. Thus, in the final adjusted model all mentioned confounders are adjusted for each other. The unstandardized beta (B) by education level was reported together with its corresponding 95 % confidence interval (CI), as well as the constant – that represented the mean intake in the reference group. This was presented for the final adjusted model in Table 5, and for all blocks in Supplementary Table 3. Results presented in text in section 3 "Results" are adjusted for all mentioned covariates. The linear trends over education were assessed by including education as a continuous variable instead of a categorical variable in an identical analysis (Table 5 and Supplementary Table 3). Model assumptions were checked by investigating the correlations between all variables in the models, the variance inflation factors (all values <10), the Cook´s Distance (all values <1) and by visual inspection of the residual plots and scatter plots. In some cases, the residual plot indicated small deviations from normality. Because of the large sample size this was however not considered a problem.

2.4.5 Analysis of odds of being compliant with recommendations across educational levels

Binary logistic regression was used for each sex separately to investigate the odds ratio (OR) of being compliant with the nutrition recommendations in different levels of education (Table 6 and Supplementary Table 4). This was done for each nutrient recommendation separately. As in the linear regression analyses, a block-wise approach was used. The binary variable for compliance with specific recommendation was included in the model as a dependent variable, and all potential confounders were included in separate blocks in the same order as in the linear analyses. The lowest categories were set as references. The exponentiation of the B coefficient (Exp(B)) was presented as odds ratios by education level together with its corresponding 95 % CI's. This was presented for the final adjusted model in Table 6, and for all blocks in Supplementary Table 4. Results presented in text in section 3 "Results" are adjusted for all mentioned covariates. The linear trends over education were assessed by including education as a continuous variable instead of a categorical variable in an identical analysis (Table 6 and Supplementary Table 4). Model assumptions were checked by investigating the variance inflation factors (all values <10) and by investigating cases with standardized residuals above 2.5 or below 2.5. All assumptions were met/fulfilled.

2.4.6 Analysis of the included versus the excluded participants

In order to investigate the characteristics of the included versus the excluded participants, a binary variable was created for participants included or not included in the final sample. Student´s *t*-test (for continuous variables) and Pearson´s chi-square test (for categorical variables) were used to investigate potential differences according to sex, age, BMI, educational level, physical activity level and smoking status in the two groups. This was presented in groups of included/excluded only, with analysis between-groups (Table 7), and in groups of educational level as well as included/excluded, with analysis within-groups (Supplementary Table 5).

All analyses were performed using IBM SPSS 26 for Mac (57). The significance level was set to 5 % for all tests. The STROBE Checklist for cross-sectional studies was used for reporting (58).

2.5 Ethical considerations and data safety

Data collection for Tromsø 7 is approved by the Regional Committee for Medical Research Ethics (REC North ref. 2014/940) and the Norwegian Data Protection Authority and performed in accordance with the 1964 Helsinki declaration and its later amendments. The FFQ data collection and analysis was approved as a subproject in Tromsø 7 (REC North ref. 2014/940). All participants gave written informed consent. For the present project (master thesis) a "fremleggingsvurdering" was submitted to REC North, who decided (decision of October 11th 2019, ref 2019/50330) that the aim of the study did not apply to the Health Research Act, thus no REC evaluation was needed (Appendix 4). An application was sent to the Tromsø Study Data and Publication Committee, who approved the project and granted access to the specified variables for the present project (decision of December 2nd 2019, EUTRO project number 8030.00315) (Appendix 5). A notification was sent to The Norwegian Data Protection Authority who decided (decision of February 7th 2020, ref. 2020/571118) that the current project was in accordance with privacy rules and regulations (Appendix 6). No data that could be attributed to identifying a participant was available, and the dataset could thus be considered as anonymous instead of de-identified. However, by combining the variables age, sex, educational level and BMI (height and weight was not included in the dataset) there is a hypothetical risk of backwards identification if the case of for example extreme BMI or age values. However, given the large dataset of more than 21 000 participants, the risk was considered as low. The data was stored on an encrypted USB stick, in accordance with the current master in public health regulations. The dataset will be deleted after the completions of this project, in accordance with the contract with the Tromsø Study.

3 Results

3.1 Study sample

A total of 11 302 participants (54 % women) were included in the analysis (Table 3). Mean age was 57 and 58 years in women and men, respectively. About 38 % and 51 % were overweight and 22 % and 24 % were obese in women and men, respectively. Approximately 21 % of the participants had primary education level, 26 % and 29 % secondary education, 18 % and 23 % had short tertiary education and 35 % and 28 % had long tertiary education of women and men, respectively. More than half of women and men reported light leisure-time physical activity, 12 % and 13 % were sedentary, 20 % and 31 % reported moderate physical activity and 2 % and 4 % reported vigorous physical activity of women and men, respectively. In total, 12.5 % were smokers and 42 % were never smokers (Table 3).

Age, BMI and the proportion of current smokers were negatively associated with education in both women and men ($p<0.001$) (Table 3). Physical activity level and the proportion of never smokers were positively associated with education level ($p<0.001$) (Table 3).

Table 3: Characteristics of study sample by sex and education level. The Tromsø Study 2015-2016.

	Women						Men					
	Total	Education level[a]				p	Total	Education level[a]				p
		1	2	3	4			1	2	3	4	
n or %	**6043**	**21.0**	**25.5**	**18.4**	**35.1**		**5259**	**20.1**	**29.0**	**23.0**	**27.9**	
Age (years)	56.8 (10.7)	64.4 (10.1)	57.1 (10.0)	55.0 (9.9)	53.0 (9.5)	<0.001	58.0 (10.9)	62.2 (10.4)	57.8 (11.0)	57.5 (10.6)	55.6 (10.5)	<0.001
Age group						<0.001						<0.001
- 40-49 years	30.2	8.7	27.0	35.3	42.9		27.2	13.7	28.0	26.7	36.3	
- 50-59 years	29.8	20.8	32.7	32.3	31.6		27.7	24.5	28.1	31.0	26.8	
- 60-69 years	26.9	39.1	28.5	23.4	20.4		28.6	36.5	27.0	27.8	25.1	
- 70-79 years	10.9	25.2	10.1	8.0	4.5		14.2	20.9	14.4	12.2	10.7	
- 80-96 years	2.1	6.2	1.8	1.1	0.5		2.4	4.4	2.5	2.3	1.0	
BMI (kg/m^2)	26.8 (4.9)	27.7 (21.5)	27.4 (5.1)	26.5 (4.6)	26.0 (4.6)	<0.001	27.6 (3.9)	28.1 (4.2)	28.0 (4.0)	27.8 (3.8)	26.8 (3.6)	<0.001
BMI Group[b]						<0.001						<0.001
- Normal	39.9	30.3	34.1	42.3	48.7		25.4	23.3	22.0	22.8	32.5	
- Overweight	37.8	41.8	40.0	37.7	33.8		50.7	48.0	51.9	51.3	51.1	
- Obese	22.0	27.4	25.7	20.0	17.2		23.7	28.4	25.9	25.7	16.3	
Physical activity level[c]						<0.001						<0.001
- Sedentary	12.3	19.0	14.0	10.8	8.9		13.2	19.2	15.0	10.9	9.9	
- Light	63.5	67.0	68.6	66.4	60.6		50.9	53.9	53.8	52.4	47.5	
- Moderate	19.6	13.3	16.4	20.6	26.4		30.6	25.4	28.6	33.1	35.9	
- Vigorous	2.3	0.7	1.1	2.3	4.1		3.8	1.6	2.6	3.7	6.8	
Smoking status						<0.001						<0.001
- Current smoker	13.5	19.1	18.6	11.5	7.4		11.4	17.9	13.8	9.4	6.0	
- Previous smoker	44.0	48.9	47.3	43.7	38.9		45.3	54.0	49.8	44.7	34.9	
- Never smoker	42.0	31.1	33.7	44.3	53.3		42.8	27.6	35.9	45.3	58.8	

Results are presented as mean (standard deviation) or proportion.

[a] 1: Primary (up to 10 years of schooling), 2: Upper secondary education (a minimum of 3 years), 3: Tertiary education, short: College/university less than 4 years, 4:Tertiary education, long: College/university 4 years or more

[b] Normal (BMI < 25.0), overweight (BMI 25.0-29.9), obese (BMI $\geq$ 30)

[c] Exercise and physical activity in leisure time over the last year. Sedentary: reading, watching TV/screen or other sedentary activity, Light: walking, cycling or other forms of exercise at least 4 hours a week, Moderate: participation in recreational sports, heavy gardening, snow shoveling etc. at least 4 hours a week, Vigorous: participation in hard training or sports competitions, regularly several times a week

3.2 Women

3.2.1 Median intake of energy, macro- and micronutrients

In women, the median intake of energy was 8.5 MJ/day (Table 4). The median intake was 42 E% for carbohydrates, 27 g/day for fiber, 5 E% for added sugar, 18 E% for proteins, 35 E% for total fat, 13 E% for saturated fat and MUFAs, 0.3 E% for trans-fat, 6 E% for PUFA and omega-3 + omega-6 and 2 E% for alcohol (Table 4). The energy-adjusted median intake of micronutrients was 1465 RAE/10 MJ vitamin A, 11.7 µg/10 MJ vitamin D, 172 mg/10 MJ vitamin C, 373 µg/10 MH folate, 5.2 mg/10 MJ beta-carotene, 1176 mg/10 MJ calcium, 12 mg/10 MJ iron and 331 µg/10 MJ iodine (Table 4).

3.2.2 Compliance with recommendations

More than 90 % of women were below the recommended upper limit for trans-fat and added sugar and met the recommendation for omega-3 and omega-6 and iodine (Table 4). Between 80 and 90 % met the recommendation for proteins, total fat, MUFAs, vitamin A and vitamin C and were below the recommended upper limit for alcohol. Approximately 73 % met the recommendation for PUFAs. Between 60 and 70 % met the recommendations for fiber, folate, calcium and iron. About 53 % and 31% met the recommendation for vitamin D and carbohydrates, respectively, and 15 % were below the recommended upper limit for saturated fat (Table 4).

3.2.3 Educational gradient

The intake of energy, fiber, total fat, MUFAs, alcohol, vitamin D, vitamin C (mg/day and mg/10MJ), folate (µg/day and µg/MJ) and iron (mg/day and mg/10 MJ) was positively associated with education in women ($p<0.05$). The intake of carbohydrates, added sugar and iodine (µg/10 MJ) was negatively associated with education ($p<0.05$) (Table 5).

Compared to women with primary education, women from higher education levels had higher odds of being compliant with recommendations for fiber, vitamin A, vitamin D, vitamin C, folate, calcium and iron ($p<0.05$). The odds of being compliant with recommendations were negatively associated with education for carbohydrates, total fat and alcohol ($p<0.05$) (Table 6).

Table 4: Intake of energy and nutrients by sex, and compliance with Nordic Nutrition Recommendations 2012. The Tromsø Study 2015-2016.

	NNR 2012	Women (n=6043)		Men (n=5259)	
		Median Intake (25th – 75th percentile)	Compliant (%) (below/above)	Median Intake (25th – 75th percentile)	Compliant (%) (below/above)
Energy (MJ/day)		8.5 (7.0, 10.4)	-	10.4 (8.4-12.5)	-
Carbohydrates (E%)	45-60 E%	42 (38-46)	31 (69/0.3)	43 (39-46)	33 (69/0.3)
- Fiber (g/day)	≥25 g/day for women/≥35 g/day for men	27 (22-34)	60	27 (22-34)	23
- Fiber (E%)		2.5 (2.2-3.0)		2.1 (1.8-2.5)	
- Sugar (E%)	<10 E%	4.8 (3.2-6.8)	93	4.9 (3.3-7.2)	90
Proteins (E%)	10-20 E%	17.7 (16.1-19.4)	83 (0.1/17)	17.3 (15.7-19.0)	86 (0.2/14)
Total fat (E%)	25-40 E%	35 (31-38)	81 (3/16)	35 (31-378)	83 (4/13)
- Saturated fat (E%)	<10 E%	12.4 (10.8-14.2)	15	12.3 (10.7-13.9)	16
- Trans-fat (E%)	<1 E%	0.3 (0.2-0.4)	100	0.3 (0.2-0.4)	100
- Monounsaturated fat (E%)	10-20 E%	12.8 (11.1-14.5)	86 (12/2)	12.4 (10.9-14.0)	85 (14/1)
- Polyunsaturated fat (E%)	5-10 E%	5.8 (4.9-6.9)	73 (25/2)	5.9 (5.0-7.0)	73 (25/2)
- Omega-3 and omega-6 (E%)	≥3 E%	5.9 (5.0-6.8)	100	5.9 (5.0-6.9)	99
Alcohol (E%)	<5 E%	1.8 (0.5-4.1)	81	2.7 (1.0-5.4)	72
Vitamin A (RAE/10 MJ)	≥700 RAE/day for women/≥900 RAE/day for men	1465 (1124-1947)	88	1261 (966-1668)	78
Vitamin D (µg/10 MJ)	≥10 µg/day	11.7 (7.7-21.5)	53	10.6 (7.6-17.8)	58
Vitamin C (mg/10 MJ)	≥75 mg/day	172 (123-242)	88	117 (82-166)	80
Folate (µg/10 MJ)	≥300 µg/day	373 (318-465)	61	314 (275-367)	61
Beta-carotene (mg/10 MJ)		5.2 (3.5-7.5)		3.5 (2.2-5.3)	
Calcium (mg/10 MJ)	≥800 mg/day	1176 (952-1426)	69	1110 (882-1371)	78
Iron (mg/10 MJ)	≥ 9 mg/day	12.0 (10.5-14.0)	68	10.8 (9.5-12.5)	75
Iodine (µg/10 MJ)	≥150 µg/day	331 (256, 431)	91	323 (251-416)	95

E%, Proportion of total energy intake. NNR 2012, Nordic Nutrition Recommendations 2012. RAE, Retinol activity equivalents.

3.3 Men

3.3.1 Median intake of energy, macro- and micronutrients

In men, the median intake of energy was 10.4 MJ/day (Table 4). For macronutrients, the median intake was 43 E% for carbohydrates, 27 g/day for fiber, 5 E% for added sugar, 17 E% for proteins, 35 E% for total fat, 12 E% for saturated fat and MUFAs, 0.3 E% for trans-fat, 6 E% for PUFAs and omega-3 + omega-6 and 3 E% for alcohol (Table 4). The energy-adjusted median intake of micronutrients was 1261 RAE/10 MJ vitamin A, 10.6 µg/10 MJ vitamin D, 117.4 mg/10 MJ vitamin C, 13.8 µg/10 MJ folate, 3.5 mg/10 MJ beta-carotene, 1110.4 mg/10 MJ calcium and 323.1 µg/10 MJ iodine (Table 4).

3.3.2 Compliance with recommendations

More than 90 % of men were below the recommended upper limit for trans-fat and met the recommendation for omega-3 and omega-6 and iodine (Table 4). Between 80 and 90 % met the recommendations for proteins, total fat and MUFAs and were below the recommended upper limit for added sugar. Between 70 and 80 % met the recommendation for PUFAs, vitamin A, vitamin C, calcium and iron and were below the recommended upper limit for alcohol. A total of 61 %, 58 %, 33 % and 23 % met the recommendation for folate, vitamin D, carbohydrates and fiber, and 16 % were below the recommended upper limit for saturated fat (Table 4).

3.3.3 Educational gradient

The intake of fiber, alcohol, vitamin C (mg/day and mg/10 MJ), folate (µg/day and µg/10 MJ) and iron (mg/day and mg/10 MJ) was positively associated with education level in men ($p<0.001$) (Table 6). The intake of carbohydrates, sugar, saturated fat and iodine (µg/day and µg/10 MJ) was negatively associated with education level ($p<0.05$) (Table 5).

Compared to men with primary education, men from higher education levels had higher odds of being compliant with recommendations for fiber, sugar, vitamin C, folate and iron ($p<0.001$) (Table 6). The odds of being compliant with recommendation was negatively associated with education level for alcohol ($p<0.001$) (Table 6).

Table 5: Linear regression analysis of intake of energy and nutrients by education level. The Tromsø Study 2015-2016.

			Women (n=6043)	Men (n=5259)
			Unstandardized B (95 % CI)	Unstandardized B (95 % CI)
Energy (MJ/day)	Education level[a]	1	Ref. (8.6)	Ref.(10.9)
		2	0.4** (0.2, 0.6)	0.03 (-0.2, 0.3)
		3	0.4* (0.1, 0.6)	0.02 (-0.2, 0.3)
		4	0.4** (0.2, 0.6)	0.1 (-0.1, 0.4)
	p linear trend		<0.001	0.4
Carbohydrates (E%)	Education level[a]	1	Ref. (45)	Ref. (45)
		2	-1** (-2, -1)	-1* (-1, 0)
		3	-2** (-2, -1)	-1** (-2, -1)
		4	-2** (-3, -2)	-1** (-2, -1)
	p linear trend		<0.001	<0.001
Fiber (g/day)	Education level[a]	1	Ref. (23)	Ref. (25)
		2	2** (1, 2)	1 (0, 1)
		3	2** (1, 2)	1* (0, 2)
		4	2** (2, 3)	2** (1, 3)
	p linear trend		<0.001	<0.001
Sugar (E%)	Education level[a]	1	Ref. (7)	Ref. (8)
		2	-0.3* (-0.6, -0.07)	-0.5* (-0.7, -0.2)
		3	-0.6** (-0.9, -0.3)	-0.8** (-1.1, -0.5)
		4	-0.9** (-1.1, -0.6)	-0.9** (-1.2, 0.6)
	p linear trend		<0.001	<0.001
Proteins (E%)	Education level[a]	1	Ref. (16.5)	Ref. (16.2)
		2	0.009 (-0.2, 0.2)	0.06 (-0.1, 0.3)
		3	-0.2 (-0.4, 0.04)	0.1 (-0.08, 0.3)
		4	-0.1 (-0.3, 0.06)	-0.3* (-0.5, -0.07)
	p linear trend		0.08	0.007
Total fat (E%)	Education level[a]	1	Ref. (35)	Ref. (36)
		2	1* (0, 1)	0 (0, 1)
		3	1* (0, 1)	0. (-1, 1)
		4	1* (0, 1)	0 (-1, 0)
	p linear trend		0.03	0.2
Saturated fat (E%)	Education level[a]	1	Ref. (13.2)	Ref. (13.6)
		2	-0.06 (-0.3, 0.1)	-0.3* (-0.5, -0.06)
		3	0.03 (-0.2, 0.3)	0.3* (-0.6, 0.1)
		4	0.1 (-0.1, 0.3)	-0.3* (-0.5, -0.09)
	p linear trend		0.2	0.009
Monounsaturated fat (E%)	Education level[a]	1	Ref. (12.7)	Ref. (12.9)
		2	0.5** (0.3, 0.7)	0.2 (-0.006, 0.4)
		3	0.5** (0.3, 0.8)	0.3* (0.07, 0.5)
		4	0.4** (0.2, 0.7)	0.1 (-.08, 0.4)
	p linear trend		<0.001	0.2
Polyunsaturated fat (E%)	Education level[a]	1	Ref. (5.9)	Ref. (6.1)
		2	0.1 (-0.008, 0.2)	0.07 (-0.06, 0.2)
		3	0.08 (0.05, 0.2)	0.03 (-0.1, 0.2)
		4	-0.04 (-0.2, 0.08)	0.2* (-0.3, -0.03)
	p linear trend		0.1	0.004
Trans-fat (E%)	Education level[a]	1	Ref. (0.3)	Ref. (0.3)
		2	0.004 (-0.006, 0.01)	-0.006 (-0.02, 0.004)
		3	0.02* (0.007, 0.03)	0.003 (-0.007, 0.01)
		4	0.03* (0.02, 0.04)	0.02** (0.008, 0.03)
	p linear trend		<0.001	<0.001

Table 5 cont.: Linear regression analysis of intake of energy and nutrients by education level. The Tromsø Study 2015-2016.

			Women (n=6043)	Men (n=5259)
			Unstandardized B (95 % CI)	Unstandardized B (95 % CI)
Omega-3 and omega-6 (E%)	Education level[a]	1	Ref. (5.9)	Ref. (6.1)
		2	0.09 (-0.02, 0.2)	0.04 (-0.07, 0.2)
		3	0.03 (-0.09, 0.1)	-0.007 (-0.1, 0.1)
		4	-0.1 (-0.2, 0.005)	0.2** (-0.4, -0.1)
	p linear trend		0.005	<0.001
Alcohol (E%)	Education level[a]	1	Ref. (1.0)	Ref. (1.4)
		2	0.8** (0.5, 1.0)	0.4* (0.1, 0.8)
		3	1.1** (0.9, 1.4)	1.2** (0.8, 1.5)
		4	1.5** (1.3, 1.8)	1.7** (1.3, 2.0)
	p linear trend		<0.001	<0.001
Vitamin A (RAE/10MJ)	Education level[a]	1	Ref. (1541)	Ref. (1249)
		2	26 (-32, 83)	25 (-23, 74)
		3	25 (-39, 88)	65* (13, 117)
		4	-28 (-86, 29)	58* (6.7, 109)
	p linear trend		0.2	0.01
Vitamin D (µg/10MJ)	Education level[a]	1	Ref. (12.0)	Ref. (10.9)
		2	0.9 (-0.009, 1.8)	0.06 (-0.7, 0.8)
		3	1.4* (0.4, 2.4)	0.9* (0.07, 1.7)
		4	1.0* (0.07, 1.9)	1.0* (1.4, 1.8)
	p linear trend		0.06	0.003
Vitamin C (mg/10MJ)	Education level[a]	1	Ref. (146)	Ref. (91)
		2	14** (10, 22)	8** (3, 14)
		3	16** (8 25)	19** (13, 25)
		4	25** (17, 33)	28** (23, 35)
	p linear trend		<.001	<.001
Beta-carotene (mg/10MJ)	Education level[a]	1	Ref. (4.5)	Ref. (2.6)
		2	-0.2 (-0.5, 0.08)	0.2 (-0.01, 0.4)
		3	-0.3 (-0.6, 0.005)	0.2 (-0.008, 0.4)
		4	-0.3* (-0.6, -0.02)	0.3* (0.07, 0.5)
	p linear trend		0.04	0.02
Folate (µg/10MJ)	Education level[a]	1	Ref. (360)	Ref. (288)
		2	21** (9, 34)	14** (6, 22)
		3	30** (16, 44)	28** (20, 37)
		4	31** (29, 45)	37** (29, 45.6)
	p linear trend		<0.001	<0.001
Iron (mg/10MJ)	Education level[a]	1	Ref. (15.2)	Ref. (10.3)
		2	1.0* (0.03, 1.9)	0.8* (0.3, 1.3)
		3	1.3* (0.2, 2.3)	1.7** (1.2, 2.3)
		4	1.0* (0.03, 1.9)	1.4** (0.9, 2.0)
	p linear trend		0.09	<0.001
Iodine (µg/10MJ)	Education level[a]	1	Ref. (303)	Ref. (277)
		2	-16* (-27, -6)	-16* (-25, -6)
		3	-23** (-35, -12)	-17** (-28, -7)
		4	-27** (-38, -17)	-34** (-44, -24)
	p linear trend		<0.001	<0.001

Adjusted for age-groups (40-49 years (reference)/50-59 years/60-69 years/70-79 years/80+ years), BMI-groups (normal (reference)/overweight/obese), physical activity level (sedentary (reference)/light/moderate/vigorous) and level and smoking status (never smoker (reference)/current smoker/previous smoker)
*p <0.05. ** p <0.001.
[a] 1 – Primary education (up to 10 years), 2 – Upper secondary education (minimum3 years), 3 – Tertiary education, short: college/university less than 4 years, 4 – Tertiary education, long: college/university 4 years or more.
CI: confidence interval. E%, proportion of total energy intake. RAE, Retinol Activity Equivalents.

Table 6: Logistic regression analysis of odds of being compliant with the Nordic Nutrition Recommendations. The Tromsø Study 2015-2016.

			Women (n=6043)	Men (n=5259)
			Odds ratio (95 % CI)	Odds ratio (95 % CI)
Carbohydrates (45-60 E%)	Education level[a]	1	Reference (1.0)	
		2	0.7** (0.6, 0.9)	0.9 (0.8, 0.1)
		3	0.6** (0.5, 0.8)	0.8** (0.6, 0.8)
		4	0.6** (0.5, 0.8)	0.7* (0.6, 0.9)
	p linear trend		<0.001	<0.001
Fiber (≥25 g/day for women/ ≥35 g/day for men))	Education level[a]	1	Reference (1.0)	
		2	1.2* (1.0, 1.4)	1.0 (0.8, 1.3)
		3	1.3* (1.08, 1.5)	1.1 (0.9,1.4)
		4	1.5** (1.3, 1.8)	1.4** (1.2, 1.8)
	p linear trend		<0.001	<0.001
Sugar (<10 E%)	Education level[a]	1	Reference (1.0)	
		2	1.1 (.8, 1.5)	1.3* (1.0, 1.6)
		3	1.3 (.9, 1.8)	2.0** (1.5, 2.6)
		4	1.8** (1.3, 2.4)	2.2** (1.6, 2.8)
	p linear trend		<0.001	<0.001
Proteins (10-20 E%)	Education level[a]	1	Reference (1.0)	
		2	1.0 (.8, 1.2)	1.0 (.8, 1.3)
		3	1.2 (1.0, 1.5)	1.2 (.9, 1.5)
		4	1.3** (1.1, 1.7)	1.6** (1.2, 2.0)
	p linear trend		0.001	<0.001
Total fat (25-40 E%)	Education level[a]	1	Reference (1.0)	
		2	0.8* (0.6, 1.0)	1.1 (0.9, 1.3)
		3	0.6** (0.5, 0.8)	1.1 (0.8, 1.4)
		4	0.7** (0.5, 0.8)	1.0 (0.8, 1.3)
	p linear trend		<0.001	0.8
Saturated fat (<10 E%)	Education level[a]	1	Reference (1.0)	
		2	1.0 (0.8, 1.2)	1.0 (0.8, 1.2)
		3	0.9 (0.7, 1.2)	1.0 (0.8, 1.3)
		4	0.8 (0.7, 1.0)	1.2* (1.0, 1.6)
	p linear trend		0.09	0.02
Monounsaturated fat (10-20 E%)	Education level[a]	1	Reference (1.0)	
		2	1.2 (1.0, 1.5)	1.3* (1.1, 1.7)
		3	1.1 (0.7, 1.3)	1.3* (1.0, 1.7)
		4	1.2 (1.0, 1.5)	1.1 (0.9, 1.4)
	p linear trend		0.2	0.4
Polyunsaturated fat (5-10 E%)	Education level[a]	1	Reference (1.0)	
		2	1.1 (0.9, 1.3)	1.3* (1.1, 1.5)
		3	1.0 (0.8, 1.2)	1.5** (1.2, 1.8)
		4	0.9 (0.8, 1.1)	1.0 (0.9, 1.3)
	p linear trend		0.2	0.7
Trans-fat (<1 E%)	Education level[a]	1	Reference (1.0)	
		2	1.1 (0.1, 8.2)	2.4 (0.2, 26.4)
		3	0.6 (0.08, 5.0)	$1.9*10^6$ (0.0, -)
		4	0.5 (0.08, 3.2)	0.3 (0.05, 1.6)
	p linear trend		0.3	0.1
Omega-3 and omega-6 (≥3 E%, and ≥0.5 E% omega-3)	Education level[a]	1	Reference (1.0)	
		2	2.0 (0.5, 7.7)	1.6 (0.6, 3.9)
		3	3.2 (0.6, 17.1)	1.1 (0.4, 2.9)
		4	1.6 (0.5, 5.3)	0.8 (0.3, 1.8)
	p linear trend		0.6	0.4

Table 6 cont. Logistic regression analysis of odds of being compliant with the Nordic Nutrition Recommendations. The Tromsø Study 2015-2016.

