Norsk Epidemiologi

Norwegian Journal of Epidemiology

Årgang 23, supplement 1, oktober 2013

Utgitt av Norsk forening for epidemiologi

Redaktør:
Trond Peder Flaten
Institutt for kjemi,
Norges teknisk-naturvitenskapelige universitet, 7491 Trondheim

Telefon: 73 59 18 06
Telefax: 73 55 08 77

e-post: trond.p.flaten@ntnu.no

Abonnement: Tidsskriftet sendes medlemmer av Norsk forening for epidemiologi (NOFE) og abonnerende bibliotek. For å bli medlem eller abonnere, send e-post til NOFE: post@nofe.no. Medlemskontingenten er for tiden kr. 400, det samme er prisen for abonnement. Utenfor Norge er prisen kr. 600.

Adresse NOFE:
Norsk forening for epidemiologi
KKF v/Olsvik, Armauer Hansens hus
Haukeland universitetssykehus
5021 Bergen

Internettadresse for NOFE:
http://www.nofe.no

e-post: post@nofe.no

ISSN 0803-4206
Opplag: 350
Trykk: NTNU-trykk
Layout og typografi: Redaktøren

Tidsskriftet er tilgjengelig online:
www.www.ntnu.no/ojs/index.php/norepid
Også via Directory of Open Access Journals (www.doaj.org)

Utgis vanligvis med to regulære temanummer pr. år. I tillegg kommer supplement med sammendrag fra Norsk forening for epidemiologis årlige konferanse.

DEN 21. NORSKE EPIDEMIOLOGIKONFERANSEN

SOMMARØY, TROMS,

30. OKTOBER – 1. NOVEMBER 2013

The 21th Norwegian Conference on Epidemiology
Tromsø, October 30 – November 1 2013

Welcome to the 21th conference of the Norwegian Epidemiological Association (NOFE) in Tromsø and beautiful Sommarøy.

Register and environmental epidemiology are the main topics of this year's conference with a special focus on EPINOR, the new national research school in population based epidemiology.

We want to thank the keynote speakers in particular for their contributions; David Leon, Andy Gilman, Eiliv Lund, Jon Øyvind Odland and Leif Aage Strand.

Other programme items include the 2013 Publication of the Year award, NOFE's annual meeting and Honorary Membership being awarded to two distinguished members.

We also wish to thank other members of the staff at the Institute of Community Medicine for their help in organizing this conference.

We wish all 92 participants a successful conference!

The organizing committee for the NOFE conference 2013

Therese Haugdahl Nøst, Erik Eik Anda, Torkjel Sandanger, Maja-Lisa Løchen, Mari Sæthre and Jon Øyvind Odland

UiT The Arctic University of Norway, Institute for Community Medicine

The 21th Norwegian Conference on Epidemiology
Tromsø, October 30 – November 1, 2013

Overview Main Conference

Wednesday, October 30 – Main Conference (Sommarøy Hotell)

12:00	Bus departure from Langnes
12:00-13:30	Lunch / registration
13:45-14:00	Welcome (presentation of honorary members)
14:00-14:45	**Keynote Address (Stornaustet) – David Leon from the London School of Hygiene & Tropical Medicine** "The challenge of cardiovascular disease in Russia"
14:45-15:15	**Plenary Session (Stornaustet) – Jon Øyvind Odland from the Institute of community medicine at UiT** "Persistent Toxic Substances and Reproductive Health. An update with focus on the Arctic"
15:15-16:00	Coffee break
16:00-17:00	**Plenary Session (Stornaustet) –** NOFE grants the status of Honorary Membership to two distinguished members. Two presentations.
17:00-17:30	**Plenary Session (Stornaustet) –** "The publication of the year" award
17:30-18:00	**Plenary Session (Stornaustet)** – **Einar K. Borud** from the Norwegian Armed Forces Medical Services "Armed Forces Health Registry"
19:00-	Conference dinner

Thursday, October 31

08:00-09:00	Breakfast
09:00-09:45	**Plenary Session (Stornaustet)** – **Keynote Speaker Andy Gilman from the Institute of community medicine at UiT** – Environmental Epidemiology "The theory and the ground application of health messaging based on epidemiology findings"
09:45-10:30	**Plenary Session (Stornaustet)** – **Keynote Speaker Eiliv Lund from the Institute of community medicine at UiT** – Systems Epidemiology "From genomics to functional genomics "
10:30-10:45	Coffee break
10:45-12:00	Oral presentations of submitted abstracts (parallel session 1, **A1-A4** and **B1-B5**)
12:00-12:15	Coffee break
12:15-13:00	Oral presentations of submitted abstracts (parallel session 2, **A5-A7** and **B6-B8**)

13:00-14:00	Lunch
14:00- 15:15	Oral presentations of submitted abstracts (parallel session 3, **A8-A12** and **B9-B13**)
15:15-15:30	Coffee break
15:30-16:45	Oral presentations of submitted abstracts (parallel session 4, **A13-A18** and **B14-B19**)
16:45-17:00	Coffee break and light snack
17:05-17:20	**Plenary Session (Stornaustet) –** Presentation of EPINOR
17:20-17:25	**Plenary Session (Stornaustet) –** Closing remarks
18:00	Bus departure to Langnes
19:00	Dinner

Friday, November 1

08:00-09:00	Breakfast
09:00-10:00	**Elisabete Weiderpass/Torkjel Sandanger –** Welcome to EPINOR and announcement of the best EPINOR presentation at NOFE
09:00-10:00	NOFE general assembly
10:00-10:15	Coffee
10:15-11:00	**Andy Gilman** – History and effects (epidemiology and toxicology) of the POPs contaminant mix for First Nations/Aboriginals in Arctic Canada. Arctic dilemma and Policy Issues
11:00-11:30	**Andy Gilman** – Hands on session of role playing as to how to develop a meaningful guidance for specific country food consumption
11:30-12:30	Lunch
12:30-16:00	Student presentations
16:00	**Elisabete Weiderpass/Torkjel Sandanger –** Final remarks
17:00	Departure from Sommarøy

The 21th Norwegian Conference on Epidemiology
Tromsø, October 30 – November 1 2013

Scientific Programme for Parallel Sessions

Thursday, October 31

Parallel Session 1

Parallel session A1-A4 Stornaustet

Topic: Mental health and cognitive function

10:45-11:15