			Women (n=6043)	Men (n=5259)
			Odds ratio (95 % CI)	Odds ratio (95 % CI)
Alcohol (<5 E%)	Education level[a]	1	Reference (1.0)	
		2	0.6** (0.5, 0.7)	0.8* (0.6, 0.9)
		3	0.4** (0.3, 0.5)	0.5** (0.4, .06)
		4	0.3** (0.3, 0.4)	0.4** (0.3, 0.5)
	p linear trend		<0.001	<0.001
Vitamin A (RAE/day)	Education level[a]	1	Reference (1.0)	
		2	1.4* (1.1, 1.8)	1.1 (0.9, 1.3)
		3	1.3* (1.0, 1.7)	1.0 (0.8, 1.3)
		4	1.7** (1.3, 2.1)	1.3 (1.0, 1.5)
	p linear trend		<0.001	0.07
Vitamin D (µg/day)	Education level[a]	1	Reference (1.0)	
		2	1.2* (1.0, 1.4)	1.1 (1.0, 1.3)
		3	1.3* (1.0, 1.5)	1.2 (1.0, 1.4)
		4	1.3* (1.1, 1.5)	1.3** (1.1, 1.6)
	p linear trend		0.01	<0.001
Vitamin C (mg/day)	Education level[a]	1	Reference (1.0)	
		2	1.4* (1.1, 1.7)	1.4** (1.2, 1.7)
		3	1.7** (1.3, 2.2)	2.0** (1.6, 2.4)
		4	2.7** (2.1, 3.5)	2.8** (2.2, 3.5)
	p linear trend		<0.001	<0.001
Folate (µg/day)	Education level[a]	1	Reference (1.0)	
		2	1.5** (1.2, 1.7)	1.2* (1.0, 1.5)
		3	1.6** (1.3, 1.9)	1.5** (1.2, 1.7)
		4	1.8** (1.5, 2.1)	1.8**(1.5, 2.1)
	p linear trend		<0.001	<0.001
Calcium (mg/day)	Education level[a]	1	Reference (1.0)	
		2	1.2* (1.0, 1.5)	1.1 (0.9, 1.3)
		3	1.3* (1.0, 1.5)	1.0 (0.8, 1.2)
		4	1.5** (1.2, 1.7)	1.0 (0.9, 1.3)
	p linear trend		<0.001	0.99
Iron (mg/day)	Education level[a]	1	Reference (1.0)	
		2	1.4** (1.2, 1.7)	1.5** (1.2, 1.8)
		3	1.8** (1.5, 2.2)	1.9** (1.6, 2.3)
		4	1.8** (1.5, 2.1)	2.2** (1.8, 2.7)
	p linear trend		<0.001	<0.001
Iodine (µg /day)	Education level[a]	1	Reference (1.0)	
		2	1.1 (0.8, 1.4)	1.1 (0.7, 1.5)
		3	1.2 (0.8, 1.6)	1.2 (0.8, 1.8)
		4	1.1 (0.9, 1.5)	1.1 (0.7, 1.6)
	p linear trend		0.3	0.8

Adjusted for age-groups (40-49 years (reference)/50-59 years/60-69 years/70-79 years/80+ years), BMI-groups (normal (reference)/overweight/obese), physical activity level (sedentary (reference)/light/moderate/vigorous) and level and smoking status (never smoker (reference)/current smoker/previous smoker)
* p <0.05. ** p <0.001. ‡ Retinol activity equivalents. CI: confidence interval
[a] 1 - Primary education (up to 10 years), 2 - Upper secondary education (minimum 3 years), 3 - Tertiary education, short: college/university less than 4 years, 4 - Tertiary education, long: college/university 4 years or more.
CI: confidence interval. E%, proportion of total energy intake. RAE, Retinol Activity Equivalents.

3.4 Characteristics of those included in the final sample vs. those not included

Compared to the attenders of Tromsø 7 that were not included in this study, those included in the final sample had lower BMI ($p<0.001$), higher education level ($p<0.001$), and there was a higher proportion of women ($p<0.05$), and a lower proportion of current smokers ($p<0.001$) and participants reporting sedentary leisure-time physical activity level, (Table 7).

Table 7: Characteristics of participants included in the final study sample. The Tromsø Study 2015-2016

| | Attended Tromsø 7 (N=21083) | | | | |
| | Included in final sample (n=11302) | | Excluded (n=9781) | | |
	n	Mean (SD) or proportion (%)	n	Mean (SD) or proportion (%)	p
Sex					<0.05
- Women	6043	53.5	5031	51.4	
- Men	5259	46.5	4750	48.6	
Age (years)	11302	57.4 (10.8)	9781	57.3 (12.1)	0.5
Age-groups					<0.001
- 40-49 years	3256	28.8	3176	32.5	
- 50-59 years	3254	28.8	2781	28.4	
- 60-69 years	3131	27.7	2048	20.9	
- 70-79 years	1405	12.4	1271	13.0	
- 80+ years	256	2.3	505	5.2	
BMI (kg/m²)	11274	27.2 (4.5)	9746	27.5 (4.6)	<0.001
BMI-group[a]					<0.001
- Normal	3749	33.3	3002	30.8	
- Overweight	4950	43.9	4252	43.6	
- Obese	2575	22.8	2492	25.6	
Education level[b]					<0.001
- Primary	2327	20.6	2469	26.3	
- Upper secondary	3064	27.1	2692	28.6	
- Tertiary, short (<4 years)	2321	20.5	1687	17.9	
- Tertiary, long ($\geq$ 4 years)	3590	31.8	2555	27.2	
Physical activity level[c]					<0.001
- Sedentary	1439	13.0	1533	16.5	
- Light	6512	58.8	5303	57.1	
- Moderate	2791	25.2	2160	23.2	
- Vigorous	334	3.0	298	3.2	
Smoking status					<0.001
- Never smokers	4788	42.6	3945	40.9	
- Previous smokers	5043	44.8	4207	43.6	
- Current smokers	1415	12.6	1489	15.4	

[a] Normal (BMI < 25.0), overweight (BMI 25.0-29.9), obese (BMI $\geq$ 30)
[b] Primary education (up to 10 years), Upper secondary education (minimum 3 years), Tertiary education, short: college/university less than 4 years, Tertiary education, long: college/university 4 years or more.
[c] Exercise and physical activity in leisure time over the last year. Sedentary: reading, watching TV/screen or other sedentary activity, Light: walking, cycling or other forms of exercise at least 4 hours a week, Moderate: participation in recreational sports, heavy gardening, snow shoveling etc. at least 4 hours a week, Vigorous: participation in hard training or sports competitions, regularly several times a week

4 Discussion

4.1 The educational gradient in intake of energy, macro- and micronutrients

There were educational gradients in the intake of several nutrients, and in characteristics associated with lifestyle. In most cases, higher education was associated with what is considered healthier, but for alcohol the gradient was in favor of the participants with primary education. Compared to participants with primary education, those with long tertiary education had higher odds of being compliant with seven out of eighteen recommendations presented in this study.

4.1.1 Energy intake

This study revealed a positive association between education level and energy intake in women, but not in men. The differences were however small, and the clinical relevance is discussed in detail later. This is in line with results from national dietary surveys in Norway (NORKOST 3 2010-2011) (29), Sweden (Riksmaten 2010-2011) (42) and Finland (FINDIET 2007) (59). A systematic review by Giskes et al. (2009) (19) found a similar positive association in women in three out of ten included studies. However, they found a negative association between education and energy intake in women in one of ten studies, and no association in six of ten studies (19). In accordance with our findings, Giskes et al. (19) found no association between education and energy intake in men in two out of nine studies, but a positive association in five and a negative association in two out of nine studies (19).

It is well documented that excessive energy intake is associated with weight gain and further associated with several cardiovascular and metabolic risk factors (39). An individual´s energy requirement depends on among others sex, age, body size and physical activity level (39). In the present study, these are all treated as confounders and are adjusted for in the analysis – thus, the positive association between education and energy intake in women cannot be explained by the major determinants of energy requirement. One possible explanation for the educational gradient in energy intake in women is that underreporting could occur more frequently among participants with lower education (60). I did however, in accordance with previous studies (22, 44, 61-63), exclude participants with incomplete FFQs. Furthermore, I checked if the remaining women and men in the different educational levels completed different proportions of the FFQ (results not included in tables). All participants, independent of educational level, answered approximately 94 % of the FFQ, and it is therefore unlikely

that this is the explanation for the educational gradient in energy intake in women. Other possible explanations include additional confounders not included in this study, or that higher educated women actually have a higher energy intake due to higher total intake of food and drinks or higher intake of energy-dense food.

4.1.2 Intake of macronutrients

4.1.2.1 Carbohydrates

There was a negative association between education level and intake of carbohydrates and sugar and a positive association with fiber intake in both women and men. Compared to participants with primary education, those from all other education levels had lower odds of being compliant with the recommendations for carbohydrates, and higher odds of being compliant with recommendations for sugar and fiber. Riksmaten 2010-2011 found similar associations for carbohydrate intake in women (22, 29, 42). FINDIET 2007 did however find an opposite association for carbohydrate intake in men (21). NORKOST 3 found similar associations for fiber in intake in both women and men and for sugar intake in women (29). A study from the fourth survey of the Tromsø Study by Jacobsen et al. (2000) found similar associations for fiber intake in both women and men (22).

In the Nordic diet, main sources of carbohydrates are cereals and potatoes, main sources of added sugar are sweets, soft drinks, bakery products and sweetened dairy products, and main sources of dietary fiber are wholegrain cereals, vegetables, fruits and berries (39). There are persistent evidence regarding beneficial effects of the intake of vegetables, fruits and berries, fiber and wholegrains, and persistent evidence regarding the potential harmful effects of intake of added sugar and energy-dense foods on several NCD-related outcomes (18). Thus, intake of fiber can be considered healthy and intake of added sugar can be considered unhealthy. Because added sugar and fiber are components of the total carbohydrate intake, one could argue that the total carbohydrate intake is not that important in terms of a "healthy" or "unhealthy" diet, as long the intake of fiber and sugar are within the recommendations. The findings regarding added sugar and fiber in this study support the hypothesis that individuals with higher education have a healthier diet.

4.1.2.2 Proteins

No educational gradient was found for intake of protein in this study. Only a weak, negative association for men in the highest education level was significant. Similar, no educational gradient was found for women and men in NORKOST 3, for men in Riksmaten 2010-2011

and FINDIET 2012 and for women in FINDIET 2007 (21, 29, 42, 43). FINDIET 2007 did however find a positive gradient in men, and FINDIET 2012 found a negative gradient in women (43, 59). Men and women with long tertiary education had higher odds of being compliant with the recommendation for proteins, compared to those with primary education.

The present study used the NNR recommendation for adults of 10-20 E% of proteins for all participants included, although there exists age-specific recommendations (15-20 E%) for individuals 65 years or older (39). Among participants ≥ 65 years, 10 % women and 15% men had a protein intake below lowest recommended intake for this age group (results not included in tables). However, both mean and median intake in both women and men ≥ 65 years were within recommended range for this group.

4.1.2.3 Fat

There was a weak, positive gradient for total fat and MUFAs in women, and a weak, negative gradient for SFAs in men. Women with higher education levels had lower odds of being compliant with the recommendation for total fat, compared to women with primary education. Similar results for total fat in women were found in Riksmaten 2010-2011 (42), and similar results for SFAs in men were found in FINDIET 2007 and in the study by Jacobsen et al. from Tromsø 4 (22, 59). However, NORKOST 3 found no significant differences in intake of fats across educational levels (29). FINDIET 2007 found a negative gradient in total fat also for men, a negative gradient for MUFAs in men and a positive gradient for PUFAs in women (59). FINDIET 2012 found a positive gradient for total fat in men, a negative gradient for SFAs in women and a positive gradient for MUFAs and PUFAs in men (43). The study by Jacobsen et al. from Tromsø 4 found a negative educational gradient for total fat, SFAs and PUFAs in both women and men (22).

If the hypothesis is that individuals with higher educational level have a healthier diet, one would expect to find a negative educational gradient for SFAs and a positive gradient for MUFAs and PUFAs. In the present study, a negative educational gradient for SFAs was found only in men, a positive gradient for MUFAs was found only in women, and no gradient was found for PUFAs. Thus, not all expected gradients were found, and the gradients found were weaker than expected. This may have several possible explanations. The introduction of the low-carbohydrate-high-fat (LCHF) diet in the early 2000s is one plausible explanation. A study from Northern Sweden found that fat intake, especially the intake of SFAs, in both women and men increased sharply after 2004, at the same time as the LCHF diet got massive

positive media support (64). It is likely that the same increase in fat intake happened in Norway. Additionally, it is plausible that those with higher SES are among the first to adopt such new dietary trends, as cultural sociology states that those with higher SES often tend to adopt cultural changes first (65). Thus, the LCHF diet might explain why a negative gradient in SFAs was not found in women, and why the negative gradient found in men was not stronger. Another factor that might influence the educational gradient in fat is the use of cod-liver oil or omega-3 supplements. Cod-liver oil is an important source of vitamin D, PUFAs and omega-3, and is used by approximately 35 % of the Norwegian population (66). A study among Norwegian women found that the use of cod-liver oil was associated with higher education (66). If this was the case in the present study, one would expect to find a positive educational gradient in PUFAs and omega-3, but this was not found. The dataset used in the present study did not include information on what types of dietary supplements that were used, and by who. It is however plausible that an educational gradient in the use of cod-liver oil explains part of the educational gradient found in fat. Fatty foods like cake, cheese, spreads, milk and snacks are among the food items that are most likely to be underreported (60). At the same time, women and individuals with lower education are most likely to underreport (60). Hence, there is a possibility that the expected educational gradients in fats were absent because of underreporting. Additionally, it is likely that social desirability, i.e. "*the tendency of some respondents to report an answer in a way they deem to be more socially acceptable than would be their "true" answer*", results in underreporting of fatty foods (67).

4.1.3 Alcohol

A strong, positive educational gradient was observed for alcohol intake in both women and men. Women and men with long tertiary education were 70 and 60 %, respectively, less likely to be below the recommended upper limit for alcohol intake, as compared to those with primary education. Similar results were found in men in NORKOST 3, in both women and men in Tromsø 4, in Riksmaten 2010-2011 and in women in FINDIET 2007 and FINDIET 2012 (22, 29, 42, 43, 59).

The educational gradient in alcohol consumption may to some extent be explained by economic theory – namely that the consumption of unnecessary goods increases with increased purchasing power (68). This explanation implies the assumption that individuals with higher education also have more wealth and hence – have more purchasing power. Thus, they have a higher consumption of unnecessary goods like alcohol. Additionally, social

integration, in terms of how often you spend time with family and friends, is suggested as an important explanation of the educational gradient in alcohol consumption (69). It is also likely that underreporting have caused an underestimation of the educational gradient. Self-reported alcohol intake may be influenced by drinking pattern and social desirability. For instance, binge drinking may cause an incorrect reporting because one does not remember, or do not wish to report, the actual number of units consumed. A continental drinking pattern with one glass of wine per day is on the other hand probably easier to report accurately. Stigma and social desirability is also likely to cause underreporting among those with a high alcohol intake. If it is the case that persons with lower education tend to binge drink more, and hence underreport their alcohol intake, the educational gradient found in this study might have been overestimated.

It is worth to mention that the present study only has investigated the overall alcohol consumption - not the drinking pattern. Studies have suggested that the harmful effects of alcohol are lower among those with higher SES, despite a higher consumption (69). This implies a more harmful drinking pattern among those with lower SES, for example by binge drinking (69).

4.1.4 Intake of micronutrients

Clear, positive educational gradients were found in both women and men for the intake of folate, vitamin C and iron. Similar gradients for folate were found in both women and men in NORKOST 3 and in FINDIET 2007, and for women in Riksmaten 2010-2011 and FINDIET 2012 (29, 42, 43, 59). Similar gradients for iron were found in both women and men in Riksmaten 2010-2011, for women in NORKOST 3 and FINDIET 2012 and for men in FINDIET 2007. Similar gradients for vitamin C were found for both women and men in NORKOST 3, the study from Tromsø 4 and in FINDIET 2007 and 2012 (22, 29, 43, 59). Folate and iron were the only two micronutrients presented by education level in the national dietary survey from Sweden, thus results for vitamin C and other micronutrients cannot be compared (42). A positive educational gradient in the intake of folate, vitamin C and iron is somewhat expected if the hypothesis is that individuals with higher education are healthier. Main sources to vitamin C in the Nordic diet are fruits, berries and vegetables, main sources to folate are cereal products, fruits, berries, vegetables and dairy products, and main sources to iron are cereal products and meats (70). These food groups are all basic parts of the Nordic diet, are included in the Norwegian food-based dietary guidelines and are considered healthy (18).

A negative gradient was found for iodine. Iodine intake was not presented in NORKOST 3, but Carlsen et al. (71) estimated the iodine intake from NORKOST 3 in a study from 2018. They did not present the iodine intake by education level, but they did estimate that 33 % of women and 19 % of men had an intake below recommended intake (71). Other Norwegian reports based on iodine-rich foods indicates a sub-optimal intake in the population (72). FINDIET 2007 and 2012 found no educational gradients in iodine intake (43, 59). Milk and dairy products, fish, eggs and iodized salt are the main dietary sources to iodine in the Nordic diet (72). The negative gradient found in iodine intake implies a lower consumption of such foods among those with higher education level. From 2008 to 2018, the consumption of milk and fish has decreased, and the consumption of eggs, yoghurt, cheese and butter has increased in the Norwegian population (47). A general decrease in consumption of some iodine-rich foods may explain a general sub-optimal intake of iodine in the population. However, the only educational gradients found in iodine-rich foods in NORKOST 3 were a negative educational gradient in the consumption of extra light milk and a positive gradient for skimmed milk in men (29). No educational gradient was found for the overall consumption of fish, eggs, milk and yoghurt or cheese (29). It is however possible that a lower consumption of milk, dairy products and fish among those with higher education level is the explanation for the negative gradient found in this study.

A weak, although significant positive gradient was found in men for the intake of vitamin A, vitamin D and beta-carotene. A weak, but significant negative gradient was found for beta-carotene in women. This does not correspond to findings from the national dietary surveys in Norway or Finland (29, 43, 59). In contrast to findings in the present study, Jacobsen et al. (22) found a positive educational gradient in the intake of beta-carotene in both women and men in Tromsø 4.

The micronutrient intake by education level presented in NORKOST 3 (29), FINDIET 2007 (59) and Riksmaten 2010-2011 (42), is from food sources solely. In contrast, the micronutrient intake presented in the present project is from food sources and dietary supplements. The educational gradient in the use of dietary supplements has yet not been explored in Tromsø 7, but such a gradient could partly explain the educational gradients observed in some micronutrients. Confounders not taken account for, participation bias or misclassification are among other plausible explanations.

4.2 Possible explanations for the educational gradient

A Norwegian report from 2008 suggested possible explanations for the educational gradient in health in Norway (73). Among the mechanisms mentioned were lifestyle, occupation, income, life course stability, skills on solving problems and locus of control (73). The report concluded that education is the basis for, and a contributor to, multiple processes that influence health – and that each mechanism is complex and cannot be viewed isolated (73). In the following, some of the most important mechanisms in the educational gradient in diet will be discussed.

4.2.1 Health literacy and emphasis on a healthy lifestyle

There are persistent educational gradients in physical activity, smoking and diet in Norway (27). Hence, individuals with higher education have a healthier lifestyle. A plausible mechanism is that individuals with higher education have more knowledge about – and/or have more emphasis on – a healthy lifestyle. This implies the assumption that individuals with higher education are better equipped to make healthy choices and live healthy lives because they have higher health literacy. There are currently no national studies mapping the health literacy of the Norwegian population, but a study conducted in eight EU-countries found that there was a higher proportion of individuals with limited health literacy among those with lower education, compared to those with higher education (74). Regarding diet, studies have found an educational gradient in nutritional knowledge and further a positive association with diet quality (75, 76). A Finnish study found that participants with lower education level had higher priority on price and familiarity, lower priority to health motives, and that higher income was associated with a greater relative importance of health considerations (77). The present study found an educational gradient in favor of a healthier diet for participants with higher education for most of the significant results. Thus, this study supports the theory that individuals with higher education might have higher health literacy - and/or more emphasis on - a healthy lifestyle.

4.2.2 Life course stability

Another theory in the explanation of the educational gradient in health is that individuals with higher education have more stability in their life course, and that this contributes to better health (73). Literature suggests that individuals with higher education have better living conditions in general, have more stable employments, safer working environments and less accidents, divorces and unemployment – and that these are factors that are closely related to health in adulthood (73). Numbers from Statistics Norway in 2017 supports this (78). It is

plausible that the same factors also facilitates making healthy choices, including a healthy diet.

4.2.3 Economy
In Norway, the median income per month among those with primary and long tertiary education is 38 380 and 56 750 NOK, respectively (79). Thus, there is a significant educational gradient in income. It is therefore plausible that economy is an important mechanism in the educational gradient in diet.

Is it the case that healthy foods are more expensive than unhealthier foods? A Swedish study found that it was more expensive to comply with nutrition recommendations than to not comply, and hence that to not comply with nutrition recommendations offered an opportunity to lower the diet cost (80). The costs of a diet in line with the recommendations had however not increased more than the general food prices (the consumer price index) between 1980 and 2012 (80). For some nutrients however, for example for iron and vitamin D, the costs had increased faster than the general food prices (80). It is plausible that the situation is the same in Norway. However, in Norway foods like chocolate, confectionary and alcohol-free beverage have an excise tax (81). This is mainly a fiscal measure but has also a health-promoting feature by contributing to a reduction in selected unhealthy foods. The consumption of chocolate and confectionary has decreased in the population during the last decade, and the excise tax can be a contributor to this development (47). Though, the price per kg is in many cases higher for healthier alternatives as compared to unhealthier alternatives of similar foods. For example, bread of wholegrains is more expensive than refined bread, boiled ham is more expensive than salami and unprocessed meat like chicken fillet is more expensive than processed meat like minced meat (82). Thus, the theory that healthy foods are more expensive, and that individuals with higher education (and higher income) therefore have a healthier diet, is supported by the findings in the present study.

An economic theory states that with increased purchasing power comes increased consume of necessary and unnecessary/luxury goods (68). Luxury goods are in health economics defined as goods whose demand increases relatively more than the income increases (68). If we assume that individuals with higher education also have more wealth, the economic theory can be a part of the explanation of the educational gradient in among others alcohol consumption. This theory would however also imply a higher consumption of goods like

chocolate and sweets in the higher educated group, but this is not reflected in the gradient found for sugar and SFAs in this study.

4.3 Strengths and limitations

The design and analyses used in this study allowed me to investigate the educational gradient in diet with adjustments for potential confounders and by investigating two important aspects of the diet: the absolute intake of nutrients and the compliance with NNR 2012. The study had a large number of participants that were similar to the general Norwegian population.

4.3.1 Education as indicator for SES

The main grouping variables of interest were education level and sex. In this study, data on education level was self-reported, and with self-reported data comes a risk of differential or random misclassifications. Thus, as with all other self-reported data, it is a limitation and the internal validity could potentially be strengthened by using validated education level.

Education level was chosen as the indicator for SES in this thesis. It is possible that another indicator, or a combination of indicators, would have given other results. Education level is however an indicator frequently used for SES in the literature, among others in the Norwegian Public Health Report (27). A Norwegian report on education and inequalities in health concluded that education as SES-indicator is practical, the information is easy to attain and it serves as an appropriate indicator in order to rank individuals in the socioeconomic hierarchy (73). They did, however, also conclude that education is not always the best indicator for all types of health outcomes, as different indicators reveal different associations with outcomes (73). Some literature exists also regarding which SES-indicator is best in studies of diet. A French study with 91 900 participants investigated the independent effect of the SES-indicators education, income and occupation on nutrient intake (83). Main findings were that the different indicators were associated with specific differences in nutrient intake, suggesting that they underpin different social processes. For instance, the participants with lower education had higher intake of protein and cholesterol, and lower intake of fiber, vitamin C and beta-carotene (83). Participants with lower income did on the other hand have higher intake of complex carbohydrates and a lower intake of magnesium, folate and vitamin C (83). Furthermore, participants with occupations with lower SES had a lower intake of vitamin D and alcohol (83). Thus, each indicator was associated with different nutrient intakes. The authors concluded that education seemed to be an important driver of nutrient intake in the lower SES-groups (83). Another similar study found that each of the indicators education,

income and occupation had a unique contribution to the understanding of SES and diet (12). Thus, using only education level as SES-indicator in the present study is a potential weakness.

4.3.2 Methods for assessing dietary data

Several methods exist for assessing dietary data on individual- and population level. Some of the most frequently used methods on individual level include dietary records, 24-hour dietary recall and FFQs (84). On the population level, food supply statistics and consumer surveys are commonly used (84).

Individual level-methods demand more resources to conduct than population level-methods but provides more detailed and accurate data on the diet of individuals. The method called 24-hour dietary recall is among other used in the Norwegian national survey NORKOST 3 (29), and is based on interviews about individual´s dietary intake the last 24 hours. A 24-hour dietary recall is a relatively low burden for the participants but does however require an accurate memory. Additionally, it does not map the general diet, but rather the diet during the last 24 hours. Another method is FFQs. FFQs is an individual level-method that is a relatively low burden for the researchers but a high burden for the participants. For the participants, the completion of the FFQ can be time-consuming, it demands full concentration and an accurate memory, and hence, can be challenging to complete for participants with e.g. cognitive challenges. In an FFQ, the participant fills out a questionnaire with questions about their habitual frequency and amount of intake of selected food groups, food items and drinks during a specific time period – for example the last month or year (84). For researchers, FFQs are a method well suited for large dietary surveys because they are easy to administer and process on a large scale. A limitation with some FFQs is that they include questions on selected food groups and/or items, and thus can never attain a picture of the entire diet because some foods are not included in the questionnaire. FFQs can however be comprehensive, and the amount of questions, food groups and items covered will determine the FFQs ability to map the actual diet of the individual. The National Cancer Institute suggests that questions regarding 80-120 food items are needed in order for an FFQ to be able to assess the total diet (48). Other limitations with FFQs include risk of misclassification, underreporting and social desirability bias. This will be discussed further in the following section.

The method for assessing diet used in the present study has several strengths. Firstly, the FFQ used was comprehensive and validated for several dietary factors (52, 53, 85). Secondly, the

FFQ mapped the average diet during the previous year, and not only during the previous day or week. Thirdly, by only including participants who completed 90 % or more of the FFQ, I ensured that intentionally unfilled questionnaires were excluded. Thus, the method for assessing diet has qualities that increases the probability that the present study actually has investigated the intake of energy, macro- and micronutrients. However, when using an FFQ there is always a risk of information bias, especially differential misclassification. As the FFQ is self-reported, it is unlikely that the participants did remember their diet over the past year with 100 % accuracy. Inaccurate memory could therefore result in an incorrect mapping of the diet. I can nor exclude the possibility that some food items are over- or underreported. Social desirability bias is likely to cause underreporting of unhealthy foods and overreporting of healthy foods. Studies have shown that underreporting of unhealthy foods occur more frequently among women, those with higher BMI, smokers and those with lower education (60). If it is the case in the present study that women have underreported more than men, and that participants with lower education have underreported more than those with higher education – this could result in underestimation of some foods, leading to erroneous calculated levels of nutrients in these groups. This could further lead to a biased educational gradient, especially among women.

The FFQ used in this study included questions on use of supplements, and the results on micronutrient intake presented here are with supplements included. Hence, the FFQ mapped the total intake of micronutrients. However, this study gives no information regarding whether the observed educational gradient in some micronutrients are because of a higher dietary intake and/or because of supplement-use in different levels of education.

4.3.3 Confounders validity

Age, BMI, physical activity and smoking status were confounders adjusted for in the analysis. I assess age and BMI as valid because these variables are objectively measured, and not self-reported. The validity can however be discussed for physical activity and smoking status, that were self-reported. Physical activity was in The Tromsø Study reported on a four-level scale based on the Saltin and Grimby questionnaire (55). The Saltin and Grimby questionnaire has been found to be reproduceable and has in validation studies shown good agreement against among others maximal oxygen uptake, the accelerometer ActiReg and the double water method (55). However, there is a risk of differential or random misclassification and social desirability bias. This is also the case for smoking status. Thus, it is plausible that participants, by accident or by purpose, have reported their physical activity level and smoking status

incorrectly. Social desirability bias might potentially motivate participants with low physical activity level to overreport their level and motivate current or previous smokers to report that they are previous or never smokers, because being sedentary or smoker might be associated with stigma. If such a social desirability bias has caused a differential misclassification of the confounders, the validity of the confounders are questionable and thus the results in this study might be incorrectly adjusted. An objective measurement of physical activity level, for instance by accelerometers, could potentially improve the validity of the confounder. However, accelerometer-data is available for 6300 participants in Tromsø 7 and a recent study validated self-reported physical-activity level on the Saltin and Grimby questionnaire against accelerometers (86). The authors found that ranking of physical activity level on the Saltin and Grimby questionnaire had high validity (86).

4.4 Generalizability and implications

4.4.1 External validity

This study had a population-based design, a large number of participants and a high response. It included participants from both urban and rural areas and the population is similar to the general Norwegian population in regards to the distribution of sex, age and educational attainment (24, 49). However, as the Tromsø Study is a population-based study where participation is optional, selection bias is a risk. Thus, it is possible that the participants may not represent all groups in the population. Previous studies from Norwegian health surveys have shown that participants in health surveys more often tend to be female, married, have better health and higher education than the non-responders (87-89). It is plausible that this is the situation in this study sample as well. Hence, there might be an overrepresentation of high education in this study. Furthermore, results from the analysis of the responders versus the non-responders of the FFQ in Tromsø 7 found an overrepresentation of women, participants aged 60-69 years, participants with normal BMI, tertiary education (short and long) and moderate physical activity among the responders. However, this study had more than 1000 participants in each education level in both women and men, despite a possible overrepresentation of high education. Thus, the number of participants within each strata was still high and assumed sufficient to give statistical power. However, 35 % of the invited population did not participate in the Tromsø Study 2015-2016. It is a possibility that the participants with lower education are different from the general population with lower education and thus, they may not be representative. Such differences were, however, not possible to explore further in this study. Additionally, it is a possibility that the inclusion

criteria of only including participants who answered 90 % or more of the FFQ have caused a selection bias. There was a higher proportion of individuals with primary and secondary education, and a lower proportion of individuals with tertiary education among those excluded, as compared to the included participants. Thus, there might be a positive educational gradient in the overall completeness of the FFQ.

4.4.2 Clinical relevance

This study had a high number of participants, thus had strong statistical power. As a result of this, many of the analyses gave statistically significant results, although not all statistically significant results are clinically relevant. All results needs to be interpreted with caution and in perspective. The increased energy intake found in women with long tertiary education compared to those with primary education represents one apple or two squares of milk chocolate per day. This may seem small and irrelevant, but accumulated over a year such an excess energy intake may result in a weight gain of approximately 3 kg per year (39). Also, one extra apple gives extra fiber, beta-carotene and vitamin C, while two extra squares of milk chocolate gives extra saturated fat and sugar. Thus, the type of foods the energy comes from is of great importance. The difference found in fiber intake between the highest and the lowest educated men represents three tablespoons of oatmeal, and the difference in vitamin C intake in women represents 1/4 of an orange. These are also differences that might seem small and irrelevant on daily, monthly or even yearly basis. However, throughout a lifespan such differences might represent important dietary consequences.

Other results are more obviously both significant and clinically relevant. The sugar intake in those with long tertiary education is one E% lower than in those with primary education. The recommended upper limit for sugar is 10 E% and the intake in all educational groups are below this (39). However, there is a convincing association between sugar intake and caries, a plausible association between energy-dense foods and sugary drinks and weight gain/obesity and a possible association between foods with added sugar and colorectal cancer (18). Thus, a difference in intake of one percentage point of total energy may impact the health risks associated with sugar intake. The alcohol intake among women with long tertiary education is 50 % higher than the intake in women with primary education. There is evidence of a dose-response relationship between alcohol intake and the risk of atrial fibrillation and cancer (39). In addition, even moderate alcohol consumption may replace part of the food intake, especially the intake of dairy products, fruits and vegetables (39). Hence, alcohol intake may impair the quality of the diet. A difference of 50 % in alcohol intake is therefore both

significant and clinically relevant. The intake of folate is 13 % higher in the highest educated men compared to the lowest. Evidence suggests that the recommended folate intake (>300 µg/day) protects against poor cognitive function and colorectal cancer and that there is an inverse association with cardiovascular disease outcomes (39).

4.4.3 Implications

This study revealed educational gradients in the intake of energy, macro- and micronutrients, and in most cases the gradient was in favor of "healthier" for the persons with higher education. The dataset did however not offer any variables that could explain why such a gradient was present. Based on this thesis, several new questions emerge: Have the same gradients been persistent over time? Would the same gradients have been found if income, occupation, marital status, childhood conditions etc. were used as SES-indicators? Would the corresponding gradients have been found in the intake of food items and -groups? Is there an educational gradient in the use of dietary supplements? Undoubtedly, the relationship between SES and health is an interesting topic and further research is needed in order to answer all the questions and to understand the relationship completely.

The gradients found in this study implies a need to increase the health literacy of the population. Health- and dietary information, for instance the nutrient recommendations and food-based dietary guidelines, needs to be distributed in an even larger scale to the general population, and the information needs to be communicated in a way that is understandable, applicable and feasible for the lay man. Health communication should be emphasized in the education of health-related roles such as nurses, medical doctors and public health workers. Extra measures should be taken in order to reach all members of the community with high-quality information, especially vulnerable people (e.g. low educated). Pricing mechanisms, through lower price on healthy foods like vegetables, fruits, berries and fish, and higher price on foods rich on sugar and saturated fat, would undoubtedly also be efficient.

5 Conclusion

This study found an educational gradient in several of the nutrients investigated. A positive educational gradient was found for fiber, alcohol, vitamin C, folate and iron, and a negative educational gradient was found for carbohydrates, added sugar and iodine in both women and men. In addition, a positive gradient was found for energy, total fat, MUFAs and vitamin D in women, and a negative gradient was found for SFAs in men. Compared to participants with primary education, those with long tertiary education had higher odds of being compliant with seven out of eighteen recommendations presented in this study.

Several new research questions have emerged, based on this thesis. Important questions that need to be answered in order to understand the association between SES and diet include among others; which SES-indicator is most appropriate to use? How has the gradient behaved over time? And, which gradients would have been found for food groups?

Measures should be taken in order to improve the health literacy of all subgroups of the population. Individuals from all groups, independent of SES, should have the same opportunities to attain information about health and diet, and to make healthy choices. Social inequalities in health and diet are avoidable, and measures should, to any extent, be taken in order to reduce them.

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Supplementary Tables

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Supplementary Table 1: Intake of energy and nutrients by education level, women. The Tromsø Study 2015-16

	NNR 2012	Primary (n=1270)		Upper secondary (n=1539)		Tertiary education, short (n=1112)		Tertiary education, long (n=2122)	
		Median Intake (25th–75th percentile)	Compliant (%) (below/above)	Median Intake (25th–75th percentile)	Compliant (%) (below/above)	Median Intake (25th–75th percentile)	Compliant (%) (below/above)	Median Intake (25th–75th percentile)	Compliant (%) (below/above)
Energy (MJ/day)		8.0 (6.4-9.9)	-	8.6 (6.9-10.5)	-	8.6 (7.1-10.5)	-	8.7 (7.3-10.6)	-
Carbohydrates (E%)	45-60 E%	43 (39-47)	37 (63/1)	42 (38-46)	40 (30/0)	42 (38-46)	29 (29/0)	42 (38-46)	30 (30/0)
- Fiber (g/day)	≥25 g/day	25 (20-32)	52	27 (21-34)	58	27 (22-34)	61	28 (23-35)	65
- Fiber (E%)		2.5 (2.1-3.0)		2.5 (2.1-3.0)		2.5 (2.2-2.9)		3 (2-3)	
- Sugar (E%)	<10 E%	5.1 (3.4-7.4)	91	4.9 (3.2-7.0)	91	4.6 (3.1-6.8)	92	5 (3-7)	94
Proteins (E%)	10-20 E%	17.9 (16.2-19.6)	80 (0/20)	17.8 (16.2-19.6)	81 (0/20)	17.6 (16.0-19.3)	84 (0/16)	17.6 (16.1-19.1)	85 (0/15)
Total fat (E%)	25-40 E%	34 (30-38)	85 (4/11)	35 (31-38)	81 (3/16)	35 (31-39)	79 (3/19)	35 (31-39)	79 (3/18)
- Saturated fat (E%)	<10 E%	12.5 (10.0-14.3)	15	12.4 (10.8-14.1)	15	12.4 (10.8-14.2)	15	12.4 (10.8-14.3)	14
- Trans-fat (E%)	<1 E%	0.3 (0.2-0.4)	100	0.3 (0.2-0.4)	100	0.3 (0.2-0.4)	100	0.3 (0.2-0.4)	100
- Monounsaturated fat (E%)	10-20 E%	12.3 (10.6-13.9)	83 (17/0)	12.8 (11.2-14.6)	87 (11/2)	12.8 (11.2-14.7)	87 (11/3)	13.1 (11.2-14.7)	88 (10/2)
- Polyunsaturated fat (E%)	5-10 E%	5.8 (4.9-6.8)	72 (27/1)	5.9 (5.0-7.0)	75 (23/2)	5.9 (5.0-6.9)	73 (24/2)	5.8 (4.9-6.8)	73 (26/2)
- Omega-3 and omega-6 (E%)	≥3 E%	5.8 (4.9-6.8)	99	6.0 (6.1-6.9)	100	3.6 (1.7)	100	5.8 (4.9-6.8)	100
Alcohol (E%)	<5 E%	1.1 (0.2-2.9)	87	1.8 (0.5-3.8)	82	2.0 (0.7-4.5)	79	2.2 (0.8-4.7)	77
Vitamin A (RAE/day)	≥700 RAE/day	1228 (872-1665)	86	1317 (928-1807)	89	1310 (932-1783)	88	1266 (919-1752)	90
- Adj.[a]		1512 (1166-1966)		1514 (1144-1987)		1443 (1123-1964)		1420 (1087-1887)	
Vitamin D (µg/day)	≥10 µg/day	10.4 (6.1-17.9)	52.	10.6 (6.5-19.2)	53	10.8 (6.6-19.9)	53	10.6 (6.4-18.8)	52.
- Adj.[a]		12.0 (7.9-22.0)		11.7 (7.9-22.0)		11.8 (7.6-22.2)		11.4 (7.4-20.9)	
Vitamin C (mg/day)	≥75 mg/day	134 (89-192)	83	150 (100-213)	87	151 (102-218)	8	159 (113-222)	93
- Adj.[a]		162 (111-234)		170 (122-240)		167 (122-241)		182 (130-247)	
Folate (µg/day)	≥300 µg/day	303 (228-398)	51	335 (251-441)	60	339 (259-436)	63	349 (272-450)	66
- Adj.[a]		357 (302-449)		372 (316-465)		372 (321-465)		381 (328-472)	
Beta-carotene (mg/day)	-	4.5 (2.9-6.7)		4.6 (3.0-6.7)		4.3 (2.9-6.4)		4.4 (3.0-6.3)	
- Adj.[a]		5.5 (3.6-8.1)		5.2 (3.5-7.7)		5.0 (3.5-7.1)		5.0 (3.4-7.2)	
Calcium (mg/day)	≥800 mg/day	945 (680-1287)	64	1003 (732-1355)	69	989 (731-1307)	70	1040 (780-1366)	73
- Adj.[a]		1208 (950-1466)		1160 (951-1423)		1148 (922-1394)		1184 (967-1425)	
Iron (mg/day)	≥ 9 mg/day	9.4 (7.3-12.3)	56	10.5 (8.3-14.0)	67	10.9 (8.8-14.2)	74	11.0 (8.9-14.1)	74
- Adj.[a]		11.4 (9.8-13.4)		12.0 (10.6-14.1)		12.3 (10.8-14.6)		12.1 (10.8-14.2)	
Iodine (µg/day)	≥150 µg/day	309 (224-411)	93	296 (212-398)	91	283 (202-375)	91	275 (203-363)	90
- Adj.[a]		386 (301-483)		341 (263-439)		313 (245-416)		306 (242-394)	

[a] Energy-adjusted intake (intake/10MJ)

E%, Proportion of total energy intake. RAE, Retinol Activity Equivalents.

Supplementary Table 2: Intake of energy and nutrients by education level, men. The Tromsø Study 2015-16

	NNR 2012	Primary (n=1057) Median Intake (25th–75th percentile)	Primary (n=1057) Compliant (%) (below/above)	Upper secondary (n=1525) Median Intake (25th–75th percentile)	Upper secondary (n=1525) Compliant (%) (below/above)	Tertiary education, short (n=1209) Median Intake (25th–75th percentile)	Tertiary education, short (n=1209) Compliant (%) (below/above)	Tertiary education, long (n=1468) Median Intake (25th–75th percentile)	Tertiary education, long (n=1468) Compliant (%) (below/above)
Energy (MJ/day)		9.9 (7.9-12.4)	-	10.2 (8.4-12.5)	-	10.3 (8.4-12.5)	-	10.7 (8.8-12.7)	-
Carbohydrates (E%)	45-60 E%	43 (39-47)	35 (65/1)	43 (39-47)	34 (66/0)	42 (38-46)	30 (70/0)	43 (39-46)	33 (66/0)
- Fiber (g/day)	≥25 g/day	25 (20-32)	18	27 (21-33)	20	27 (22-34)	23	29 (23-36)	29
- Fiber (E%)		2.1 (1.7-2.4)		2.1 (1.7-2.5)		2.1 (1.8-2.5)		2.2 (1.9-2.5)	
- Sugar (E%)	<10 E%	5.2 (3.4-7.7)	86	4.9 (3.2-7.5)	89	4.7 (3.1-6.9)	92	4.9 (3.3-6.9)	92
Proteins (E%)	10-20 E%	17.4 (15.7-17.0)	83 (0/20)	17.4 (15.8-15.1)	85 (0/20)	17.4 (15.8-19.0)	86 (0/14)	16.9 (15.4-18.5)	91 (0/9)
Total fat (E%)	25-40 E%	34 (30-38)	82 (5/13)	34 (31-38)	83 (5/13)	34 (31-38)	83 (5/12)	34 (30-37)	83 (5/13)
- Saturated fat (E%)	<10 E%	12.5 (10.8-14.3)	16	12.3 (10.7-13.9)	15	12.2 (10.6-13.8)	16	12.1 (10.5-14.0)	18
- Trans-fat (E%)	<1 E%	0.3 (0.2-0.4)	100	0.3 (0.2-0.3)	100	0.3 (0.2-0.4)	100	0.3 (0.2-0.4)	100
- Monounsaturated fat (E%)	10-20 E%	12.2 (10.6-13.7)	82 (17/1)	12.5 (10.9-14.2)	87 (12/1)	12.6 (11.1-14.2)	86 (12/1)	12.4 (10.9-14.1)	85 (13/1)
- Polyunsaturated fat (E%)	5-10 E%	5.8 (4.8-7.0)	69 (28/3)	5.9 (5.0-7.1)	75 (22/3)	6.0 (5.1-7.0)	78 (21/1)	5.8 (4.9-6.8)	71 (27/1)
- Omega-3 and omega-6 (E%)	≥3 E%	5.9 (4.9-7.0)	99	6.0 (5.1-7.0)	99	6.0 (5.1-7.0)	99	5.7 (4.9-6.7)	99
Alcohol (E%)	<5 E%	2.2 (0.7-4.5)	78	2.4 (1.0-4.9)	75	2.9 (1.2-5.8)	69	3.3 (1.3-6.3)	66
Vitamin A (RAE/day)	≥900 RAE/day	1277 (919-1736)	75	1301 (943-1781)	77	1354 (935-1849)	77	1369 (986-1844)	80
Adj.[a]		1256 (976-1642)		1250 (945-1648)		1261 (975-1707)		1274 (981-1685)	
Vitamin D (µg/day)	≥10 µg/day	10.9 (7.3-19.0)	55	10.9 (7.4-18.2)	57	11.7 (7.4-19.7)	58	12.0 (7.9-20.4)	61
Adj.[a]		10.3 (7.7-16.9)		10.4 (7.5-16.5)		10.9 (7.4-18.6)		10.9 (7.6-19.2)	
Vitamin C (mg/day)	≥75 mg/day	104 (68-157)	70	114 (77-166)	77	126 (88-183)	81	137 (96-195)	88
Adj.[a]		104 (71-151)		109 (79-157)		122 (86-170)		128 (92-182)	
Folate (µg/day)	≥300 µg/day	304 (237-386)	52	326 (255-408)	59	339 (268-432)	63	356 (280-450)	69
Adj.[a]		300 (261-349)		308 (271-357)		319 (282-371)		328 (283-386)	
Beta-carotene (mg/day)		3.6 (2.0-5.4)		3.7 (2.3-5.5)		3.8 (2.4-5.5)		3.8 (2.4-5.6)	
Adj.[a]		3.4 (2.0-5.6)		3.5 (2.2-5.3)		3.6 (2.3-5.2)		3.5 (2.3-5.2)	
Calcium (mg/day)	≥800 mg/day	1133 (810-526)	76	1134 (848-1510)	78	1148 (831-514)	77	1167 (855-1526)	79
Adj.[a]		1151 (895-1397)		1150 (876-1380)		1106 (893-1366)		1094 (872-1344)	
Iron (mg/day)	≥9 mg/day	10.2 (7.9-13.0)	63	11.2 (8.9-14.2)	74	11.7 (9.4-14.9)	79	12.1 (9.8-15.1)	82
Adj.[a]		10.2 (8.9-11.7)		10.7 (9.5-12.2)		11.1 (9.8-12.7)		11.2 (9.9-12.8)	
Iodine (µg/day)	≥150 µg/day	366 (271-486)	95	338 (248-448)	95	335 (248-446)	95	319 (237-415)	94
Adj.[a]		361 (278-462)		332 (252-422)		315 (251-412)		297 (231-376)	

[a] Energy-adjusted intake (intake/10MJ)
E%, Proportion of total energy intake. RAE, Retinol Activity Equivalents.

Supplementary Table 3: Linear regression analysis of intake of energy and nutrients by education level. Full model. The Tromsø Study 2015-16

		Women (n=6043)					Men (n=5259)				
		Unstandardized B (95 % confidence interval)					Unstandardized B (95 % confidence interval)				
		Crude	Adjusted[1]	Adjusted[2]	Adjusted[3]	Adjusted[4]	Crude	Adjusted[1]	Adjusted[2]	Adjusted[3]	Adjusted[4]
Energy (MJ/day)	Education level[a] 1						Reference				
	2	0.6** (0.4, 0.8)	0.4** (0.2, 0.6)	0.4** (0.2, 0.6)	0.4** (0.1, 0.6)	0.4** (0.2, 0.6)	0.3* (0.03, 0.5)	0.04 (-0.2, 0.3)	0.03 (-0.2, 0.3)	0.007 (-0.2, 0.2)	0.03 (-0.2, 0.3)
	3	0.6** (0.4, 0.8)	0.4* (0.1, 0.6)	0.4* (0.1, 0.6)	0.3* (0.09, 0.6)	0.4* (0.1, 0.6)	0.3* (0.05, 0.6)	0.05 (-0.2, 0.3)	0.04 (-0.2, 0.3)	-0.02 (-0.3, 0.2)	0.02 (-0.2, 0.3)
	4	0.7** (0.6, 0.9)	0.4** (0.2, 0.6)	0.4** (0.2, 0.6)	0.4** (0.2, 0.6)	0.4** (0.2, 0.6)	0.5** (0.3, 0.8)	0.2 (-0.06, 0.4)	0.1 (-0.1, 0.4)	0.06 (-0.2, 0.3)	0.1 (-0.1, 0.4)
	p Trend	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	0.1	0.3	0.7	0.4
Carbohydrates (E%)	Education level[a] 1						Reference				
	2	-1.4** (-1.9, -1.0)	-1.3** (-1.8, -0.8)	-1.3** (-1.8, -0.8)	-1.3** (-1.8, -0.8)	-1.4** (-1.8, -0.9)	-0.4 (-0.9, 0.05)	-0.4 (-0.9, 0.04)	-0.5 (-0.9, 0.02)	-0.5 (-1.0, -0.001)	-0.6* (-1.1, -0.1)
	3	-1.6** (-2.1, -1.1)	-1.5** (-2.0, -1.0)	-1.5** (-2.0, -1.0)	-1.5** (-2.0, -.9)	-1.7** (-2.2, -1.2)	-1.1** (-1.6, -.6)	-1.0** (-1.5, -.5)	-1.0** (-1.6, -.6)	-1.1** (-1.6, -.6)	-1.4** (-1.9, -.9)
	4	-1.7** (-2.1, -1.3)	-1.6** (-2.1, -1.2)	-1.7** (-2.1, -1.2)	-1.6** (-2.1, -1.1)	-2.0** (-2.5, -1.5)	-0.5* (-1.0, -0.03)	-0.5* (-1.0, -0.03)	-0.7* (-1.2, -0.2)	-0.7* (-1.2, -0.2)	-1.2** (-1.7, -0.7)
	p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	0.01	0.02	0.002	0.001	<0.001
Fiber (g/day)	Education level[a] 1						Reference				
	2	1.9** (1.2, 2.7)	1.8** (1.0, 0.5)	1.8** (1.0, 2.5)	1.6** (0.9, 2.3)	1.6** (0.9, 2.3)	1.1** (0.3, 1.9)	1.0* (0.2, 1.7)	1.0* (0.2, 1.7)	0.7 (-0.04, 1.5)	0.6 (-0.1, 1.4)
	3	2.2** (1.4, 3.0)	2.1** (1.3, 2.9)	2.1** (1.3, 2.9)	1.7** (0.9, 2.5)	1.6** (0.8, 2.4)	2.1** (1.2, 2.9)	1.9** (1.0, 2.7)	1.8** (1.0, 2.7)	1.3* (0.5, 2.1)	1.1* (0.3, 1.9)
	4	3.1** (2.4, 3.7)	3.0** (2.3, 3.7)	2.9** (2.2, 3.7)	2.4** (1.7, 3.1)	2.2** (1.5, 2.9)	3.2** (2.4, 4.0)	3.0** (2.2, 3.7)	2.8** (2.0, 3.6)	2.2** (1.4, 2.9)	1.8** (1.0, 2.6)
	p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Fiber (E%)	Education level[a] 1						Reference				
	2	-0.002 (-0.05, 0.05)	0.04 (-0.009, 0.09)	0.04 (-0.009, 0.09)	0.03 (-0.02, 0.08)	0.02 (-0.03, 0.07)	0.03 (-0.01, 0.07)	0.07* (0.02, 0.1)	0.07* (0.02, 0.1)	0.06* (0.01, 0.1)	0.04* (0.002, 0.09)
	3	0.01 (-0.04, 0.06)	0.07* (0.02, 0.1)	0.07* (0.02, 0.1)	0.05 (-0.005, 0.1)	0.03 (-0.03, 0.08)	0.08** (0.04, 0.1)	0.1** (0.08, 0.2)	0.1** (0.08, 0.2)	0.09** (0.05, 0.1)	0.07* (0.03, 0.1)
	4	0.04 (-0.003, 0.09)	0.1** (0.07, 0.2)	0.1** (0.07, 0.2)	0.09** (0.04, 0.1)	0.06* (0.007, 0.1)	0.1** (0.08, 0.2)	0.2** (0.1, 0.2)	0.2** (0.1, 0.2)	0.1** (0.1, 0.2)	0.1** (0.07, 0.2)
	p Trend	0.03	<0.001	<0.001	<0.001	0.02	<0.001	<0.001	<0.001	<0.001	<0.001

Supplementary Table 3 cont.

		Women (n=6043) Unstandardized B (95 % confidence interval)					Men (n=5259) Unstandardized B (95 % confidence interval)				
	Education level[a]	Crude	Adjusted[1]	Adjusted[2]	Adjusted[3]	Adjusted[4]	Crude	Adjusted[1]	Adjusted[2]	Adjusted[3]	Adjusted[4]
Sugar (E%)	1						Reference				
	2	-0.2 (-0.5, 0.02)	-0.4* (-0.6, -0.1)	-0.4* (-0.6, -0.1)	-0.3* (-0.6, -0.08)	-0.3* (-0.6, -0.07)	-0.4* (-0.7, -0.1)	-0.5** (-0.8, -0.2)	-0.5** (-0.8, -0.2)	-0.5* (-0.7, -0.2)	-0.5* (-0.7, -0.2)
	3	-0.5** (-0.8, -0.2)	-0.7** (-1.0, -0.4)	-0.7** (-1.0, -0.4)	-0.6** (-0.9, -0.3)	-0.6** (-0.9, -0.3)	-0.8** (-1.1, -0.5)	-0.8** (-1.1, -0.5)	-0.8** (-1.1, -0.6)	-0.8** (-1.1, -0.5)	-0.8** (-1.1, -0.5)
	4	-0.7** (-0.9, -0.4)	-0.9** (-1.2, -0.7)	-0.9** (-1.2, -0.7)	-0.9** (-1.1, -0.6)	-0.9** (-1.1, -0.6)	-0.7** (-1.0, -0.4)	-0.8** (-1.0, -0.5)	-0.9** (-1.2, -0.6)	-0.8** (-1.1, -0.5)	-0.9** (-1.2, -0.6)
	p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Proteins (E%)	1						Reference				
	2	-0.05 (-0.2, 0.1)	0.01 (-0.2, 0.2)	0.03 (-0.2, 0.2)	0.006 (-0.2, 0.2)	0.009 (-0.2, 0.2)	-0.02 (-0.2, 0.2)	0.05 (-0.1, 0.2)	0.07 (-0.1, 0.3)	0.06 (-0.1, 0.3)	0.06 (-0.1, 0.3)
	3	-0.3* (-0.5, -0.1)	-0.2 (-0.4, 0.007)	-0.1 (-0.4, 0.07)	-0.2 (-0.4, 0.02)	-0.2 (-0.4, 0.04)	0.05 (-0.2, 0.3)	0.1 (-0.09, 0.3)	0.1 (-0.06, 0.3)	0.1 (-0.1, 0.3)	0.1 (-0.08, 0.3)
	4	-0.3** (-0.5, -0.2)	-0.2 (-0.4, 0.008)	-0.09 (-0.3, 0.1)	-0.2 (-0.4, 0.02)	-0.1 (-0.3, 0.06)	-0.5** (-0.7, -0.3)	-0.4** (-0.6, -0.2)	-0.3* (-0.5, -0.06)	-0.3* (-0.5, -0.1)	-0.3* (-0.5, -0.07)
	p Trend	<0.001	0.01	0.2	0.03	0.08	<0.001	<0.001	0.01	0.002	0.007
Total fat (E%)	1						Reference				
	2	0.9** (0.4, 1.3)	0.5* (0.1, 1.0)	0.5* (0.1, 1.0)	0.5* (0.1, 1.0)	0.6* (0.1, 1.0)	0.2 (-0.2, 0.7)	-0.04 (-0.5, 0.4)	-0.03 (-0.5, 0.4)	-0.005 (-0.5, 0.4)	0.04 (-0.4, 0.5)
	3	1.0** (0.5, 1.5)	0.6* (0.09, 1.0)	0.6* (0.09, 1.1)	0.6* (0.1, 1.1)	0.7* (0.2, 1.2)	0.1 (-0.3, 0.6)	-0.1 (-0.6, 0.3)	-0.1 (-0.6, 0.3)	-0.08 (-0.6, 0.4)	0.03 (-0.5, 0.5)
	4	0.9** (0.5, 1.3)	0.3 (-0.09, 0.8)	0.3 (-0.1, 0.8)	0.4 (-0.05, 0.8)	0.6* (0.2, 1.0)	-0.1 (-0.6, 0.3)	-0.5* (-1.0, -0.06)	-0.6* (-1.0, -0.09)	-0.5* (-1.0, -0.03)	-0.3 (-0.8, 0.2)
	p Trend	<0.001	0.3	0.4	0.2	0.03	0.4	0.02	0.01	0.02	0.2
Saturated fat (E%)	1						Reference				
	2	-0.1 (-0.3, 0.1)	-0.1 (-0.3, 0.1)	-0.1 (-0.3, 0.1)	-0.08 (-0.3, 0.1)	-0.06 (-0.3, 0.1)	-0.2* (-0.4, -0.03)	-0.3* (-0.5, -0.1)	-0.3* (-0.5, -0.1)	-0.3* (-0.5, -0.08)	-0.3* (-0.5, -0.06)
	3	-0.06 (-0.3, 0.2)	-0.1 (-0.3, 0.1)	-0.09 (-0.3, 0.1)	-0.03 (-0.3, 0.2)	0.03 (-0.2, 0.3)	-0.4** (-0.6, -0.2)	-0.4** (-0.7, -0.2)	-0.4** (-0.7, -0.2)	-0.4** (-0.6, -0.2)	-0.3* (-0.6, 0.1)
	4	-0.02 (-0.2, 0.2)	-0.08 (-0.3, 0.1)	-0.07 (-0.3, 0.1)	0.01 (-0.2, 0.2)	0.1 (-0.01, 0.3)	-0.3* (-0.5, -0.1)	-0.4** (-0.6, -0.2)	-0.5** (-0.7, -0.2)	-0.4** (-0.6, -0.2)	-0.3* (-0.5, -0.09)
	p Trend	0.9	0.6	0.7	0.7	0.2	0.002	<0.001	<0.001	0.001	0.009

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Supplementary Table 3 cont.

| | | Women (n=6043) | | | | | Men (n=5259) | | | | |
| | | Unstandardized B (95 % confidence interval) | | | | | Unstandardized B (95 % confidence interval) | | | | |
		Crude	Adjusted[1]	Adjusted[2]	Adjusted[3]	Adjusted[4]	Crude	Adjusted[1]	Adjusted[2]	Adjusted[3]	Adjusted[4]
Monounsaturated fat (E%)	Education level[a] 1	Reference					Reference				
	2	0.7** (0.5, 1.0)	0.5** (0.2, 0.7)	0.5** (0.2, 0.7)	0.5** (0.2, 0.7)	0.5** (0.3, 0.7)	0.3* (0.1, 0.5)	0.2 (-0.04, 0.4)	0.2 (-0.03, 0.4)	0.2 (-0.02, 0.4)	0.2 (-0.006, 0.4)
	3	0.8** (0.6, 1.1)	0.5** (0.3, 0.7)	0.5** (0.3, 0.7)	0.5** (0.3, 0.7)	0.5** (0.3, 0.8)	0.4** (0.2, 0.6)	0.2* (0.005, 0.4)	0.2* (0.01, 0.4)	0.2* (0.02, 0.5)	0.3* (0.07, 0.5)
	4	0.8** (0.6, 1.0)	0.4** (0.2, 0.6)	0.4** (0.2, 0.6)	0.4** (0.2, 0.6)	0.4** (0.2, 0.7)	0.3* (0.09, 0.5)	0.05 (-0.2, 0.3)	0.05 (-0.2, 0.3)	0.05 (-0.2, 0.3)	0.1 (-0.08, 0.4)
	p Trend	<0.001	0.007	0.009	0.01	<0.001	0.02	0.8	0.8	0.8	0.2
Polyunsaturated fat (E%)	Education level[a] 1	Reference					Reference				
	2	0.2* (0.07, 0.3)	0.1 (-0.003, 0.2)	0.1 (-0.006, 0.2)	0.1 (-0.01, 0.2)	0.1 (-0.008, 0.2)	0.09 (-0.03, 0.2)	0.07 (-0.06, 0.2)	0.07 (-0.06, 0.2)	0.06 (-0.07, 0.2)	0.07 (-0.06, 0.2)
	3	0.2* (0.04, 0.3)	0.09 (-0.04, 0.2)	0.08 (-0.05, .02)	0.07 (-0.06, .02)	0.08 (0.05, 0.2)	0.06 (-0.07, .02)	0.03 (-0.1, 0.2)	0.03 (-0.1, 0.2)	0.02 (-0.1, 0.2)	0.03 (-0.1, 0.2)
	4	0.05 (-0.06, 0.2)	-0.05 (-0.2, 0.07)	-0.06 (-0.2, 0.05)	-0.07 (-0.2, 0.05)	-0.04 (-0.2, 0.08)	-0.1 (-0.2, 0.009)	-0.2* (-0.3, -0.03)	-0.2* (-0.3, -0.05)	-0.2* (-0.3, -0.07)	-0.2* (-0.3, -0.03)
	p Trend	0.97	0.1	0.05	0.04	0.1	0.02	0.003	0.001	<0.001	0.004
Trans-fat (E%)	Education level[a] 1	Reference					Reference				
	2	-0.002 (-0.01, 0.007)	0.004 (-0.006, 0.01)	0.003 (-0.007, 0.01)	0.004 (-0.006, 0.01)	0.004 (-0.006, 0.01)	-0.005 (-0.02, 0.004)	-0.006 (-0.02, 0.004)	-0.006 (-0.02, 0.004)	-0.006 (-0.02, 0.004)	-0.006 (-0.02, 0.004)
	3	0.009 (-0.001, 0.02)	0.02* (0.005, 0.03)	0.015* (0.004, 0.03)	0.02* (0.006, 0.03)	0.02* (0.007, 0.03)	0.003 (-0.007, 0.01)	0.003 (-0.007, 0.01)	0.003 (-0.008, 0.01)	0.004 (-0.006, 0.01)	0.003 (-0.007, 0.01)
	4	0.02** (0.007, 0.03)	0.02** (0.01, 0.03)	0.02** (0.01, 0.03)	0.03** (0.02, 0.04)	0.03* (0.02, 0.04)	0.02** (0.01, 0.03)	0.02** (0.009, 0.03)	0.02** (0.008, 0.03)	0.02** (0.009, 0.03)	0.02** (0.008, 0.03)
	p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Omega-3 and omega-6 (E%)	Education level[a] 1	Reference					Reference				
	2	0.2* (0.06, 0.3)	0.09 (-0.02, 0.2)	0.09 (-0.02, 0.2)	0.09 (-0.02, 0.2)	0.09 (-0.02, 0.2)	0.07 (-0.05, 0.2)	0.04 (-0.07, 0.2)	0.04 (-0.07, 0.2)	0.04 (-0.08, 0.2)	0.04 (-0.07, 0.2)
	3	0.1 (-0.02, 0.2)	0.02 (-0.1, 0.1)	0.02 (0.1, 0.1)	0.009 (-0.1, 0.1)	0.03 (-0.09, 0.1)	0.01 (-0.1, 0.1)	-0.01 (-0.1, 0.1)	-0.02 (-0.1, 0.1)	-0.02 (-0.1, 0.1)	-0.007 (-0.1, 0-1)
	4	-0.03 (-0.1, 0.07)	-0.1* (-0.2, -0.01)	-0.1* (-0.2, -0.02)	-0.1* (-0.2, -0.03)	-0.1 (-0.2, 0.005)	-0.2* (-0.3, -0.09)	-0.3** (-0.4, -0.1)	-0.3** (-0.4, -0.1)	-0.3** (-0.4, -0.2)	-0.2** (-0.4, -0.1)
	p Trend	0.08	0.001	<0.001	<0.001	0.005	<0.001	<0.001	<0.001	<0.001	<0.001

Supplementary Table 3 cont.

	Education level	Women (n=6043) Crude	Women Adjusted1	Women Adjusted2	Women Adjusted3	Women Adjusted4	Men (n=5259) Crude	Men Adjusted1	Men Adjusted2	Men Adjusted3	Men Adjusted4
		Unstandardized B (95 % confidence interval)					Unstandardized B (95 % confidence interval)				
Alcohol (E%)	1						Reference				
	2	0.6** (0.4, 0.9)	0.7** (0.5, 1.0)	0.7** (0.5, 1.0)	0.7** (0.5, 1.0)	0.8** (0.5, 1.0)	0.4* (0.02, 0.7)	0.4* (0.02, 0.7)	0.4* (0.02, 0.7)	0.4* (0.04, 0.7)	0.4* (0.1, 0.8)
	3	0.9** (0.6, 1.1)	1.1** (0.8, 1.3)	1.0** (0.7, 1.3)	1.0** (0.7, 1.3)	1.1** (0.9, 1.4)	0.9** (0.6, 1.3)	0.9** (0.6, 1.3)	0.9** (0.6, 1.3)	1.0** (0.6, 1.3)	1.2** (0.8, 1.5)
	4	1.1** (0.9, 1.4)	1.4** (1.1, 1.6)	1.3** (1.1, 1.6)	1.3** (1.1, 1.6)	1.5** (1.3, 1.8)	1.2** (0.9, 1.6)	1.3** (1.0, 1.7)	1.3** (1.0, 1.7)	1.4** (1.0, 1.7)	1.7** (1.3, 2.0)
	p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vitamin A (RAE/day)	1						Reference				
	2	101** (46, 156)	98** (41, 154)	99** (42, 155)	94* (38, 151)	96** (39, 152)	46 (-14, 105)	29 (-32, 89)	28 (-32, 88)	21 (-39, 81)	23 (-38, 83)
	3	86* (27, 146)	79* (17, 141)	84* (22, 146)	75* (13, 137)	82* (19.6, 144.4)	96* (33, 159)	79* (16, 143)	78* (5, 142)	62 (-1, 126)	66 (2, 130)
	4	61* (10, 112)	51 (-4, 107)	58* (2, 112)	45 (-11, 101)	55 (-2, 112)	113** (52, 173)	87* (25, 148)	78* (17, 141)	58 (-4, 120)	66* (3, 129)
	p Trend	0.1	0.4	0.3	0.5	0.3	<0.001	0.002	0.004	0.03	0.02
Vitamin A (RAE/10MJ)	1						Reference				
	2	-2 (-57, 54)	27 (-31, 84)	28 (-29, 85)	26 (31, 83)	26 (-32, 83)	12 (-36, 60)	30 (-19, 79)	30 (-19, 78)	26 (-22, 75)	25 (-23, 74)
	3	-10 (-70, 50)	24 (-39, 86)	28 (-34, 91)	24 (-38, 88)	25 (-39, 88)	52* (1, 102)	73* (22, 124)	73* (22, 124)	66* (15, 117)	65* (13, 117)
	4	-70* (-122, -18)	-30 (-86, 26)	-24 (-80, 33)	-29 (-86, 28)	-28 (-86, 29)	39 (-10, 88)	67* (17, 116)	67* (17, 116)	59* (9, 109)	58* (7, 109)
	p Trend	0.003	0.1	0.2	0.2	0.2	0.05	0.004	0.003	0.009	0.01
Vitamin D (µg/day)	1						Reference				
	2	0.6 (-0.1, 1.4)	1.5** (0.7, 2.3)	1.4** (0.7, 2.2)	1.4** (0.6, 2.2)	1.4** (0.6, 2.2)	-0.2 (-0.9, 0.6)	0.2 (-0.5, 1.0)	0.2 (-0.6, 1.0)	0.1 (-0.7, 0.9)	0.07 (-0.7, 0.8)
	3	0.8 (-0.04, 1.6)	1.9** (1.0, 2.7)	1.8** (0.9, 2.7)	1.7** (0.8, 2.5)	1.7** (0.9, 2.6)	0.9* (0.1, 1.7)	1.4* (0.5, 2.2)	1.3* (0.5, 2.2)	1.1* (0.2, 1.9)	1.0* (0.2, 1.8)
	4	0.4 (-0.3, 1.1)	1.7** (0.9, 2.5)	1.6** (0.8, 2.4)	1.4** (0.6, 2.2)	1.5** (0.7, 2.3)	1.2** (0.4, 2.0)	1.8** (1.0, 2.6)	1.6** (0.8, 2.4)	1.3* (0.5, 2.1)	1.1* (0.3, 2.0)
	p Trend	0.5	<0.001	<0.001	0.004	0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Supplementary Table 3 cont.

		Women (n=6043)					Men (n=5259)				
		Unstandardized B (95 % confidence interval)					Unstandardized B (95 % confidence interval)				
		Crude	Adjusted¹	Adjusted²	Adjusted³	Adjusted⁴	Crude	Adjusted¹	Adjusted²	Adjusted³	Adjusted⁴
Vitamin D (µ g/10MJ) Education level[a]	1	*Reference*					*Reference*				
	2	-0.4 (-1.3, 0.5)	1.0* (0.06, 1.9)	1.0* (0.04, 1.9)	.09 (-0.01, 1.8)	0.9 (-0.009, 1.8)	-0.5 (-1.3, 0.3)	0.2 (-0.6, 1.0)	0.2 (-0.6, 1.0)	0.1 (-0.7, 0.9)	0.06 (-0.7, 0.8)
	3	-0.2 (-1.2, 0.8)	1.5* (0.5, 2.5)	1.5* (0.4, 2.5)	1.4* (0.4, 2.4)	1.4* (0.4, 2.4)	0.4 (-0.4, 1.2)	1.2* (0.4, 2.0)	1.1* (0.3, 2.0)	1.0* (0.2, 1.8)	.9* (0.07, 1.7)
	4	-0.9* (-1.7, -0.02)	1.2* (0.3, 2.1)	1.1* (0.2, 2.0)	1.0* (0.04, 1.9)	1.0* (0.07, 1.9)	0.3 (-0.5, 1.1)	1.4** (0.6, 2.2)	1.3* (0.5, 2.1)	1.1* (0.3, 1.9)	1.0* (1.4, 1.8)
	p Trend	0.05	0.02	0.03	0.07	0.06	0.09	<0.001	<0.001	<0.001	0.003
Vitamin C (mg/day) Education level[a]	1	*Reference*					*Reference*				
	2	14.8** (7.5, 22.2)	20.6** (13.1, 28.1)	20.4** (12.9, 28.0)	19.4** (11.9, 26.8)	19.0** (11.5, 26.5)	8.1* (1.6, 14.6)	10.3* (3.8, 16.9)	10.3* (3.8, 16.9)	9.1* (2.6, 15.7)	8.8* (2.3, 15.3)
	3	17.1** (9.1, 25.0)	24.5** (16.5, 32.9)	24.1** (15.8, 32.3)	21.6** (13.4, 29.8)	20.3** (12.0, 28.5)	21.6** (14.8, 28.5)	23.9** (17.0, 30.9)	23.9** (17.0, 30.8)	21.0** (14.1, 28.0)	20.3** (13.3, 27.2)
	4	25.3** (18.5, 32.2)	34.9** (27.5, 42.3)	33.9** (26.5, 41.3)	29.8** (22.4, 37.3)	27.8** (20.3, 35.4)	32.6** (26.0, 39.2)	36.0** (29.2, 52.7)	35.3** (28.5, 42.0)	31.5** (24.7, 38.2)	30.2** (23.4, 37.1)
	p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vitamin C (mg/10MJ) Education level[a]	1	*Reference*					*Reference*				
	2	5.2 (-2.7, 13.0)	15.5** (7.5, 23.5)	15.3** (7.3, 23.4)	14.5** (6.5, 22.5)	13.9** (5.9, 21.9)	4.7 (-1.1, 10.6)	9.8* (3.9, 15.6)	9.8* (4.0, 15.6)	9.0* (3.2, 14.8)	8.4** (2.6, 14.2)
	3	7.8 (-7, 16.3)	21.2** (12.5, 30.0)	20.7** (11.9, 29.5)	18.7** (9.9, 27.4)	16.4** (7.6, 25.2)	16.9** (10.7, 23.0)	22.3** (16.2, 28.4)	22.4** (16.2, 28.5)	20.4** (14.3, 26.5)	19.2** (13.1, 25.4)
	4	15.5** (8.2, 22.9)	32.1** (24.2, 39.9)	31.3** (23.3, 39.2)	27.8** (19.9, 35.8)	24.6** (16.5, 32.6)	25.5** (19.6, 31.3)	33.0** (27.1, 38.9)	33.2** (27.2, 39.2)	30.6** (24.6, 36.6)	28.7** (22.6, 34.8)
	p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Beta-carotene (mg/day) Education level[a]	1	*Reference*					*Reference*				
	2	0.01 (-0.2, 0.2)	0.1 (-0.1, 0.4)	0.1 (-0.1, 0.4)	0.09 (-0.1, 0.3)	0.09 (-0.1, 0.3)	0.1 (-0.1, 0.3)	0.2 (-0.005, 0.4)	0.2 (-0.002, 0.4)	0.2 (-0.04, 0.4)	0.2 (-0.04, 0.4)
	3	-0.1 (-0.4, 0.1)	0.04 (-0.2, 0.3)	0.07 (-0.2, 0.3)	-0.01 (-0.3, 0.2)	-0.002 (-0.3, .03)	0.2 (-0.05, 0.3)	0.3** (0.05, 0.5)	0.3** (0.06, 0.5)	0.2 (-0.02, 0.4)	0.2 (-0.02, 0.4)
	4	-0.1 (-0.3, 0.1)	0.1 (-0.1, 0.3)	0.1 (-0.1, 0.4)	0.02 (-0.2, 0.3)	0.04 (-0.2, 0.3)	0.2 (-0.04, 0.4)	0.3** (0.1, 0.5)	0.4** (0.1, .06)	0.3** (0.06, 0.5)	0.3** (0.05, 0.5)
	p Trend	0.2	0.6	0.4	0.9	0.97	0.09	0.004	0.001	0.02	0.02

Supplementary Table 3 cont.

		Women (n=6043)					Men (n=5259)				
		Crude	Unstandardized B (95 % confidence interval)				Crude	Unstandardized B (95 % confidence interval)			
			Adjusted[1]	Adjusted[2]	Adjusted[3]	Adjusted[4]		Adjusted[1]	Adjusted[2]	Adjusted[3]	Adjusted[4]
Beta-carotene (mg/10MJ)	Education level[a] 1						Reference				
	2	-0.4* (-0.7, -0.2)	-0.2 (-0.4, 0.1)	-0.1 (-0.4, 0.1)	-0.2 (-0.5, 0.08)	-0.2 (-0.5, 0.08)	0.03 (-0.2, 0.2)	0.2* (0.01, 0.4)	0.2* (0.02, 0.4)	0.2 (-0.004, 0.4)	0.2 (-0.01, 0.4)
	3	-0.6** (-0.9, -0.3)	-0.2 (-0.5, 0.06)	-0.2 (-0.5, 0.09)	-0.3 (-0.6, 0.02)	-0.3 (-0.6, 0.005)	0.07 (-0.2, 0.3)	0.3* (0.05, 0.5)	0.3* (0.06, 0.5)	0.2* (0.01, 0.5)	0.2 (-0.008, 0.4)
	4	-0.7** (-0.9, -0.4)	-0.2 (-0.5, 0.04)	-0.2 (-0.4, 0.08)	-0.3* (-0.5, -0.01)	-0.3* (-0.6, -0.02)	0.02 (-0.2, 0.2)	0.3* (0.09, 0.5)	0.4** (0.2, 0.6)	0.3* (0.1, 0.5)	0.3* (0.07, 0.5)
	p Trend	<0.001	0.1	0.2	0.05	0.04	0.9	0.009	0.001	0.007	0.02
Folate (µg/day)	Education level[a] 1						Reference				
	2	36** (24, 48)	37** (25, 49)	37** (25, 49)	35.6** (23.5, 47.8)	36** (23, 48)	21** (10, 32)	17* (6, 28)	17* (6, 28)	15* (5, 26)	15* (5, 26)
	3	43** (30, 55)	45** (31, 58)	45** (31, 58)	41.0** (27.7, 54.4)	41** (27, 54)	39** (28, 50)	35** (23, 46)	35** (23, 46)	30** (19, 41)	31** (19, 42)
	4	49** (38, 60)	52** (40, 64)	51** (39, 64)	45.4** (33.4, 57.5)	45** (33, 57)	54** (43, 64)	48* (37, 58)	47** (36, 57)	40** (30, 51)	41** (30, 52)
	p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Folate (µg/10MJ)	Education level[a] 1						Reference				
	2	13* (1, 25)	23** (10, 35)	23** (10, 35)	22** (9, 34)	21** (9, 34)	12* (4, 20)	16** (7, 24)	16** (8, 24)	15** (7, 22)	14** (6, 22)
	3	22* (9, 35)	35** (21, 48)	35** (21, 48)	32** (19, 46)	30** (16, 44)	27** (18, 35)	31** (23, 40)	31** (23, 40)	29.2** (21, 38)	28** (20, 37)
	4	24** (13, 35)	49* (27, 52)	39** (27, 52)	35** (23, 48)	31** (20, 45)	35** (27, 43)	41** (32, 49)	42** (33, 50)	39** (30, 47)	37** (29, 46)
	p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Calcium (mg/day)	Education level[a] 1						Reference				
	2	38 (-1, 77)	35 (-5, 75)	35 (-5, 75)	32 (-8, 72)	33 (-7, 73)	-5 (-47, 38)	-25 (-68, 18)	-24 (-67, 18)	-27 (-70, 15)	-26 (-69, 16)
	3	16 (-21, 58)	11 (-33, 55)	11 (-33, 55)	4 (-40, 43)	6 (-38, 51)	7 (-38, 52)	-14 (-59, 31)	-14 (-59, 31)	-22 (-67, 24)	-21 (-66, 25)
	4	63** (27, 100)	57* (18, 97)	57* (17, 97)	45* (6, 85)	48* (8, 89)	13 (-30, 56)	-17 (-61, 26)	-13 (-57, 31)	-24 (-68, 20)	-24 (-69, 21)
	p Trend	0.002	0.01	0.01	0.07	0.05	0.4	0.6	0.8	0.4	0.4

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Supplementary Table 3 cont.

	Women (n=6043)					Men (n=5259)				
	Unstandardized B (95 % confidence interval)					Unstandardized B (95 % confidence interval)				
	Crude	Adjusted[1]	Adjusted[2]	Adjusted[3]	Adjusted[4]	Crude	Adjusted[1]	Adjusted[2]	Adjusted[3]	Adjusted[4]
Calcium (mg/10MJ) Education level[a]										
1	Reference					Reference				
2	-31* (-59, -2)	-11 (-40, 18)	-11 (-40, 18)	-12 (-41, 17)	-13 (-42, 17)	-24 (-54, 7)	-23 (-54, 7)	-23 (-54, 7)	-23 (-53, 7)	-24 (-55, 6)
3	-55** (-86, -24)	-30 (-62, 2)	-31 (-63, 2)	-34* (-66, -2)	-35* (-68, -3)	-15 (-47, 7)	-14 (-46, 18)	-14 (-46, 18)	-14 (-46, 18)	-18 (-50, 14)
4	-20 (-46, 7)	10 (-19, 38)	9 (-20, 38)	3 (-26, 32)	1 (-29, 30)	-32* (-63, -1)	-23 (-54, 8)	-23 (-54, 8)	-24 (-55, 7)	-32 (-63, .0)
p Trend	0.2	0.4	0.4	0.8	0.9	0.09	0.3	0.3	0.2	0.1
Iron (mg/day) Education level[a]										
1	Reference					Reference				
2	1.8** (1.1, 2.6)	1.4** (0.6, 2.2)	1.4** (0.6, 2.2)	1.4** (0.6, 2.2)	1.4** (0.6, 2.1)	0.8* (0.3, 1.4)	0.8* (0.3, 1.4)	0.8* (0.3, 1.4)	0.8* (0.2, 1.3)	0.8* (0.3, 1.3)
3	2.4** (1.6, 3.2)	1.8* (0.9, 2.6)	1.8** (0.9, 2.6)	1.7** (0.9, 2.6)	1.7** (0.8, 2.5)	1.8** (1.2, 2.4)	1.8** (1.2, 2.4)	1.8** (1.2, 2.4)	1.7** (1.1, 2.3)	1.7** (1.2, 2.3)
4	2.4** (1.7, 3.1)	1.7** (0.9, 2.4)	1.6** (0.9, 2.4)	1.6** (0.8, 2.3)	1.5** (0.7, 2.3)	1.7** (1.2, 2.3)	1.7** (1.1, 2.2)	1.7** (1.1, 2.2)	1.5** (.9, 2.0)	1.6** (1.0, 2.1)
p Trend	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Iron (mg/10MJ) Education level[a]										
1	Reference					Reference				
2	1.2* (0.3, 2.1)	1.0* (0.03, 1.9)	1.0* (0.02, 1.9)	1.0* (0.04, .06)	1.0* (0.03, 1.9)	.08* (0.3, 1.3)	0.8* (0.3, 1.3)	0.8* (0.3, 1.3)	0.8* (0.3, 1.3)	0.8* (0.3, 1.3)
3	1.7** (0.7, 2.7)	1.4* (0.4, 2.4)	1.3* (0.3, 2.4)	1.4* (0.4, 2.4)	1.3* (0.2, 2.3)	1.8** (1.2, 2.2)	1.7** (1.2, 2.3)	1.8** (1.2, 2.3)	1.7** (1.2, 2.3)	1.7** (1.2, 2.3)
4	1.5** (0.7, 2.4)	1.2* (0.2, 2.1)	1.1* (0.2, 2.0)	1.1 (0.2, 2.1)	1.0* (0.03, 1.9)	1.5** (1.0, 2.0)	1.5** (1.0, 2.0)	1.5** (1.0, 2.0)	1.5** (0.9, 2.0)	1.4** (0.9, 2.0)
p Trend	<0.001	0.03	0.04	0.03	0.09	<0.001	<0.001	<0.001	<0.001	<0.001
Iodine (µg/day) Education level[a]										
1	Reference					Reference				
2	-12.7* (-23.2, -2.1)	2.2 (-8.5, 13.0)	2.4 (-8.4, 13.1)	1.6 (-9.2, 12.3)	2.3 (-8.5, 13.0)	-16.7* (-28.6, -4.8)	-16.6* (-28.4, -4.8)	-16.6* (-28.4, -4.7)	-17.9* (-29.8, -6.0)	-16.5* (-28.4, -4.6)
3	-28.6** (-40.0, -17.2)	-9.0 (-20.8, 2.7)	-8.4 (-20.2, 3.3)	-10.3 (-22.1, 1.4)	-7.6 (-19.4, 4.2)	-18.2* (-30.8, -5.7)	-18.1* (-30.8, -5.7)	-18.1* (-30.6, -5.6)	-21.2** (-33.8, -8.7)	-18.3* (-30.9, -5.7)
4	-34.7** (-44.6, -24.9)	-10.6* (-21.1, -0.09)	-9.7 (-20.3, 0.9)	-13.0* (-23.6, -2.3)	-8.9 (-19.7, 1.9)	-36.1** (-48.3, -24.0)	-35.3** (-47.5, -24.0)	-35.3** (-47.5, -23.1)	-39.2** (-51.5, -26.9)	-34.5** (-47.0, -22.1)
p Trend	<0.001	0.007	0.01	0.002	0.03	<0.001	<0.001	<0.001	<0.001	<0.001

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Supplementary Table 3 cont.

	Women (n=6043) Unstandardized B (95 % confidence interval)					Men (n=5259) Unstandardized B (95 % confidence interval)				
Education level[a]	Crude	Adjusted[1]	Adjusted[2]	Adjusted[3]	Adjusted[4]	Crude	Adjusted[1]	Adjusted[2]	Adjusted[3]	Adjusted[4]
Iodine (µg/10MJ)										
1						*Reference*				
2	-42.0** (-52.5, -31.5)	-16.5* (-27.0, -6.1)	-16.4* (-26.8, -5.9)	-16.6* (-27.0, -6.1)	-16.2* (-26.6, -5.7)	-35.0** (-45.2, -24.7)	-16.5** (-26.2, -6.8)	-16.3 (-26.0, -6.6)	-16.5** (-26.2, -6.9)	-15.8* (-25.4, -6.1)
3	-57.6** (-69.0, -46.3)	-24.6** (-36.1, -13.2)	-23.9** (-35.4, -12.5)	-24.7** (-36.2, -13.2)	-23.0** (-34.6)	-38.7** (-49.5, -27.9)	-18.8** (-29.0, -8.7)	-18.5** (-28.7, -8.3)	-19.1** (-29.3, -8.9)	-17.4** (-27.7, -7.2)
4	-69.7** (-79.5, -59.9)	-29.4** (-39.6, -19.1)	-28.1** (-38.5, -17.8)	-29.8** (-40.1, -19.4)	-27.1** (-37.6, -16.5)	-66.4** (-76.8, -56.1)	-36.0** (-48.6, -28.9)	-36.0** (-45.9, -26.1)	-36.8** (-46.8, -26.8)	-34.0** (-44.2, -23.9)
p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

* $p < 0.05$. ** $p < 0.001$.

a 1 - Primary/partly secondary education (up to 10 years of schooling), 2 - Upper secondary education (a minimum of 3 years), 3 - Tertiary education, short: college/university less than 4 years, 4 - Tertiary education, long: college/university 4 years or more

1 Adjusted for age-groups (40-49 years (reference)/50-59 years/60-69 years/70-79 years/80+ years).

2 Adjusted for age-groups and BMI-groups (normal (reference)/overweight/obese).

3 Adjusted for age-groups, BMI-groups and physical activity level (sedentary (reference)/light/moderate/vigorous).

4 Adjusted for age-groups, BMI-groups, physical activity level and smoking status (never smoker (reference)/current smoker/previous smoker)

E%, proportion of total energy intake. RAE, Retinol Activity Equivalents

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Supplementary Table 4: Logistic regression analysis of odds of following recommendations for intake of nutrients by education level. Full model. The Tromsø Study 2015-16

		Women (n=6043) Odds ratio (95 % confidence interval)					Men (n=5259) Odds ratio (95 % confidence interval)				
	Education level[a]	Crude	Adjusted[1]	Adjusted[2]	Adjusted[3]	Adjusted[4]	Crude	Adjusted[1]	Adjusted[2]	Adjusted[3]	Adjusted[4]
Carbohydrates (45-60 E%)	1	Reference					Reference				
	2	0.7** (0.6, 0.8)	0.7** (0.6, 0.9)	0.7** (0.6, 0.9)	0.7** (0.6, 0.9)	0.7** (0.6, 0.9)	0.9 (0.8, 1.1)	1.0 (0.8, 1.1)	0.9 (0.8, 1.1)	0.9 (0.8, 1.1)	0.9 (0.8, 0.1)
	3	0.7** (0.7, 0.6)	0.7** (0.6, 0.8)	0.7** (0.6, 0.8)	0.7** (0.6, 0.9)	0.6** (0.5, 0.8)	0.8* (0.7, 0.9)	0.8* (0.7, 1.0)	0.8* (0.7, 0.9)	0.8* (0.6, 0.9)	0.8** (0.6, 0.8)
	4	0.7** (0.6, 0.8)	0.7** (0.6, 0.9)	0.7** (0.6, 0.9)	0.7** (0.6, 0.9)	0.6** (0.5, 0.8)	0.9 (0.8, 1.1)	0.9 (0.8, 1.1)	0.9 (0.7, 1.1)	0.9 (0.7, 1.1)	0.7* (0.6, 0.9)
	p Trend	<0.001	0.001	0.001	0.002	<0.001	0.2	0.2	0.08	0.06	<0.001
Fiber (≥ 25 g/day)	1	Reference					Reference				
	2	1.3* (1.1, 1.5)	1.3* (1.1, 1.5)	1.3* (1.1, 1.5)	1.2* (1.0, 1.4)	1.2* (1.0, 1.4)	1.1 (0.9, 1.4)	1.1 (0.9, .3)	1.1 (0.9, 1.3)	1.1 (0.9, 1.3)	1.0 (0.8, 1.3)
	3	1.4** (1.2, 1.7)	1.4** (1.2, 1.7)	1.4** (1.2, 1.7)	1.3* (1.1, 1.6)	1.3* (1.08, 1.5)	1.3* (1.0, 1.6)	1.2 (1.0, 1.5)	1.2 (.9, 1.5)	1.1 (0.9, 1.4)	1.1 (0.9, 1.4)
	4	1.7** (1.5, 2.0)	1.7** (1.5, 2.0)	1.7** (1.5, 2.0)	1.6** (1.3, 1.8)	1.5** (1.3, 1.8)	1.8** (1.5, 2.2)	1.7** (1.4, 2.1)	1.6** (1.3, 2.0)	1.5** (1.2, 1.8)	1.4** (1.2, 1.8)
	p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sugar (<10 E%)	1	Reference					Reference				
	2	1.0 (.8, 1.3)	1.1 (.9, 1.5)	1.1 (.9, 1.5)	1.1 (.8, 1.5)	1.1 (.8, 1.5)	1.3 (1.0, 1.6)	1.3* (1.0, 1.7)	1.3* (1.0, 1.7)	1.3* (1.0, 1.7)	1.3* (1.0, 1.6)
	3	1.2 (.9, 1.6)	1.4 (1.0, 1.9)	1.4 (1.0, 1.9)	1.3 (.9, 1.8)	1.3 (.9, 1.8)	1.9** (1.4, 2.5)	2.0** (1.5, 2.6)	2.0** (1.5, 2.6)	1.9** (1.5, 2.6)	2.0** (1.5, 2.6)
	4	1.6* (1.2, 2.0)	1.9** (1.4, 2.6)	1.9** (1.4, 2.6)	1.8** (1.3, 2.5)	1.8** (1.3, 2.4)	1.9** (1.5, 2.5)	2.1** (1.6, 2.7)	2.1** (1.6, 2.8)	2.1** (1.6, 2.7)	2.2** (1.6, 2.8)
	p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Proteins (10-20 E%)	1	Reference					Reference				
	2	1.0 (1.0, 1.2)	1.0 (.8, 1.2)	1.0 (.8, 1.2)	1.0 (.8, 1.3)	1.0 (.8, 1.2)	1.1 (.9, 1.4)	1.1 (.9, 1.3)	1.1 (.8, 1.3)	1.1 (.9, 1.3)	1.0 (.8, 1.3)
	3	1.3* (1.1, 1.6)	1.3* (1.0, 1.6)	1.2 (1.0, 1.5)	1.2 (1.0, 1.6)	1.2 (1.0, 1.5)	1.3 (1.0, 1.6)	1.2 (.9, 1.5)	1.2 (.9, 1.5)	1.2 (.9, 1.5)	1.2 (.9, 1.5)
	4	1.5** (1.3, 1.8)	1.5** (1.2, 1.8)	1.3* (1.1, 1.6)	1.4** (1.2, 1.7)	1.3** (1.1, 1.7)	2.0* (1.6, 2.5)	1.8** (1.4, 2.3)	1.6** (1.3, 2.1)	1.6** (1.3, 2.1)	1.6** (1.2, 2.0)
	p Trend	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total fat (25-40 E%)	1	Reference					Reference				
	2	0.7* (0.6, 0.9)	0.8* (0.6, 1.0)	0.8* (0.6, 1.0)	0.8* (0.6, 1.0)	0.8* (0.6, 1.0)	1.0 (0.8, 1.3)	1.1 (0.8, 1.3)	1.1 (0.9, 1.3)	1.1 (0.9, 1.3)	1.1 (0.9, 1.3)
	3	0.6** (0.5, 0.8)	0.7** (0.6, 0.9)	0.7* (0.6, 0.9)	0.7** (0.5, 0.9)	0.6** (0.5, 0.9)	1.1 (0.9, 1.4)	1.1 (0.9, 1.4)	1.1 (0.9, 1.4)	1.1 (0.9, 1.4)	1.1 (0.8, 1.4)
	4	0.7** (0.5, 0.8)	0.7** (0.6 0.9)	0.7* (0.6, 0.9)	0.7* (0.6, 0.9)	0.7** (0.5, 0.9)	1.0 (0.7, 1.3)	1.1 (0.9, 1.4)	1.1 (0.9, 1.4)	1.1 (0.9, 1.4)	1.0 (0.8, 1.3)
	p Trend	<0.001	0.005	0.003	0.002	<0.001	0.7	0.4	0.3	0.4	0.8
Saturated fat (<10 E%)	1	Reference					Reference				
	2	1.0 (0.8, 1.3)	1.0 (0.8, 1.3)	1.0 (0.8, 1.3)	1.0 (0.8, 1.2)	1.0 (0.8, 1.2)	0.9 (0.7, 1.2)	1.0 (0.8, 1.2)	1.0 (0.8, 1.2)	1.0 (0.8, 1.2)	1.0 (0.8, 1.2)
	3	1.0 (0.8, 1.3)	1.0 (0.8, 1.3)	1.0 (0.8, 1.3)	1.0 (0.8, 1.3)	0.9 (0.7, 1.2)	1.0 (0.8, 1.3)	1.1 (0.8, 1.3)	1.1 (0.9, 1.3)	1.0 (0.8, 1.3)	1.0 (0.8, 1.3)
	4	0.9 (0.8, 1.2)	1.0 (0.8, 1.2)	0.9 (0.8, 1.2)	0.9 (0.7, 1.1)	0.8 (0.7, 1.0)	1.2 (1.0, 1.5)	1.3* (1.1, 1.6)	1.3* (1.1, 1.7)	1.3* (1.0, 1.6)	1.2* (1.0, 1.6)
	p Trend	0.5	0.7	0.6	0.3	0.09	0.05	0.005	0.003	0.01	0.02

Supplementary Table 4 cont.

	Education level[a]	Women (n=6043) Crude	Women Adjusted[1]	Women Adjusted[2]	Women Adjusted[3]	Women Adjusted[4]	Men (n=5259) Crude	Men Adjusted[1]	Men Adjusted[2]	Men Adjusted[3]	Men Adjusted[4]
Monounsaturated fat (10-20 E%)	1	Reference					Reference				
	2	1.4* (1.2, 1.8)	1.2 (1.0, 1.5)	1.2 (1.0, 1.5)	1.2 (1.0, 1.5)	1.2 (1.0, 1.5)	1.5** (1.2, 1.8)	1.3* (1.1, 1.7)	1.3* (1.1, 1.7)	1.3* (1.1, 1.7)	1.3* (1.1, 1.7)
	3	1.3* (1.0, 1.7)	1.0 (0.8, 1.3)	1.1 (0.8, 1.4)	1.1 (0.8, 1.3)	1.1 (0.7, 1.3)	1.4* (1.1, 1.8)	1.3* (1.0, 1.6)	1.3* (1.0, 1.6)	1.3* (1.0, 1.6)	1.3* (1.0, 1.7)
	4	1.5** (1.2, 1.8)	1.1 (0.9, 1.4)	1.2 (0.9, 1.4)	1.2 (0.9, 1.4)	1.2 (1.0, 1.5)	1.3* (1.0, 1.6)	1.1 (0.9, 1.3)	1.1 (0.9, 1.3)	1.1 (0.9, 1.3)	1.1 (0.9, 1.4)
	p Trend	<0.001	0.5	0.4	0.4	0.2	<0.001	0.9	0.9	0.9	0.4
Polyunsaturated fat (5-10 E%)	1	Reference					Reference				
	2	1.2* (1.0, 1.4)	1.1 (0.9, 1.3)	1.0 (0.9, 1.3)	1.0 (0.9, 1.3)	1.1 (0.9, 1.3)	1.3* (1.1, 1.6)	1.3* (1.1, 1.5)	1.3* (1.1, 1.5)	1.3* (1.1, 1.5)	1.3* (1.1, 1.5)
	3	1.1 (0.9, 1.3)	1.0 (0.08, 1.2)	1.0 (0.8, 1.2)	1.0 (0.8, 1.2)	1.0 (0.8, 1.2)	1.6** (1.3, 1.9)	1.5** (1.2, 1.8)	1.5 (1.2, 1.8)	1.4* (1.2, 1.8)	1.5** (1.2, 1.8)
	4	1.0 (0.9, 1.2)	0.9 (0.8, 1.1)	0.9 (0.8, 1.1)	0.9 (0.8, 1.0)	0.9 (0.8, 1.1)	1.1 (0.9, 1.3)	1.0 (0.9, 1.2)	1.0 (0.9, 1.2)	1.0 (0.8, 1.2)	1.0 (0.9, 1.3)
	p Trend	0.7	0.1	0.1	0.09	0.2	0.3	0.9	0.8	0.9	0.7
Trans-fat (<1 E%)	1	Reference					Reference				
	2	1.2 (0.2, 8.9)	1.1 (0.1, 8.4)	1.0 (0.1, 8.2)	1.1 (0.1, 8.5)	1.1 (0.1, 8.2)	2.9 (0.3, 32.5)	2.5 (0.2, 27.3)	2.5 (0.2, 27.9)	2.5 (0.2, 28.2)	2.4 (0.2, 26.4)
	3	0.9 (0.1, 6.5)	0.8 (0.1, 6.3)	0.7 (0.09, 5.7)	0.7 (0.1, 5.8)	0.6 (0.08, 5.0)	3.2×10^6 (0.0, -)	2.4×10^6 (0.0, -)	2.2×10^6 (0.0, -)	2.2×10^6 (0.0, -)	1.9×10^6 (0.0, -)
	4	0.9 (0.2, 4.8)	0.7 (0.1, 4.8)	0.7 (0.1, 4.2)	0.6 (0.1, 4.1)	0.5 (0.08, 3.2)	0.6 (0.1, 2.9)	0.4 (0.08, 2.2)	0.3 (0.07, 1.8)	0.3 (0.07, 1.9)	0.3 (0.05, 1.6)
	p Trend	0.8	0.7	0.6	0.5	0.3	0.3	0.2	0.1	0.1	0.1
Omega-3 and omega-6 (≥ 3 E%)	1	Reference					Reference				
	2	1.8 (0.5, 6.7)	2.3 (0.6, 8.6)	2.3 (0.6, 8.7)	2.1 (0.6, 7.8)	2.0 (0.5, 7.7)	1.6 (0.7, 4.0)	1.7 (0.7, 4.2)	1.7 (0.7, 4.4)	1.6 (0.7, 4.1)	1.6 (0.6, 3.9)
	3	2.7 (0.6, 13.6)	3.6 (0.7, 19.2)	3.9 (0.7, 20.9)	3.3 (0.6, 17.7)	3.2 (0.6, 17.1)	1.3 (0.5, 3.2)	1.4 (0.6, 3.4)	1.4 (0.6, 3.5)	1.2 (0.5, 3.1)	1.1 (0.4, 2.9)
	4	1.3 (0.5, 3.8)	1.8 (0.6, 6.0)	2.1 (0.6, 6.9)	1.6 (0.5, 5.5)	1.6 (0.5, 5.3)	1.0 (0.4, 2.1)	1.0 (0.4, 2.3)	1.0 (0.4, 2.3)	0.9 (0.4, 2.0)	0.8 (0.3, 1.8)
	p Trend	0.7	0.5	0.4	0.5	0.6	0.6	0.7	0.7	0.5	0.4
Alcohol (<5 E%)	1	Reference					Reference				
	2	0.7** (0.5, 0.8)	0.6** (0.5, 0.8)	0.6** (0.5, 0.8)	0.6** (0.5, 0.8)	0.6** (0.5, 0.7)	0.9 (0.7, 1.1)	0.8* (0.7, 1.0)	0.8* (0.7, 1.0)	0.8* (0.7, 1.0)	0.8* (0.6, 0.9)
	3	0.5** (0.4, 0.7)	0.5** (0.4, 0.6)	0.5** (0.4, 0.6)	0.5** (0.4, 0.6)	0.4** (0.3, 0.5)	0.6** (0.5, 0.8)	0.6** (0.5, 0.7)	0.6** (0.5, 0.7)	0.6** (0.5, 0.7)	0.5** (0.4, 0.6)
	4	0.5** (0.4, 0.6)	0.4** (0.3, 0.5)	0.4** (0.3, 0.5)	0.4** (0.3, 0.5)	0.3** (0.3, 0.4)	0.5** (0.5, 0.7)	0.5** (0.4, 0.6)	0.5** (0.4, 0.6)	0.5** (0.4, 0.6)	0.4** (0.3, 0.5)
	p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vitamin A (RAE/day)	1	Reference					Reference				
	2	1.4* (1.1, 1.7)	1.4* (1.1, 1.8)	1.4* (1.1, 1.8)	1.4* (1.1, 1.8)	1.4 (1.1, 1.8)	1.1 (0.9, 1.3)	1.1 (0.9, 1.3)	1.1 (0.9, 1.3)	1.1 (0.9, 1.3)	1.1 (0.9, 1.3)
	3	1.2 (1.0, 1.6)	1.3* (1.0, 1.7)	1.3* (1.0, 1.7)	1.3 (1.0, 1.6)	1.3* (1.0, 1.7)	1.1 (0.9, 1.3)	1.1 (0.9, 1.3)	1.1 (0.9, 1.3)	1.0 (0.8, 1.2)	1.0 (0.8, 1.3)
	4	1.6** (1.3, 2.0)	1.7** (1.3, 2.1)	1.7** (1.3, 2.1)	1.6** (1.3, 2.0)	1.7** (1.3, 2.1)	1.3* (1.0, 1.5)	1.2* (1.0, 1.5)	1.2* (1.0, 1.5)	1.2 (1.0, 1.4)	1.3 (1.0, 1.5)
	p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	0.03	0.05	0.05	0.1	0.07

Supplementary Table 4 cont.

Nutrient	Education level[a]	Women (n=6043) Crude	Women Adjusted[1]	Women Adjusted[2]	Women Adjusted[3]	Women Adjusted[4]	Men (n=5259) Crude	Men Adjusted[1]	Men Adjusted[2]	Men Adjusted[3]	Men Adjusted[4]
		Odds ratio (95 % confidence interval)					Odds ratio (95 % confidence interval)				
Vitamin D (µg/day)	1	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
	2	1.0 (0.9, 1.2)	1.2* (1.0, 1.4)	1.2* (1.0, 1.4)	1.2 (1.0, 1.4)	1.2* (1.0, 1.4)	1.1 (0.9, 1.3)	1.1 (1.0, 1.3)	1.1 (1.0, 1.3)	1.1 (1.0, 1.3)	1.1 (1.0, 1.3)
	3	1.0 (0.9, 1.2)	1.3* (1.1, 1.5)	1.3* (1.1, 1.5)	1.2* (1.0, 1.5)	1.3* (1.0, 1.5)	1.1 (1.0, 1.3)	1.2* (1.0, 1.4)	1.2* (1.0, 1.4)	1.2 (1.0, 1.4)	1.2 (1.0, 1.4)
	4	1.0 (0.9, 1.2)	1.3* (1.1, 1.5)	1.3* (1.1, 1.5)	1.2* (1.0, 1.4)	1.3* (1.1, 1.5)	1.3* (1.1, 1.5)	1.4** (1.2, 1.7)	1.4** (1.2, .7)	1.3** (1.1, 1.6)	1.3** (1.1, 1.6)
	p Trend	0.97	0.006	0.008	0.03	0.01	0.002	<0.001	<0.001	<0.001	<0.001
Vitamin C (mg/day)	1	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
	2	1.3* (1.1, 1.6)	1.5** (1.2, 1.8)	1.5** (1.2, 1.8)	1.4* (1.1, 1.8)	1.4* (1.1, 1.7)	1.4** (1.2, 1.7)	1.5** (1.2, 1.8)	1.5** (1.2, 1.8)	1.4** (1.2, 1.7)	1.4** (1.2, 1.7)
	3	1.6** (1.3, 2.0)	1.9** (1.4, 2.4)	1.9** (1.5, 2.5)	1.8** (1.4, 2.3)	1.7** (1.3, 2.2)	2.1** (1.7, 2.5)	2.2** (1.8, 2.7)	2.2** (1.8, 2.7)	2.0** (1.7, 2.5)	2.0** (1.6, 2.4)
	4	2.5** (2.0, 3.2)	3.1** (2.4, 3.9)	3.2** (2.5, 4.1)	2.9** (2.2, 3.7)	2.7** (2.1, 3.5)	2.9** (2.4, 3.6)	3.2** (2.6, 4.0)	3.2** (2.6, 4.0)	3.0** (2.4, 3.7)	2.8** (2.2, 3.5)
	p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Folate (µg/day)	1	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
	2	1.5** (1.3, 1.7)	1.5** (1.3, 1.8)	1.5** (1.3, 1.8)	1.5** (1.3, 1.7)	1.5** (1.2, 1.7)	1.3* (1.1, 1.5)	1.3* (1.1, 1.5)	1.3* (1.1, 1.5)	1.2* (1.0, 1.5)	1.2* (1.0, 1.5)
	3	1.6** (1.4, 1.9)	1.7** (1.4, 2.0)	1.7** (1.4, 2.0)	1.6** (1.3, 1.9)	1.6** (1.3, 1.9)	1.6** (1.3, 1.9)	1.5** (1.3, 1.8)	1.5** (1.3, 1.8)	1.4* (1.2, 1.7)	1.5** (1.2, 1.7)
	4	1.9** (1.6, 2.2)	1.9** (1.7, 2.3)	1.9** (1.7, 2.3)	1.8** (1.5, 2.1)	1.8** (1.5, 2.1)	2.0** (1.7, 2.4)	1.9** (1.6, 2.2)	1.9** (1.6, 2.2)	1.8** (1.5, 2.1)	1.8** (1.5, 2.1)
	p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Calcium (mg/day)	1	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
	2	1.3* (1.1, 1.5)	1.3* (1.1, 1.5)	1.3* (1.1, 1.5)	1.2* (1.0, 1.4)	1.2* (1.0, 1.5)	1.1 (1.0, 1.4)	1.1 (0.9, 1.3)	1.1 (0.9, 1.3)	1.1 (0.9, 1.3)	1.1 (0.9, 1.3)
	3	1.3* (1.1, 1.6)	1.3* (1.1, 1.6)	1.3* (1.1, 1.6)	1.2* (1.0, 1.5)	1.3* (1.0, 1.5)	1.0 (0.9, 1.3)	1.0 (0.8, 1.2)	1.0 (0.8, 1.2)	1.0 (0.8, 1.2)	1.0 (0.8, 1.2)
	4	1.6** (1.3, 1.8)	1.5** (1.3, 1.8)	1.5** (1.3, 1.8)	1.4** (1.2, 1.7)	1.5** (1.2, 1.7)	1.2 (1.0, 1.4)	1.1 (0.9, 1.4)	1.1 (0.9, 1.4)	1.1 (0.9, 1.3)	1.0 (0.9, 1.3)
	p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	0.2	0.5	0.5	0.8	0.99
Iron (mg/day)	1	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
	2	1.6** (1.4, 1.9)	1.4** (1.2, 1.7)	1.4** (1.2, 1.7)	1.4** (1.2, 1.7)	1.4** (1.2, 1.7)	1.6* (1.4, 1.9)	1.5** (1.3, 1.8)	1.5** (1.3, 1.8)	1.5** (1.2, 1.8)	1.5** (1.2, 1.8)
	3	2.2** (1.8, 2.6)	1.9** (1.6, 2.3)	1.9** (1.6, 2.2)	1.8** (1.5, 2.2)	1.8** (1.5, 2.2)	2.2** (1.8, 2.7)	2.0** (1.7, 2.5)	2.0** (1.7, 2.5)	1.9** (1.6, 2.3)	1.9** (1.6, 2.3)
	4	2.2** (1.9, 2.6)	1.9** (1.6, 2.3)	1.9** (1.6, 2.3)	1.8** (1.5, 2.1)	1.8** (1.5, 2.1)	2.7** (2.2, 3.2)	2.4** (2.0, 2.9)	2.3** (1.9, 2.8)	2.2** (1.8, 2.7)	2.2** (1.8, 2.7)
	p Trend	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Iodine (µg/day)	1	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference	Reference
	2	0.8 (0.6, 1.0)	1.1 (0.8, 1.5)	1.1 (0.8, 1.5)	1.1 (0.8, 1.4)	1.1 (0.8, 1.4)	0.9 (0.6, 1.3)	1.1 (0.7, 1.5)	1.1 (0.7, 1.5)	1.0 (0.7, 1.5)	1.1 (0.7, 1.5)
	3	0.8 (0.6, 1.1)	1.2 (0.9, 1.6)	1.2 (0.9, 1.6)	1.1 (0.8, 1.6)	1.2 (0.8, 1.6)	1.0 (0.7, 1.4)	1.2 (0.8, 1.8)	1.2 (0.8, 1.8)	1.1 (0.7, 1.6)	1.2 (0.8, 1.8)
	4	0.7* (0.6, 1.0)	1.2 (0.9, 1.6)	1.2 (0.9, 1.6)	1.1 (0.8, 1.5)	1.1 (0.9, 1.5)	0.8 (0.5, 1.1)	1.0 (0.7, 1.5)	1.0 (0.7, 1.5)	1.0 (0.7, 1.4)	1.1 (0.7, 1.6)
	p Trend	0.05	0.2	0.1	0.4	0.3	0.2	0.99	0.8	0.8	0.8

* p <0.05. ** p <0.001.

a 1 - Primary/partly secondary education (up to 10 years of schooling), 2 - Upper secondary education (a minimum of 3 years), 3 - Tertiary education, short: college/university less than 4 years, 4 - Tertiary education, long: college/university 4 years or more.

1 Adjusted for age-groups (40-49 years (reference)/50-59 years/60-69 years/70-79 years/80+ years).

² Adjusted for age-groups and BMI-groups (normal (reference)/overweight/obese).
³ Adjusted for age-groups, BMI-groups and physical activity level (sedentary (reference)/light/moderate/vigorous).
⁴ Adjusted for age-groups, BMI-groups, physical activity level and smoking status (never smoker (reference)/current smoker/previous smoker)
E%, proportion of total energy intake. RAE, Retinol Activity Equivalents

Supplementary Table 5: Characteristics of participants included in the final study sample in strata of educational level. The Tromsø Study 2015-2016

n or %	Attended Tromsø 7 (N=21083)								Differences				
	Included in final sample (n=11302)				Excluded (n=9781)				Between-groups	Within-groups			
	Education level[a]				Education level[a]					Education level[a]			
	1	2	3	4	1	2	3	4	*p*	1	2	3	4
	20.6	27.1	20.5	31.8	26.3	28.6	17.9	27.1	**<0.001**				
	Mean (SD) or proportion (%)				Mean (SD) or proportion (%)					*p*			
Sex									<0.05	0.99	<0.001	0.90	0.12
- Women	54.6	50.2	47.9	59.1	54.6	45.3	47.7	57.1					
- Men	45.4	49.8	52.1	40.9	45.4	54.7	52.3	42.9					
Age (years)	63.5 (10.3)	57.5 (10.5)	56.3 (10.3)	54.1 (10.0)	63.5 (12.2)	56.0 (11.2)	54.4 (10.8)	52.7 (9.9)	0.5	<0.001	0.015	0.13	0.11
Age-groups									<.0.001	<.001	<0.001	<0.001	<0.001
- 40-49 years	11.0	27.5	30.8	40.2	15.0	33.9	39.8	46.4					
- 50-59 years	22.5	30.4	31.6	29.7	24.0	32.1	30.8	29.1					
- 60-69 years	37.9	27.7	25.7	22.3	27.8	20.2	18.0	17.2					
- 70-79 years	23.2	12.2	10.2	7.0	22.5	10.4	9.2	6.3					
- 80+ years	5.4	2.1	1.7	0.7	10.7	3.5	2.3	1.0					
BMI (kg/m²)	27.9 (4.6)	27.7 (4.6)	27.2 (4.3)	26.3 (4.2)	27.9 (4.9)	28.0 (4.6)	27.6 (4.5)	26.6 (4.3)	<0.001	0.072	0.035	0.032	0.25
BMI-group[b]									<0.001	0.77	0.011	0.056	0.096
- Normal	27.2	28.2	32.2	42.2	27.9	25.6*	28.9	40.3					
- Overweight	44.8	46.0	44.8	41.0	43.0	45.3	45.7	40.9					
- Obese	28.0	25.8	23.0	16.9	28.4	29.1	25.6	18.9					
Leisure-time physical activity level[c]									<0.001	<0.001	0.034	0.067	0.091
- 1	19.1	14.5	10.8	9.3	23.8	17.1	13.4	11.1					
- 2	61.0	61.2	59.1	55.2	57.9	58.1	57.9	55.1					
- 3	18.9	22.5	27.1	30.2	16.1	22.7	25.4	28.4					
- 4	1.1	1.8	3.0	5.2	2.3	2.0	3.3	5.5					
Smoking status									<0.001	<0.001	0.044	0.25	0.69
- Never smokers	29.7	34.9	45.1	55.8	29.7	34.4	44.2	56.9					
- Previous smokers	51.6	48.8	44.4	37.4	47.1	46.8	43.7	36.3					
- Current smokers	18.7	16.3	10.5	6.8	23.1	18.7	12.2	6.8					

Between-groups differences: The differences between the included and excluded participants, overall.
Within-groups differences: The differences between the included and excluded participants, within the same educational level.

[a] 1: Primary/partly secondary education (up to 10 years of schooling), 2: Upper secondary education (a minimum of 3 years), 3: Tertiary education, short: College/university less than 4 years, 4:Tertiary education, long: College/university 4 years or more
[b] Normal (BMI <25.0 kg/m^2), overweight (BMI 25.0-29.9 kg/m^2), obese (BMI ≥30.0 kg/m^2)
[c] Exercise and physical activity in leisure time over the last year. 1: Reading, watching TV/screen or other sedentary activity, 2: Walking, cycling or other forms of exercise at least 4 hours a week, Participation in recreational sports, heavy gardening, snow shoveling etc. at least 4 hours a week, 4: Participation in hard training or sports competitions, regularly several times a week
SD, standard deviation

Appendix

Vil du være med i
Tromsøundersøkelsen?

Forespørsel om deltakelse i Tromsøundersøkelsen

Hva er Tromsøundersøkelsen?

Tromsøundersøkelsen er en folkehelseundersøkelse. Formålet er å samle inn opplysninger til forskning som gir økt kunnskap om helse og sykdom, og hvordan folkehelsen kan forbedres gjennom forebygging og behandling.

Tromsøundersøkelsen startet i 1974 med bakgrunn i den høye forekomsten av hjerte -og karsykdom i Nord-Norge. Siden den gang er undersøkelsen gjennomført med 6-7 års mellomrom og dette er den sjuende runden.

Ved å delta bidrar du til viktig forskning om forekomst, forebygging og behandling av sykdom, hva som fremmer god helse, og hva som er årsak til helseproblemer.

Ditt bidrag teller!

Hvorfor spør vi deg?

Alle innbyggere i Tromsø kommune fra 40 år og oppover spørres om å delta. I tillegg inviterer vi ca.1000 personer i alderen 21-25 år. Hver deltaker er like viktig, enten du er ung eller gammel, frisk eller syk.

Sammen med denne informasjonsbrosjyren finner du en invitasjon med praktiske opplysninger om undersøkelsen.

Det er gratis å delta i Tromsøundersøkelsen. Trenger du videre undersøkelse eller oppfølging av fastlegen eller spesialisthelsetjenesten, betaler du vanlig egenandel.

Slik foregår undersøkelsen

Alle deltakere inviteres til en hovedundersøkelse som omfatter spørreskjema, intervju, blodprøver og undersøkelser. Et helt tilfeldig utvalg av deltakere inviteres tilbake til en spesialundersøkelse som omfatter flere prøver og mer omfattende undersøkelser. Alle undersøkelsene gjennomføres av helsepersonell.

Tilbakemelding

Noen uker etter undersøkelsen får du et brev med noen resultater, det vil si høyde, vekt, BMI, hemoglobin, blodtrykk, kolesterolnivå og om du har diabetes. Det gis ikke rutinemessig tilbakemelding om resultater av andre blodprøver eller målinger. Dersom prøveresultatet viser at det er nødvendig med oppfølging av lege eller henvisning til spesialist, vil du få råd om det. Ved behov for henvisning til spesialist, sørger vi for å sende henvisning.

Du kan reservere deg mot å få vite resultatene av prøvene dine. Men hvis et prøveresultat krever rask legebehandling, vil du likevel bli kontaktet.

Du vil også få informasjon om undersøkelsen underveis gjennom aviser, sosiale medier (Facebook, Twitter m.m) samt på arrangementer som "Lørdagsuniversitetet" og "Forskningsdagene".

Frivillig deltakelse

Det er frivillig å delta i Tromsøundersøkelsen. Om du sier ja til å delta, kan du når som helst trekke tilbake samtykket.

Hva omfatter den sjuende Tromsøundersøkelsen?

Hva skal vi forske på?

I denne runden av Tromsøundersøkelsen er det mer enn 50 prosjekter som skal forske på forekomst, forebygging og behandling av folkehelseproblemer.

Det skal blant annet forskes på hjerte- og karsykdommer, kreft, lunge-sykdommer, aldring og demens, fedme, diabetes, legemiddelbruk, psykisk helse, kronisk smerte, tannhelse, muskel- og skjelettplager, risikofaktorer som alkohol, fysisk aktivitet og kosthold, nyrer og urinveier, hudproblemer, miljøgifter, infeksjoner og antibiotikaresistens, nervesystemet, sosial ulikhet, samspill mellom arv og miljø, søvn og bruk av helsetjenester.

Du finner mer informasjon om forskningen på vår internettside, www.tromsoundersokelsen.no

Spørreskjema

Deltakernes informasjon om egen helse er en svært viktig del av Tromsø-undersøkelsen. Vi ber deg derfor fylle ut to spørreskjema. Alle spørsmål kan besvares på nett. Det ene skjemaet er vedlagt i papirform, hvis du foretrekker det. Fyll det gjerne ut før du møter opp så sparer du tid under undersøkelsen. Hvis du trenger assistanse vil personalet hjelpe deg på undersøkelsen hvor det også er satt opp egne datamaskiner til dette.

Utfylte svar i spørreskjema er like viktig for forskningen som resultater fra blodprøver og kliniske undersøkelser.

Du kan delta på Tromsøundersøkelsen selv om du ikke ønsker å være med på alle deler av undersøkelsen.

———————

Hovedundersøkelsen

Helsepersonell veileder deg gjennom undersøkelsen som varer ca. en time hvis du har fylt ut spørreskjemaene på forhånd. Du får også time til spesialundersøkelsen hvis du er valgt ut til denne.

Vi starter med noen enkle spørsmål knyttet til undersøkelsene du skal gjennomføre. Videre måler vi høyde, vekt, hofte- og livvidde, blodtrykk og puls.

Det tas deretter prøver og gjøres noen kliniske undersøkelser:

Blodprøve. Det tas blodprøver til bruk for forskning som samlet er mye mindre enn det en blodgiver gir. Det fryses ned prøver til bruk for senere analyser og forskning. Arvestoff (DNA/RNA) vil bli lagret til bruk for forskning.

Bakterieprøve fra nese og hals for å se etter gule stafylokokker, en bakterie som normalt finnes på hud og slimhinner hos mennesker, men som i enkelte tilfeller kan forårsake alvorlige infeksjoner. Prøvene tas med en fuktet vattpensel.

Spyttprøver til bruk for forskning knyttet til tannhelse, virusinfeksjon og kreft.

Smertefølsomhet måles med to metoder. Først holder du hånden i kaldt vann i opptil 90 sekunder, deretter får du en blodtrykksmansjett plassert rundt leggen som blåses opp. Underveis angir du hvor mye smerte du opplever, og kan avbryte testene når som helst hvis det blir for ubehagelig.

Tannsjekk som omfatter et røntgenbilde av kjeven, registrering av hull i tennene og betennelsessykdom i tannkjøttet.

Fysisk aktivitet og kosthold. Utvalgte deltakere blir bedt om å registrere fysisk aktivitet ved bruk av aktivitetsmåler og registrering av kosthold i en periode.

Du får også utdelt utstyr for innlevering av urin- og avføringsprøve hvis du er valgt ut til spesialundersøkelsen.

Spesialundersøkelsen

Et tilfeldig utvalg av deltakere inviteres til spesialundersøkelsen som gjennomføres noen uker etter hovedundersøkelsen. Denne varer totalt ca. 2 timer, avhengig av hvor mange deler du blir spurt om å være med på.

Ved oppmøte vil urinprøvene samles inn, og det tas noen nye blodprøver. Deler av blodprøvene fryses ned for senere forskning beskrevet i denne brosjyren.

Videre inviteres du til én eller flere av disse undersøkelsene:

EKG er en registrering av hjerterytmen som også kan gi informasjon om hjertesykdom. Ved registrering festes ledninger til kroppen.

Kognitiv funksjon testes ved hjelp av enkle spørsmål knyttet til gjenkjenning av ord, kopling av symboler og tall samt grad av fingerbevegelighet.

Fysisk funksjon undersøkes ved å teste balanse, gange og gripestyrke.

Ultralyd av halspulsåre gjøres for å se etter forkalkninger og innsnevringer av årene. Undersøkelsen kartlegger også blodforsyningen til hjernen.

Fotografering av øyebunnen gir bilder som både sier noe om synet og om tilstanden til blodkarene i kroppen. Det gis en øyendråpe i hvert øye en tid før fotografering for at pupillene skal utvide seg. Dette kan svi noe og synet kan forbigående bli noe uklart. Effekten går gradvis over, og er borte etter en time. I tillegg gjøres det en enkel synstest som du får svar på umiddelbart.

Lungefunksjonen testes ved at du puster så hardt du klarer gjennom et munnstykke. Hvor mye luft som blåses ut pr. sekund, er et mål på lunge-funksjonen din. I tillegg vil det gjøres lydopptak av lungelyder og hjertelyder.

Måling av beintetthet. Ved hjelp av ultralyd foretas det beintetthetsmåling som brukes til å undersøke risiko for beinskjørhet og brudd.

Ultralyd av hjertet gjøres for å undersøke hjertets form og funksjon.

Videre bruk av opplysninger og prøver i forskning

Personvern

All informasjon du gir til Tromsøundersøkelsen behandles med respekt for personvern og privatliv, og i samsvar med lover og forskrifter. Alle medarbeidere som jobber med undersøkelsen har taushetsplikt. Opplysningene som samles inn skal bare brukes til godkjente forskningsformål. Det vil ikke være mulig å identifisere deg når resultatene av forskningen publiseres.

UiT Norges arktiske universitet ved universitetsdirektøren er ansvarlig for behandlingen av personopplysninger. Tromsøundersøkelsen har konsesjon fra Datatilsynet. Regional komité for medisinsk og helsefaglig forskningsetikk i Nord-Norge (REK nord) har gjort en etisk og helsefaglig vurdering av undersøkelsene som gjennomføres, samt godkjent innsamlingen av prøver.

Hvilke data lagres i Tromsøundersøkelsen?

I Tromsøundersøkelsen lagres opplysninger gitt av deltakere i de forskjellige rundene av Tromsøundersøkelsen. Det lagres også opplysninger om kreftdiagnoser og dødsårsaker fra Kreftregisteret og Dødsårsaksregisteret. For deltakere som har eller får diagnoser innen hjerte- og karsykdom, diabetes og beinbrudd, innhentes opplysninger fra sykejournalen i spesialist- og primærhelsetjenesten som er nødvendig for å kvalitetssikre aktuelle diagnoser. Dette for å sikre forskning av høy kvalitet. Tilsvarende vil også kunne bli aktuelt for andre sykdommer det forskes på i Tromsøundersøkelsen.

Hvordan lagres dine opplysninger og prøver?

Alle opplysningene og prøvene lagres uten navn og fødselsnummer.

En kode knytter deg til dine opplysninger og prøver. Det er kun noen få autoriserte personer som kan finne tilbake til deg gjennom en egen kodenøkkel.

De biologiske prøvene lagres i godkjent forskningsbiobank ved Institutt for samfunnsmedisin, UiT. Leder av Tromsøundersøkelsen er ansvarlig for biobanken. Den er registrert i Folkehelseinstituttets Biobankregister (nr 2397). Det biologiske materialet kan bare brukes etter godkjenning fra REK.

Utlevering av opplysninger og prøver til forskere

Hvis du sier ja til å delta i studien, samtykker du til at dine opplysninger og prøver kan brukes videre i forskning på ubestemt tid. Medisinsk forskning forandrer seg hele tiden, og i fremtiden kan data bli brukt i forskningsprosjekter forutsatt at det er i samsvar med gjeldende lover og forskrifter.

Alle forskningsprosjekter som får data fra Tromsøundersøkelsen må være i samsvar med lover og forskrifter. Prosjektleder må tilhøre en kompetent forskningsinstitusjon. Den enkelte forsker vil kun få tilgang til personidentifiserende opplysninger etter å ha innhentet nødvendige godkjenninger fra REK, og/eller Datatilsynet.

I noen forskningsprosjekter kan prøver og avidentifiserte opplysninger bli utlevert til andre land. Det vil skje i en slik form at våre utenlandske samarbeidspartnere ikke kan knytte prøvene opp mot deg som person.

I noen prosjekter kan det bli aktuelt å kontakte deg igjen for å samle inn flere data, f.eks. ved spørreskjema, intervju eller kliniske undersøkelser. Du vil da få ny informasjon og bes om nytt samtykke til det konkrete prosjektet.

Ved å delta i Tromsøundersøkelsen bidrar du til viktig forskning på sykdom og helse, oppbygging av fagmiljøer og bedre pasientbehandling.

Sammenstilling med andre registre

I noen forskningsprosjekter vil opplysninger om deg kunne bli sammenstilt med:

Opplysninger du har gitt i tidligere runder av Tromsøundersøkelsen hvis du har deltatt i Tromsøundersøkelsen før.

Opplysninger fra barn, søsken, foreldre og beste-foreldre som har deltatt i Tromsøundersøkelsen.

Opplysninger om deg i nasjonale helseregistre som Reseptregisteret, Medisinsk fødselsregister, Kreftregisteret, Norsk pasientregister, Hjerte- og karregisteret, Dødsårsaksregisteret, infeksjonsregistre og andre nasjonale sykdoms- og kvalitetsregistre.

Helseopplysninger om deg fra primær- og spesialisthelsetjenesten.

Opplysninger om sosiale forhold som arbeid, utdanning, inntekt, boforhold osv. fra registre hos bl.a. Statistisk sentralbyrå og NAV.

Slike sammenstillinger krever som regel forhåndsgodkjenning av offentlige instanser, som REK og/eller Datatilsynet.

Rett til innsyn og sletting av dine opplysninger og prøver

Hvis du sier ja til å delta i studien, har du rett til å få innsyn i hvilke opplysninger som er registrert om deg. Du har også rett til å få korrigert eventuelle feil i opplysningene vi har registrert. Dersom du trekker deg fra studien, kan du kreve å få slettet innsamlede prøver og opplysninger, med mindre opplysningene allerede er inngått i analyser eller er brukt i vitenskapelige artikler.

Finansiering

Tromsøundersøkelsen er finansiert av UiT Norges arktiske universitet, Helse Nord RHF, Universitetssykehuset Nord-Norge (UNN) samt ulike forskningsfond.

Forsikring

Deltakere i Tromsøundersøkelsen er forsikret gjennom Norsk Pasientskadeerstatning.

Samtykke til deltakelse i studien

Hvis du vil delta i den sjuende Tromsø-undersøkelsen, må du gi skriftlig samtykke ved oppmøte. Personalet vil gi mer informasjon og svare deg dersom du har spørsmål i forbindelse med samtykket.

Du kan når som helst trekke tilbake samtykket ditt.

Appendix 1. cont.

IX

Appendix 2: Questionnaire 1 from the Tromsø Study 2015-2016

Tromsø-undersøkelsen

2015–2016

KONFIDENSIELT

Skjemaet skal leses optisk. Vennligst bruk blå eller sort penn. Bruk blokkbokstaver. Du kan ikke bruke komma.

Dato for utfylling: | | | | | |

HELSE OG SYKDOMMER

1.1 Hvordan vurderer du din egen helse sånn i alminnelighet?

Meget god	God	Verken god eller dårlig	Dårlig	Meget dårlig
☐	☐	☐	☐	☐

1.2 Hvordan synes du at helsen din er sammenlignet med andre på din alder?

Mye bedre	Litt bedre	Omtrent lik	Litt dårligere	Mye dårligere
☐	☐	☐	☐	☐

1.3 Har du eller har du hatt?
Sett ett kryss per linje.

	Nei	Ja nå	Før, ikke nå	Alder første gang
Høyt blodtrykk	☐	☐	☐	
Hjerteinfarkt	☐		☐	
Hjertesvikt	☐	☐	☐	
Atrieflimmer *(hjerteflimmer)*	☐	☐	☐	
Angina pectoris *(hjertekrampe)*	☐	☐	☐	
Hjerneslag/hjerneblødning	☐		☐	
Diabetes	☐	☐	☐	
Nyresykdom *(unntatt urinveisinfeksjon)*	☐	☐	☐	
Kronisk bronkitt/emfysem/KOLS	☐	☐	☐	
Astma	☐	☐	☐	
Kreft	☐	☐	☐	
Revmatoid artritt *(leddgikt)*	☐	☐	☐	
Artrose *(slitasjegikt)*	☐	☐	☐	
Migrene	☐	☐	☐	
Psykiske plager *(som du har søkt hjelp for)*	☐	☐	☐	

1.4 Har du langvarige eller stadig tilbakevendende smerter som har vart i 3 måneder eller mer?

☐ Nei   ☐ Ja

TANNHELSE

2.1 Hvordan vurderer du din egen tannhelse?

	1	2	3	4	5	
Svært dårlig	☐	☐	☐	☐	☐	Svært god

2.2 Hvor fornøyd eller misfornøyd er du med tennene eller protesene dine?

	1	2	3	4	5	
Svært misfornøyd	☐	☐	☐	☐	☐	Svært fornøyd

BRUK AV HELSETJENESTER

3.1 Har du, grunnet egen helse, i løpet av de siste 12 måneder vært hos:

	Nei	Ja	Antall ganger
Fastlege/allmennlege	☐	☐	
Legevakt	☐	☐	
Psykiater/psykolog	☐	☐	
Legespesialist utenfor sykehus *(utenom fastlege/allmennlege/psykiater)*	☐	☐	
Tannlege/tannpleier	☐	☐	
Apotek *(for kjøp/råd om medisiner/behandling)*	☐	☐	
Fysioterapeut	☐	☐	
Kiropraktor	☐	☐	
Akupunktør	☐	☐	
Alternativ behandler *(homøopat, soneterapeut, healer etc)*	☐	☐	
Tradisjonell helbreder *(hjelper, «læser» etc)*	☐	☐	
Har du kommunisert via internett med noen av tjenestene over?	☐	☐	

3.2 Har du i løpet av de siste 12 måneder vært på sykehus?

	Nei	Ja	Antall ganger
Innlagt på sykehus	☐	☐	

Konsultasjon ved sykehus uten innleggelse:

	Nei	Ja	Antall ganger
Ved psykiatrisk poliklinikk	☐	☐	
Ved annen sykehuspoliklinikk	☐	☐	

X

BRUK AV MEDISINER

4.1 **Bruker du, eller har du brukt, noen av følgende medisiner?** *Sett ett kryss per linje.*

	Aldri	Nå	Før, ikke nå	Alder første gang
Medisin mot høyt blodtrykk	☐	☐	☐	
Kolesterolsenkende medisin	☐	☐	☐	
Vanndrivende medisin	☐	☐	☐	
Annen medisin mot hjertesykdom (f.eks. blodfortynnende, rytmestabili-serende, nitroglycerin)	☐	☐	☐	
Insulin	☐	☐	☐	
Tabletter mot diabetes	☐	☐	☐	
Stoffskiftemedisin (Levaxin/thyroxin)	☐	☐	☐	

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

	Ikke brukt siste 4 uker	Sjeldnere enn hver uke	Hver uke, men ikke daglig	Daglig
Smertestillende på resept	☐	☐	☐	☐
Smertestillende uten resept	☐	☐	☐	☐
Magesyrehemmende medisiner	☐	☐	☐	☐
Sovemidler	☐	☐	☐	☐
Beroligende medisiner	☐	☐	☐	☐
Medisin mot depresjon	☐	☐	☐	☐

4.3 **Skriv alle medisiner (reseptfrie og reseptbelagte) du har brukt regelmessig siste 4 uker.** *Ikke regn med reseptfrie vitamin-, mineral- og kosttilskudd, urter, naturmedisin etc.*

_____

_____

_____

_____

_____

_____

_____

_____

Får du ikke plass til alle medisinene, bruk eget ark.

KOSTHOLD

5.1 **Spiser du vanligvis frokost hver dag?**

☐ Nei   ☐ Ja

5.2 **Hvor mange porsjoner frukt og grønnsaker spiser du i gjennomsnitt per dag?** *Med porsjon menes f.eks. et eple, en salatbolle.*

Antall porsjoner [____]

5.3 **Hvor ofte spiser du vanligvis disse matvarene?** *Sett ett kryss per linje.*

	0–1 pr. mnd.	2–3 pr. mnd.	1–3 pr. uke	4–6 pr. uke	1 eller mer pr. dag
Rødt kjøtt (alle produkter av storfe, får, svin)	☐	☐	☐	☐	☐
Grønnsaker, frukt, bær	☐	☐	☐	☐	☐
Mager fisk (torsk, sei)	☐	☐	☐	☐	☐
Feit fisk (laks, ørret, uer makrell, sild, kveite)	☐	☐	☐	☐	☐

5.4 **Hvor mange glass/beger drikker/spiser du vanligvis av følgende?** *Sett ett kryss per linje.*

	Sjelden/ aldri	1–6 pr. uke	1 pr. dag	2–3 pr. dag	4 eller mer pr. dag
Melk/yoghurt tilsatt probiotika (Biola, Cultura, Activia, Actimel, BioQ)	☐	☐	☐	☐	☐
Fruktjuice	☐	☐	☐	☐	☐
Brus/leskedrikker:					
med sukker	☐	☐	☐	☐	☐
med kunstig søtning	☐	☐	☐	☐	☐

5.5 **Hvor mange kopper kaffe og te drikker du daglig?** *Sett 0 for de typene du ikke drikker daglig.*

Antall kopper

Filterkaffe (trakterkaffe)	[____]
Kokekaffe og /eller presskannekaffe	[____]
Pulverkaffe	[____]
Espressobasert kaffe (fra kaffemaskin, kapsler etc)	[____]
Sort te (f.eks. Earl Grey)	[____]
Grønn/hvit/oolong te	[____]
Urtete (f.eks. nype, kamille, Rooibos)	[____]

HELSEBEKYMRING

	Ikke i det hele tatt	Litt	Noe	En hel del	Svært mye
6.1 **Tror du at det er noe alvorlig galt med kroppen din?**	☐	☐	☐	☐	☐
6.2 **Er du svært bekymret over helsen din?**	☐	☐	☐	☐	☐
6.3 **Er det vanskelig for deg å tro på legen din dersom hun/han forteller deg at det ikke er noe å bekymre seg for?**	☐	☐	☐	☐	☐
6.4 **Er du ofte bekymret for muligheten for at du har en alvorlig sykdom?**	☐	☐	☐	☐	☐
6.5 **Hvis du blir gjort oppmerksom på en sykdom (f.eks. via TV, radio, internett, avis eller noen du kjenner), bekymrer du deg da for selv å få sykdommen?**	☐	☐	☐	☐	☐
6.6 **Opplever du at du plages av mange ulike symptomer?**	☐	☐	☐	☐	☐
6.7 **Har du tilbakevendende tanker (som er vanskelig å bli kvitt) om at du har en sykdom?**	☐	☐	☐	☐	☐

FYSISK AKTIVITET

7.1 **Hvis du er i lønnet eller ulønnet arbeid, hvordan vil du beskrive arbeidet ditt?** *Sett kryss i den ruta som passer best.*

☐ For det meste stillesittende arbeid
(f.eks. skrivebordsarbeid, montering)

☐ Arbeid som krever at du går mye
(f.eks. ekspeditørarbeid, lett industriarbeid, undervisning)

☐ Arbeid der du går og løfter mye
(f.eks. pleier, bygningsarbeider)

☐ Tungt kroppsarbeid

7.2 **Angi bevegelse og kroppslig anstrengelse i din fritid det siste året.** *Hvis aktiviteten varierer gjennom året, ta et gjennomsnitt. Sett kryss i den ruta som passer best.*

☐ Leser, ser på TV / skjerm eller annen stillesittende aktivitet

☐ Spaserer, sykler eller beveger deg på annen måte minst 4 timer i uka *(inkludert gang eller sykling til arbeidsstedet, søndagsturer etc)*

☐ Driver mosjonsidrett, tyngre hagearbeid, snømåking etc minst 4 timer i uka

☐ Trener hardt eller driver konkurranseidrett regelmessig flere ganger i uka

7.3 **Siste uka, omtrent hvor lang tid tilbrakte du <u>sittende</u> på en typisk hverdag og fridag?** *F.eks. ved arbeidsbord, hos venner, mens du så på TV / skjerm.*

☐☐ timer sittende på en hverdag *(både jobb og fritid)*

☐☐ timer sittende på en fridag

ALKOHOL

8.1 **Hvor ofte drikker du alkohol?**

☐ Aldri

☐ Månedlig eller sjeldnere

☐ 2–4 ganger hver måned

☐ 2–3 ganger per uke

☐ 4 eller flere ganger per uke

8.2 **Hvor mange enheter alkohol (flaske øl, glass vin eller drink) tar du vanligvis når du drikker?**

1–2	3–4	5–6	7–9	10 eller flere
☐	☐	☐	☐	☐

8.3 **Hvor ofte drikker du 6 eller flere enheter alkohol ved en anledning?**

☐ Aldri

☐ Sjeldnere enn månedlig

☐ Månedlig

☐ Ukentlig

☐ Daglig eller nesten daglig

RØYK OG SNUS

9.1 **Har du røykt/røyker du daglig?**

☐ Aldri ☐ Ja, nå ☐ Ja, tidligere

9.2 **Har du brukt/bruker du snus eller skrå daglig?**

☐ Aldri ☐ Ja, nå ☐ Ja, tidligere

SPØRSMÅL OM KREFT

10.1 Har du noen gang fått

	Nei	Ja	Hvis ja: alder første gang	Hvis ja: alder siste gang
Utført mammografi	☐	☐		
Målt PSA (prostataspesifikt antigen)	☐	☐		
Utført tykktarmsundersøkelse (koloskopi, avføringsprøve)	☐	☐		

10.2 Har noen i din nære biologiske familie hatt

	Egne barn	Mor	Far	Mormor	Morfar	Farmor	Farfar	Tante	Onkel	Søsken
Brystkreft	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Prostatakreft	☐		☐		☐		☐		☐	☐
Tykktarmskreft	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

UTDANNING OG INNTEKT

11.1 Hva er din høyeste fullførte utdanning? *Sett ett kryss.*

☐ Grunnskole/framhaldsskole/folkehøyskole inntil 10 år

☐ Fagutdanning/realskole/videregående/gymnas minimum 3 år

☐ Høyskole/universitet mindre enn 4 år

☐ Høyskole/universitet 4 år eller mer

11.2 Hva var din husstands samlede bruttoinntekt siste år? *Ta med alle inntekter fra arbeid, trygder, sosialhjelp og lignende.*

☐ Under 150 000 kr   ☐ 451 000–550 000 kr

☐ 150 000–250 000 kr   ☐ 551 000–750 000 kr

☐ 251 000–350 000 kr   ☐ 751 000 –1 000 000 kr

☐ 351 000–450 000 kr   ☐ Over 1 000 000 kr

FAMILIE OG VENNER

12.1 Hvem bor du sammen med?

	Nei	Ja	Antall
Ektefelle/samboer	☐	☐	
Andre personer over 18 år	☐	☐	
Personer under 18 år	☐	☐	

12.2 Har du nok venner som kan gi deg hjelp når du trenger det?

☐ Ja   ☐ Nei

12.3 Har du nok venner som du kan snakke fortrolig med?

☐ Ja   ☐ Nei

12.4 Hvor ofte deltar du vanligvis i foreningsvirksomhet som syklubb, idrettslag, politiske, religiøse eller andre foreninger?

Aldri, eller noen få ganger i året	1–2 ganger i måneden	Omtrent 1 gang i uka	Mer enn 1 gang i uka
☐	☐	☐	☐

SPØRSMÅL TIL KVINNER

13.1 Hvor gammel var du da du fikk menstruasjon første gang?

Alder [ ]

13.2 Er du gravid nå?

☐ Nei   ☐ Ja   ☐ Usikker

13.3 Hvor mange barn har du født?

Antall barn [ ]

13.4 Hvis du har født, fyll ut for hvert barn: fødselsår og vekt samt hvor mange måneder du ammet. *Angi så godt du kan. Hvis flere barn, bruk ekstra ark.*

	Fødselsår	Fødselsvekt i gram	Ammet ant. mnd.
Barn 1			
Barn 2			
Barn 3			
Barn 4			
Barn 5			
Barn 6			

SPØRSMÅL TIL MENN

14.1 Har du fått behandling for betennelse i prostata eller urinblæra?

☐ Nei   ☐ Ja

14.2 Har du fått utført steriliseringsoperasjon?

☐ Nei   ☐ Ja   Hvis ja: hvilket år [ ]

Tusen takk for ditt bidrag.

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Appendix 3: Food frequency questionnaire from The Tromsø Study 2015-2016

Spørreskjema om kosthold

Utfylte svar i spørreskjema er like viktig for Tromsøundersøkelsen som resultater fra blodprøver og kliniske undersøkelser.

Forskere har funnet ut at kosthold er den risikofaktoren som fører til flest tapte leveår og dager med sykdom eller skade i Norge. Det finnes lite informasjon om kostholdet i Nord-Norge. Vi ber deg derfor fylle ut dette spørreskjemaet som vil gi viktige data for forskningen.

Vi spør her om matvanene dine og hvor ofte du vanligvis spiser og drikker ulike typer mat og drikke. Vi er klar over at kostholdet varierer fra dag til dag, men prøv så godt du kan å gi et «gjennomsnitt» av matvanene dine. Ha det siste året i tankene når du fyller ut skjemaet. Der du er usikker anslår du svaret ditt.

Alle svar lagres og behandles uten navn og fødselsnummer, i samsvar med lover og forskrifter.

Dersom du fyller ut skjemaet hjemme, bruk vedlagte svarkonvolutt.

Takk for at du tar deg tid til å fylle ut skjemaet.

Skjemaet skal lese av en maskin og det er derfor viktig at du setter tydelige kryss i rutene. Bruk blå eller sort kulepenn.

☒ Riktig markering i rutene er slik
■ Ved feil markering, fyll hele ruten slik

Har du spørsmål om utfyllingen av skjemaet kan du ta kontakt med personalet på undersøkelsen eller sende e-post til: tromso7@ism.uit.no

Eksempel

Kari Normann spiser daglig 5 skiver brød og ett grovt knekkebrød. Hun spiser vanligvis kneippbrød, men i helgene spiser hun som oftest loff. Spørsmål 1 fyller hun ut slik:

1. Hvor mye brød pleier du å spise?
Legg sammen det du bruker til alle måltider i løpet av en dag.
(1/2 rundstykke = 1 skive, 1 baguett = 4 skiver, 1 ciabatta = 2 skiver)

	Aldri/ sjelden	½	1	2	3	4	5	6	7	8	9	10	11	12+
Fint brød (loff, baguetter, fine rundstykker, ciabatta)	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Mellomgrovt brød (helkornbrød, kneipp, grove rundstykker)	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐
Grovt brød (mer enn 50 % sammalt, mørkt rugbrød)	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Fint knekkebrød (kavring)	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Grovt knekkebrød (grov skonrok)	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Sum skiver pr. dag = ___6___

Antall skiver pr. uke: ___6___ x 7 = ___42___.   Tallet brukes i spørsmål 4.

Prøv så godt du kan å gi et «gjennomsnitt» av matvanene dine.
Ha det siste året i tankene når du fyller ut.

1. Hvor mye brød pleier du å spise?
Legg sammen det du bruker til alle måltider i løpet av en dag.
(1/2 rundstykke = 1 skive, 1 baguett = 4 skiver, 1 ciabatta = 2 skiver)

	Aldri/ sjelden	½	1	2	3	4	5	6	7	8	9	10	11	12+
						Antall skiver pr. dag								
Fint brød (loff, baguetter, fine rundstykker, ciabatta)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Mellomgrovt brød (helkornbrød, kneipp, grove rundstykker)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Grovt brød (mer enn 50 % sammalt, mørkt rugbrød)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Fint knekkebrød (kavring)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Grovt knekkebrød (grov skonrok)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Sum skiver pr. dag = _____

Antall skiver pr. uke: _____ x 7 = _____.   Tallet brukes i spørsmål 4.
              (sum skriver pr. dag)

2. Hva pleier du å smøre på brødet?
Legg sammen det du bruker på skivene i løpet av en uke.
(1/2 rundstykke = 1 skive, 1 baguett = 4 skiver, 1 ciabatta = 2 skiver)

	Aldri/ sjelden	1-5	6-14	15-21	22-28	29-35	36-42	43-49	50-56	57+
					Antall skiver pr. uke					
Smør (meierismør)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Bremykt	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Brelett	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Myk margarin (Soft Flora, Soft Ekstra)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Vita	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Soft Light, Vita Lett	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Melange	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Annen margarin	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Olivenolje, annen olje på brød	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Majones, remulade på brød	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

3. Hvis du bruker smør/margarin på brødet, hvor mye bruker du?

	½	1	2	3	4	5 eller flere
			Antall skiver			
En porsjonspakke smør/margarin på 12 g rekker til antall skiver:	☐	☐	☐	☐	☐	☐

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Prøv så godt du kan å gi et «gjennomsnitt» av matvanene dine.
Ha det siste året i tankene når du fyller ut.

5. Frokostgryn
Svar enten per måned eller per uke.

	Aldri/ sjelden	Gang pr. måned eller			1	Gang pr. uke				Mengde pr. gang			
		1	2	3	1	2-3	4-5	6-7	8+	1	1½	2	3+
Havregrøt	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl) ☐	☐	☐	☐
Havregryn, 4-korn	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl) ☐	☐	☐	☐
Mysli, søtet (eks. Solfrokost)	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl) ☐	☐	☐	☐
Mysli, usøtet (eks. Go'Dag)	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl) ☐	☐	☐	☐
Cornflakes	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl) ☐	☐	☐	☐
Honnikorn/Frosties/Chocofrokost	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl) ☐	☐	☐	☐
All Bran, Weetabix, Havrefras o.l.	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl) ☐	☐	☐	☐
Puffet ris, havrenøtter	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl) ☐	☐	☐	☐

	Aldri/ sjelden	Gang pr. måned eller			1	Gang pr. uke				Mengde pr. gang			
		1	2	3	1	2-3	4-5	6-7	8+	1	1½	2	3+
Syltetøy til frokostgryn, grøt	☐	☐	☐	☐	☐	☐	☐	☐	☐	(ss) ☐	☐	☐	☐
Sukker til frokostgryn, grøt	☐	☐	☐	☐	☐	☐	☐	☐	☐	(ts) ☐	☐	☐	☐

6. Melk (Husk også å ta med melk du bruker på frokostgryn, grøt og dessert)
(1 glass = 2 dl)

	Aldri/ sjelden	Antall glass pr. dag							
		½	1	2	3	4	5	6	7+
Helmelk, kefir, kultur	☐	☐	☐	☐	☐	☐	☐	☐	☐
Lettmelk	☐	☐	☐	☐	☐	☐	☐	☐	☐
Ekstra lettmelk	☐	☐	☐	☐	☐	☐	☐	☐	☐
Skummet melk, skummet kultur	☐	☐	☐	☐	☐	☐	☐	☐	☐
Biola/Cultura naturell	☐	☐	☐	☐	☐	☐	☐	☐	☐
Biola/Cultura med bær/frukt	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sjokolademelk, jordbærmelk	☐	☐	☐	☐	☐	☐	☐	☐	☐
Drikkeyoghurt	☐	☐	☐	☐	☐	☐	☐	☐	☐

7. Yoghurt (Husk å ta med yoghurt du bruker til frokostgryn)
Svar enten per måned eller per uke.

	Aldri/ sjelden	Gang pr. måned eller			1	Gang pr. uke				Beger pr. gang			
		1	2	3	1	2-3	4-5	6-7	8+	½	1	2	3+
Yoghurt naturell (125 g)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Yoghurt med frukt (125 g)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Go'morgen yoghurt m/mysli	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Lettyoghurt med frukt (125 g)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Lettyoghurt m/mysli	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

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Appendix 3 cont.

Prøv så godt du kan å gi et «gjennomsnitt» av matvanene dine.
Ha det siste året i tankene når du fyller ut.

8. Kalde drikker

Svar enten per uke eller per dag, <1 betyr sjeldnere enn 1 gang. Merk at porsjonsenhetene er forskjellige, 1/5 liter tilsvarer ett glass (2 dl), mens 1/3 liter tilsvarer 0,33 liter glassflaske/boks.

	Aldri/ sjelden	Gang pr. uke <1	1-2	3-4	5-6	eller / Gang pr. dag 1	2	3	4+		Mengde pr. gang			
Vann (springvann)	☐	☐	☐	☐	☐	☐	☐	☐	☐	(glass)	1 ☐	2 ☐	3 ☐	4+ ☐
Flaskevann med/uten kullsyre (eks. Farris, Imsdal)	☐	☐	☐	☐	☐	☐	☐	☐	☐	(liter)	1/5 ☐	1/3 ☐	½ ☐	1+ ☐
Appelsinjuice	☐	☐	☐	☐	☐	☐	☐	☐	☐	(glass)	1 ☐	2 ☐	3 ☐	4+ ☐
Eplejuice, annen juice	☐	☐	☐	☐	☐	☐	☐	☐	☐	(glass)	1 ☐	2 ☐	3 ☐	4+ ☐
Eplenektar, annen nektar	☐	☐	☐	☐	☐	☐	☐	☐	☐	(glass)	1 ☐	2 ☐	3 ☐	4+ ☐
Saft med sukker	☐	☐	☐	☐	☐	☐	☐	☐	☐	(glass)	1 ☐	2 ☐	3 ☐	4+ ☐
Saft, kunstig søtet	☐	☐	☐	☐	☐	☐	☐	☐	☐	(glass)	1 ☐	2 ☐	3 ☐	4+ ☐
Brus med sukker	☐	☐	☐	☐	☐	☐	☐	☐	☐	(liter)	1/5 ☐	1/3 ☐	½ ☐	1+ ☐
Brus, kunstig søtet	☐	☐	☐	☐	☐	☐	☐	☐	☐	(liter)	1/5 ☐	1/3 ☐	½ ☐	1+ ☐
Iste med sukker	☐	☐	☐	☐	☐	☐	☐	☐	☐	(liter)	1/5 ☐	1/3 ☐	½ ☐	1+ ☐
Iste, kunstig søtet	☐	☐	☐	☐	☐	☐	☐	☐	☐	(liter)	1/5 ☐	1/3 ☐	½ ☐	1+ ☐
Alkoholfritt øl (eks. Vørterøl, Munkholm)	☐	☐	☐	☐	☐	☐	☐	☐	☐	(liter)	1/5 ☐	1/3 ☐	½ ☐	1+ ☐

9. Alkoholholdige drikker

Svar enten pr. måned eller pr. uke. Merk at porsjonsenhetene er forskjellige, 1/5 liter tilsvarer ett glass (2 dl), mens 1/3 liter tilsvarer 0,33 liter glassflaske/boks.

	Aldri/ sjelden	Gang pr. måned 1	2	3	eller / Gang pr. uke 1	2-3	4-5	6-7		Mengde pr. gang					
Øl, sterk øl, pils	☐	☐	☐	☐	☐	☐	☐	☐	(liter)	1/3 ☐	½ ☐	1 ☐	2 ☐	3 ☐	4+ ☐
Lettøl	☐	☐	☐	☐	☐	☐	☐	☐	(liter)	1/3 ☐	½ ☐	1 ☐	2 ☐	3 ☐	4+ ☐
Rusbrus, Cider m/alkohol	☐	☐	☐	☐	☐	☐	☐	☐	(liter)	1/5 ☐	1/3 ☐	½ ☐	1 ☐	1½ ☐	2+ ☐
Rødvin	☐	☐	☐	☐	☐	☐	☐	☐	(vinglass)	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6+ ☐
Hvitvin	☐	☐	☐	☐	☐	☐	☐	☐	(vinglass)	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6+ ☐
Hetvin (portvin, sherry o.l.)	☐	☐	☐	☐	☐	☐	☐	☐	(1 glass = 4cl)	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6+ ☐
Brennevin, likør	☐	☐	☐	☐	☐	☐	☐	☐	(1 dram = 4cl)	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6+ ☐
Blandede drinker, cocktail	☐	☐	☐	☐	☐	☐	☐	☐	(drink)	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6+ ☐

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Prøv så godt du kan å gi et «gjennomsnitt» av matvanene dine.
Ha det siste året i tankene når du fyller ut.

10. Varme drikker

Svar enten per uke eller per dag, < 1 betyr sjeldnere enn 1 gang.

	Aldri/ sjelden	Gang pr. uke				eller	Gang pr. dag				Mengde pr. gang						
		<1	1-2	3-4	5-6	1	2	3	4+								
Kaffe - kokt og presskanne 1 kopp = 2 dl	☐	☐	☐	☐	☐	☐	☐	☐	☐	(kopp)	1 ☐	2 ☐	3-4 ☐	5-6 ☐	7-8 ☐	9+ ☐
Kaffe - traktet, filter 1 kopp = 2 dl	☐	☐	☐	☐	☐	☐	☐	☐	☐	(kopp)	1 ☐	2 ☐	3-4 ☐	5-6 ☐	7-8 ☐	9+ ☐
Kaffe - pulver (instant) 1 kopp = 2 dl	☐	☐	☐	☐	☐	☐	☐	☐	☐	(kopp)	1 ☐	2 ☐	3-4 ☐	5-6 ☐	7-8 ☐	9+ ☐
Espresso 1 kopp = 0,3 dl	☐	☐	☐	☐	☐	☐	☐	☐	☐	(kopp)	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6+ ☐
Caffe latte 1 kopp = 3 dl	☐	☐	☐	☐	☐	☐	☐	☐	☐	(kopp)	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6+ ☐
Cappucino 1 kopp = 3 dl	☐	☐	☐	☐	☐	☐	☐	☐	☐	(kopp)	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6+ ☐
Kakao/varm sjokolade 1 kopp = 2 dl	☐	☐	☐	☐	☐	☐	☐	☐	☐	(kopp)	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6+ ☐
Sort te (eks. Earl Grey, solbær) 1 kopp = 2 dl	☐	☐	☐	☐	☐	☐	☐	☐	☐	(kopp)	1 ☐	2 ☐	3-4 ☐	5-6 ☐	7-8 ☐	9+ ☐
Grønn te 1 kopp = 2 dl	☐	☐	☐	☐	☐	☐	☐	☐	☐	(kopp)	1 ☐	2 ☐	3-4 ☐	5-6 ☐	7-8 ☐	9+ ☐
Urtete (eks. nype, kamille, Rooibois) 1 kopp = 2 dl	☐	☐	☐	☐	☐	☐	☐	☐	☐	(kopp)	1 ☐	2 ☐	3-4 ☐	5-6 ☐	7-8 ☐	9+ ☐

	Bruker ikke	Antall pr. kopp				
		½	1	2	3	4+
Sukker til te (ts/sukkerbit)	☐	☐	☐	☐	☐	☐
Sukker til kaffe (ts/sukkerbit)	☐	☐	☐	☐	☐	☐
Sukketter til te (stk)	☐	☐	☐	☐	☐	☐
Sukketter til kaffe (stk)	☐	☐	☐	☐	☐	☐
Melk/fløte til te (ss)	☐	☐	☐	☐	☐	☐
Melk/fløte til kaffe (ss)	☐	☐	☐	☐	☐	☐

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Prøv så godt du kan å gi et «gjennomsnitt» av matvanene dine.
Ha det siste året i tankene når du fyller ut.

11. Middagsretter

Vi spør både om middagsmåltidene og det du spiser til andre måltider. Legg til slutt sammen hvor mange retter per måned du har merket av for å se om summen virker sannsynlig.

	Aldri/ sjelden	Gang pr. måned								Mengde pr. gang				
		1	2	3	4	5-6	7-8	9+						
Kjøtt/kjøttretter														
Kjøttpølse av storfe/svin	☐	☐	☐	☐	☐	☐	☐	☐	(pølse)	½ ☐	1 ☐	1½ ☐	2 ☐	3+ ☐
Kjøttpølse av storfe/svin, lett/mager	☐	☐	☐	☐	☐	☐	☐	☐	(pølse)	½ ☐	1 ☐	2 ☐	3 ☐	4+ ☐
Kjøttpølse av kylling/kalkun	☐	☐	☐	☐	☐	☐	☐	☐	(pølse)	½ ☐	1 ☐	2 ☐	3 ☐	4+ ☐
Grillpølse/wienerpølse av storfe/svin	☐	☐	☐	☐	☐	☐	☐	☐	(pølse)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Grillpølse/wienerpølse av kylling/kalkun	☐	☐	☐	☐	☐	☐	☐	☐	(pølse)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Hamburger (m/brød)	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Karbonade	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Kjøttkaker, medisterkaker, kjøttpudding	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Kjøttsaus, gryterett med kjøttdeig	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Taco (tacoskjell med kjøtt og salat)	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Tortilla lefse (med kjøtt og salat)/ wrap	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Kebab	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	½ ☐	1 ☐	1½ ☐	2 ☐	3+ ☐
Lasagne, moussaka	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Pizza (en Grandiosa = ca 550 g)	☐	☐	☐	☐	☐	☐	☐	☐	(pizza)	1/8 ☐	1/4 ☐	½ ☐	3/4 ☐	1+ ☐
Calzone (1 stk = 250-300 g)	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	½ ☐	1 ☐	1½ ☐	2 ☐	2½+ ☐
Pai/quiche	☐	☐	☐	☐	☐	☐	☐	☐	(bit)	1-2 ☐	3-4 ☐	5-6 ☐	7-8 ☐	9+ ☐
Vårruller	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Biff (svin, okse, lam)	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	½ ☐	1 ☐	1½ ☐	2 ☐	2½+ ☐
Koteletter (svin, okse, lam)	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	½ ☐	1 ☐	1½ ☐	2 ☐	2½+ ☐
Stek (svin, okse, lam)	☐	☐	☐	☐	☐	☐	☐	☐	(skive)	1-2 ☐	3-4 ☐	5-6 ☐	7-8 ☐	9+ ☐
Stek (elg, hjort, reinsdyr, rådyr)	☐	☐	☐	☐	☐	☐	☐	☐	(skive)	1-2 ☐	3-4 ☐	5-6 ☐	7-8 ☐	9+ ☐
Gryterett med helt kjøtt, frikassé, fårikål	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1-2 ☐	3-4 ☐	5-6 ☐	7-8 ☐	9+ ☐
Lapskaus, suppelapskaus, betasuppe	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1-2 ☐	3-4 ☐	5-6 ☐	7-8 ☐	9+ ☐

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Prøv så godt du kan å gi et «gjennomsnitt» av matvanene dine.
Ha det siste året i tankene når du fyller ut.

12. Poteter, ris, spagetti, grønnsaker
Svar enten per måned eller per uke.
Disse spørsmålene dreier seg først og fremst om tilbehør til middagsretter, men spiser du for eksempel en rå gulrot eller salat til lunsj, skal det tas med her.

	Aldri/ sjelden	Gang pr. måned eller			Gang pr. uke						Mengde pr. gang				
		1	2	3	1	2-3	4-5	6-7	8+						
Poteter, kokte og bakte	☐	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Potetmos	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Potetsalat m/majones	☐	☐	☐	☐	☐	☐	☐	☐	☐	(ss)	1 ☐	2-3 ☐	4-5 ☐	6-7 ☐	8+ ☐
Fløtegratinerte poteter	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Stekte poteter	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Pommes frites (gatekjøkken, frityrstekt)	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Pommes frites, varmet i ovn	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Bønner/linser	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Ris	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Spagetti, makaroni, pasta	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1-2 ☐	3-4 ☐	5-6 ☐	7-8 ☐	9+ ☐
Pølsebrød, lomper	☐	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Gulrot	☐	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Hodekål	☐	☐	☐	☐	☐	☐	☐	☐	☐	(skalk)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Kålrot	☐	☐	☐	☐	☐	☐	☐	☐	☐	(skive)	1/2 ☐	1 ☐	2 ☐	3 ☐	4+ ☐
Blomkål	☐	☐	☐	☐	☐	☐	☐	☐	☐	(hode)	1/8 ☐	1/6 ☐	1/4 ☐	1/3 ☐	1/2+ ☐
Brokkoli	☐	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1/8 ☐	1/4 ☐	1/2 ☐	3/4 ☐	1+ ☐
Rosenkål	☐	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1-2 ☐	3-4 ☐	5-6 ☐	7-8 ☐	9+ ☐
Løk, rå og stekt	☐	☐	☐	☐	☐	☐	☐	☐	☐	(ss)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Salat (eks. issalat, ruccola)	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1/2 ☐	1 ☐	11/2 ☐	2 ☐	21/2+ ☐
Paprika	☐	☐	☐	☐	☐	☐	☐	☐	☐	(ring)	1-2 ☐	3-4 ☐	5-6 ☐	7-8 ☐	9+ ☐
Avokado	☐	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1/4 ☐	1/2 ☐	3/4 ☐	1 ☐	11/2+ ☐
Tomat	☐	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1/2 ☐	1 ☐	11/2 ☐	2 ☐	21/2+ ☐
Mais	☐	☐	☐	☐	☐	☐	☐	☐	☐	(ss)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Frosne grønnsakblandinger	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐
Blandet salat (eks. salat, tomat, agurk, mais)	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1 ☐	2 ☐	3 ☐	4 ☐	5+ ☐

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Prøv så godt du kan å gi et «gjennomsnitt» av matvanene dine.
Ha det siste året i tankene når du fyller ut.

13. Saus og dressing

	Aldri/ sjelden	1	2	3	4	5-6	7-8	9+		Mengde pr. gang				
Gang pr. måned														
Brun/hvit saus	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	½ ☐	1 ☐	1½ ☐	2 ☐	3+ ☐
Bearnéssaus, hollandés	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	½ ☐	1 ☐	1½ ☐	2 ☐	3+ ☐
Smeltet margarin/smør	☐	☐	☐	☐	☐	☐	☐	☐	(ss)	½ ☐	1 ☐	1½ ☐	2 ☐	3+ ☐
Kryddersmør	☐	☐	☐	☐	☐	☐	☐	☐	(ts)	½ ☐	1 ☐	1½ ☐	2 ☐	3+ ☐
Majones/remulade vanlig	☐	☐	☐	☐	☐	☐	☐	☐	(ss)	½ ☐	1 ☐	2 ☐	3 ☐	4+ ☐
Majones/remulade lett	☐	☐	☐	☐	☐	☐	☐	☐	(ss)	½ ☐	1 ☐	2 ☐	3 ☐	4+ ☐
Seterrømme (35 % fett)	☐	☐	☐	☐	☐	☐	☐	☐	(ss)	½ ☐	1 ☐	2 ☐	3 ☐	4+ ☐
Lettrømme (20 % fett)	☐	☐	☐	☐	☐	☐	☐	☐	(ss)	½ ☐	1 ☐	2 ☐	3 ☐	4+ ☐
Ekstra lett rømme (10 % fett)	☐	☐	☐	☐	☐	☐	☐	☐	(ss)	½ ☐	1 ☐	2 ☐	3 ☐	4+ ☐
Dressing (eks. Thousand Island)	☐	☐	☐	☐	☐	☐	☐	☐	(ss)	½ ☐	1 ☐	2 ☐	3 ☐	4+ ☐
Lett dressing (eks. lett Thousand Island)	☐	☐	☐	☐	☐	☐	☐	☐	(ss)	½ ☐	1 ☐	2 ☐	3 ☐	4+ ☐
Oljedressing, vinagrette	☐	☐	☐	☐	☐	☐	☐	☐	(ss)	½ ☐	1 ☐	2 ☐	3 ☐	4+ ☐
Soyasaus	☐	☐	☐	☐	☐	☐	☐	☐	(ss)	½ ☐	1 ☐	2 ☐	3 ☐	4+ ☐
Pesto	☐	☐	☐	☐	☐	☐	☐	☐	(ss)	½ ☐	1 ☐	2 ☐	3 ☐	4+ ☐
Tomatsaus, salsa	☐	☐	☐	☐	☐	☐	☐	☐	(ss)	1-2 ☐	3-4 ☐	5-6 ☐	7-8 ☐	9+ ☐
Ketchup	☐	☐	☐	☐	☐	☐	☐	☐	(ss)	½ ☐	1 ☐	2 ☐	3 ☐	4+ ☐
Sennep	☐	☐	☐	☐	☐	☐	☐	☐	(ss)	½ ☐	1 ☐	2 ☐	3 ☐	4+ ☐

14. Hvilken type smør/margarin/olje bruker du mest til matlaging?
(Velg en eller to typer)

Smør/margarin	Oljer
☐ Smør (meierismør)	☐ Olivenolje
☐ Bremykt	☐ Soyaolje
☐ Melange	☐ Maisolje
☐ Soft Flora, Soft Ekstra	☐ Solsikkeolje
☐ Vita	☐ Valnøttolje
☐ Flytende margarin på flaske (Vita, Melange, Bremykt o.l.)	☐ Rapsolje
☐ Annen margarin	☐ Vita hjertego
	☐ Andre oljer

Prøv så godt du kan å gi et «gjennomsnitt» av matvanene dine.
Ha det siste året i tankene når du fyller ut.

15. Frukt
Svar enten per måned eller per uke.

	Aldri/ sjelden	Gang pr. måned			eller	Gang pr. uke					Mengde pr. gang			
		1	2	3	1	2-3	4-5	6-7	8+					
Eple	☐	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1/2 ☐	1 ☐	2 ☐	3+ ☐
Pære	☐	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1/2 ☐	1 ☐	2 ☐	3+ ☐
Banan	☐	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1/2 ☐	1 ☐	2 ☐	3+ ☐
Appelsin	☐	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1/2 ☐	1 ☐	2 ☐	3+ ☐
Klementiner	☐	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1 ☐	2 ☐	3 ☐	4+ ☐
Grapefrukt	☐	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1/2 ☐	1 ☐	2 ☐	3+ ☐
Fersken, nektarin	☐	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1 ☐	2 ☐	3 ☐	4+ ☐
Kiwi	☐	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1 ☐	2 ☐	3 ☐	4+ ☐
Druer	☐	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1-10 ☐	11-20 ☐	21-40 ☐	41+ ☐
Melon	☐	☐	☐	☐	☐	☐	☐	☐	☐	(skive)	1 ☐	2 ☐	3 ☐	4+ ☐
Jordbær (friske, frosne)	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1/2 ☐	1 ☐	2 ☐	3+ ☐
Bringebær (friske, frosne)	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1/2 ☐	1 ☐	2 ☐	3+ ☐
Blåbær	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1/2 ☐	1 ☐	2 ☐	3+ ☐
Multer	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1/2 ☐	1 ☐	2 ☐	3+ ☐
Rosiner	☐	☐	☐	☐	☐	☐	☐	☐	☐	(dl)	1/2 ☐	1 ☐	2 ☐	3+ ☐
Tørket frukt (eks. aprikos, fiken)	☐	☐	☐	☐	☐	☐	☐	☐	☐	(stk)	1-5 ☐	6-10 ☐	11-15 ☐	16+ ☐
Frukt- og nøtteblanding	☐	☐	☐	☐	☐	☐	☐	☐	☐	(neve)	1 ☐	2 ☐	3 ☐	4+ ☐

16. Grønnsaker og frukt

Hvor mange porsjoner grønnsaker (utenom potet) spiser du vanligvis pr. dag? (En porsjon er f. eks. 1 gulrot, 1 bolle salat)

Mindre enn 1	1	2	3	4	5+
☐	☐	☐	☐	☐	☐

Hvor mange frukt spiser du vanligvis pr. dag?

Mindre enn 1	1	2	3	4	5+
☐	☐	☐	☐	☐	☐

Prøv så godt du kan å gi et «gjennomsnitt» av matvanene dine.
Ha det siste året i tankene når du fyller ut.

18. Kosttilskudd (ts = teskje, bs = barneskje)

	Aldri/ sjelden	Gang pr. uke				Mengde pr. gang			
		1	2-3	4-5	6-7				
						1 ts	1 bs	1 ss	
Tran	☐	☐	☐	☐	☐	☐	☐	☐	
						1	2	3	4+
Trankapsler	☐	☐	☐	☐	☐	(kapsler) ☐	☐	☐	☐
						1	2	3	4+
Fiskeoljekapsler, omega-3 tilskudd	☐	☐	☐	☐	☐	(kapsler) ☐	☐	☐	☐
						1	2	3	4+
Seloljekapsler	☐	☐	☐	☐	☐	(kapsler) ☐	☐	☐	☐

Multipreparater	Aldri/ sjelden	Gang pr. uke				Mengde pr. gang			
		1	2-3	4-5	6-7	1	2	3	4+
Sana-sol	☐	☐	☐	☐	☐	(bs) ☐	☐	☐	☐
Biovit	☐	☐	☐	☐	☐	(bs) ☐	☐	☐	☐
Mulitvitamin og mineral (eks. Vitamineral)	☐	☐	☐	☐	☐	(tablett) ☐	☐	☐	☐
Multivitaminer (uten mineraler)	☐	☐	☐	☐	☐	(tablett) ☐	☐	☐	☐

Jernpreparater	Aldri/ sjelden	Gang pr. uke				Mengde pr. gang			
		1	2-3	4-5	6-7	1	2	3	4+
Duroferon Duretter, Ferromax	☐	☐	☐	☐	☐	(tablett) ☐	☐	☐	☐
Hemofer, hemjern	☐	☐	☐	☐	☐	(tablett) ☐	☐	☐	☐
Amino Jern	☐	☐	☐	☐	☐	(tablett) ☐	☐	☐	☐
Jernmikstur (eks. Floradix)	☐	☐	☐	☐	☐	(bs) ☐	☐	☐	☐

Annet	Aldri/ sjelden	Gang pr. uke				Mengde pr. gang			
		1	2-3	4-5	6-7	1	2	3	4+
B-vitaminer (flere b-vitaminer i samme tablett)	☐	☐	☐	☐	☐	(tablett) ☐	☐	☐	☐
C-vitamin (60 mg/tablett)	☐	☐	☐	☐	☐	(tablett) ☐	☐	☐	☐
D-vitamin (10 µg/tablett)	☐	☐	☐	☐	☐	(tablett) ☐	☐	☐	☐
E-vitamin (30 mg/tablett)	☐	☐	☐	☐	☐	(tablett) ☐	☐	☐	☐
Folat (folsyre) (200 µg/tablett)	☐	☐	☐	☐	☐	(tablett) ☐	☐	☐	☐

Annet (inkludert helsekostpreparater). Noter navn på preparatet, hvor ofte og hvor mye du tar pr. gang.

Ditt bidrag teller!

Takk for at du stiller opp og bidrar til viktig forskning.

Returadresse:

Institutt for samfunnsmedisin.
Det helsevitenskapelige fakultet, UiT Norges arktiske universitet.
9037 Tromsø

Appendix 4: Decision from the Regional Committee for Medical Research Ethics

REK
REGIONALE KOMITEER FOR MEDISINSK OG HELSEFAGLIG FORSKNINGSETIKK

Region:	Saksbehandler:	Telefon:	Vår dato:	Vår referanse:
REK nord	Veronica Sørensen	77620758	11.10.2019	50330
			Deres referanse:	

Laila Hopstock

50330 Kosthold og sosioøkonomisk status: Tromsøundersøkelsen

Forskningsansvarlig: UiT Norges arktiske universitet

Søker: Laila Hopstock

Søkers beskrivelse av formål:

The objective of this master thesis project is to investigate the socioeconomic gradient in diet in a general Norwegian population. The Tromsø Study provides up-to-date data and have the potential to contribute to information regarding whether progress have been made since the national dietary survey NORKOST in 2010-2011. The Tromsø Study have strength in the large number of participants and may reveal relationships that was not found in NORKOST. Participants from the entire Tromsø municipality was invited, thus the study can give information on both urban and rural populations. Finally, since the results from other studies on socioeconomic inequalities in diet have been somewhat inconsistent, the findings from this study may contribute to strengthen the relationships found in other studies.

REKs vurdering

De prosjektene som skal framlegges for REK er prosjekt som dreier seg om «medisinsk og helsefaglig forskning på mennesker, humant biologisk materiale eller helseopplysninger», jf. helseforskningsloven § 2. «Medisinsk og helsefaglig forskning» er i § 4 a), definert som «virksomhet som utføres med vitenskapelig metodikk for å skaffe til veie ny kunnskap om helse og sykdom». Det er altså formålet med studien som avgjør om et prosjekt skal anses som framleggelsespliktig for REK eller ikke.

Alle skriftlige henvendelser om saken må sendes via REK-portalen
Du finner informasjon om REK på våre hjemmesider rekportalen.no

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Appendix 4. cont.

Av forskrift for befolkningsbaserte helseundersøkelser § 4-1. «Vilkår for behandling av helseopplysninger» fremgår det at ved tilgjengeliggjøring av opplysninger for bruk til medisinsk og helsefaglig forskning, må mottakeren ha fått forhåndsgodkjenning fra REK. REK tolker «medisinsk og helsefaglig forskning i denne sammenheng på samme måte som i helseforskningsloven § 4 a).

Målet med masteroppgaveprosjektet beskrives som å undersøke den sosioøkonomiske gradienten i kosthold i en generell norsk befolkning. Tromsø-studien gir oppdaterte data og har potensial til å bidra til informasjon om hvorvidt det er gjort fremskritt siden den nasjonale kostholdsundersøkelsen NORKOST i 2010-2011. Tromsø-studien har styrke i det store antall deltakere og kan avdekke forhold som ikke ble funnet i NORKOST. Deltakere fra hele Tromsø kommune ble invitert, og studien kan dermed gi informasjon om både by- og bygdefolk.

I prosjektet skal det benyttes utfallsvariabler som kostholdsdata (data fra næringsberegning av kostholdspørreskjema, matvareinntak og næringsstoffer) og som eksponeringsvariabler skal man benytte demografiske data (alder, kjønn, sosioøkonomiske variabler; utdanning og inntekt) 3) Stratifisering/justeringsvariabler: Helsedata (kardiometabolsk risiko; røyking, fysisk aktivitet, kroppsmasseindeks, blodtrykk, blodfettstoffer)

Selv om det skal innhentes helsedata er det slik REK forstår det kostholdsdata som utgjør endepunktsmål. Prosjektet faller derfor ikke inn under de prosjekter som skal vurderes av REK..

Vedtak

Ikke fremleggspliktig

Etter søknaden fremstår prosjektet ikke som et medisinsk og helsefaglig forskningsprosjekt som faller innenfor helseforskningsloven. Prosjektet er ikke framleggingspliktig, jf. helseforskningsloven § 2.

Alle skriftlige henvendelser om saken må sendes via REK-portalen
Du finner informasjon om REK på våre hjemmesider rekportalen.no

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Avtale

mellom

Tromsøundersøkelsen, Institutt for samfunnsmedisin,

UiT Norges arktiske universitet

og

Laila Hopstock, Institutt for samfunnsmedisin,

UiT Norges arktiske universitet

om utlevering av forskningsdata fra Tromsøundersøkelsen

Prosjektnummer EUTRO: 8030.00315

Prosjekttittel:

The educational gradient in diet of a Nordic population – A cross-sectional study from the Tromsø 7 Study

Avtalen bygger på skriftlig søknad med prosjektbeskrivelse og publikasjonsplan, samt godkjenning i Data og Publikasjonsutvalget for Tromsøundersøkelsen. Det forutsettes at arbeidet med data skjer i henhold til *Retningslinjer for tilgang til forskningsdata fra Tromsøundersøkelsen*, datert 6.2.2013.

En avidentifisert datafil utleveres til **Laila Hopstock, UiT**. Prosjektleder kan la samarbeidspartnere som er nevnt i prosjektsøknaden få analysere data, så fremt arbeidet holder seg innenfor rammen for prosjektbeskrivelsen og publikasjonsplanen. Prosjektleder har ansvar for datasikkerheten og at data oppbevares forsvarlig i hht lover og forskrifter.

Retten til data gjelder for **1 år**. Når analysene er fullført, skal datasettet slettes og bekreftelse om dette sendes skriftlig til Tromsøundersøkelsen. Dette skal ikke skje senere enn **31.12.2020** med mindre ny avtale om forlengelse er inngått. Eventuelle nye data skal tilbakeføres til Tromsøundersøkelsen, jfr. pkt. 10 i retningslinjene.

Sted, dato   Sted, dato

_____   Tromsø, 02.12.2019

_____

Prosjektleder   For Tromsøundersøkelsen

Appendix 6: Decision from The Norwegian Data Protection Authority

NSD sin vurdering

🖶 Skriv ut

Prosjekttittel
Dietary intake in a Norwegian population

Referansenummer
571118

Registrert
18.01.2020 av Laila Arnesdatter Hopstock - laila.hopstock@uit.no

Behandlingsansvarlig institusjon
UIT – Norges Arktiske Universitet / Det helsevitenskapelige fakultet / Institutt for samfunnsmedisin

Prosjektansvarlig (vitenskapelig ansatt/veileder eller stipendiat)
Laila Hopstock, laila.hopstock@uit.no, tlf: 90010811

Type prosjekt
Studentprosjekt, masterstudium

Kontaktinformasjon, student
Linn Nilsen , lni031@uit.no, tlf: 41551306

Prosjektperiode
01.01.2020 - 30.06.2021

Status
07.02.2020 - Vurdert

Vurdering (1)

07.02.2020 - Vurdert
Det er vår vurdering at behandlingen vil være i samsvar med
personvernlovgivningen, så fremt den gjennomføres i tråd med det som er
dokumentert i meldeskjemaet den 07.02.2020 med vedlegg. Behandlingen kan starte.
MELD ENDRINGER Dersom behandlingen av personopplysninger endrer seg, kan det
være nødvendig å melde dette til NSD ved å oppdatere meldeskjemaet. På våre
nettsider informerer vi om hvilke endringer som må meldes. Vent på svar før
endringen gjennomføres. TYPE OPPLYSNINGER OG VARIGHET Prosjektet vil behandle
særlige kategorier av personopplysninger om helse og alminnelige
personopplysninger frem til 30.06.2021. LOVLIG GRUNNLAG Prosjektet vil innhente
samtykke fra de registrerte til behandlingen av personopplysninger. Vår
vurdering er at prosjektet legger opp til et samtykke i samsvar med kravene i
art. 4 nr. 11 og art. 7, ved at det er en frivillig, spesifikk, informert og
utvetydig bekreftelse, som kan dokumenteres, og som den registrerte kan trekke
tilbake. Lovlig grunnlag for behandlingen vil dermed være den registrertes
uttrykkelige samtykke, jf. personvernforordningen art. 6 nr. 1 a), jf. art. 9
nr. 2 bokstav a, jf. personopplysningsloven § 10, jf. § 9 (2).
PERSONVERNPRINSIPPER NSD vurderer at den planlagte behandlingen av
personopplysninger vil følge prinsippene i personvernforordningen om:
- lovlighet, rettferdighet og åpenhet (art. 5.1 a), ved at de registrerte får
tilfredsstillende informasjon om og samtykker til behandlingen
- formålsbegrensning (art. 5.1 b), ved at personopplysninger samles inn for
spesifikke, uttrykkelig angitte og berettigede formål, og ikke viderebehandles
til nye uforenlige formål - dataminimering (art. 5.1 c), ved at det kun
behandles opplysninger som er adekvate, relevante og nødvendige for formålet med
prosjektet - lagringsbegrensning (art. 5.1 e), ved at personopplysningene ikke
lagres lenger enn nødvendig for å oppfylle formålet DE REGISTRERTES
RETTIGHETER Så lenge de registrerte kan identifiseres i datamaterialet vil de ha
følgende rettigheter: åpenhet (art. 12), informasjon (art. 13), innsyn (art.
15), retting (art. 16), sletting (art. 17), begrensning (art. 18), underretning
(art. 19), dataportabilitet (art. 20). NSD vurderer at informasjonen som de
registrerte vil motta oppfyller lovens krav til form og innhold, jf. art. 12.1
og art. 13. Vi minner om at hvis en registrert tar kontakt om sine rettigheter,

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Appendix 6 cont.

har behandlingsansvarlig institusjon plikt til å svare innen en måned. FØLG DIN INSTITUSJONS RETNINGSLINJER NSD legger til grunn at behandlingen oppfyller kravene i personvernforordningen om riktighet (art. 5.1 d), integritet og konfidensialitet (art. 5.1. f) og sikkerhet (art. 32). For å forsikre dere om at kravene oppfylles, må dere følge interne retningslinjer og eventuelt rådføre dere med behandlingsansvarlig institusjon. OPPFØLGING AV PROSJEKTET NSD vil følge opp ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet. Lykke til med prosjektet! Kontaktperson hos NSD: Elizabeth Blomstervik Tlf. Personverntjenester: 55 58 21 17 (tast 1)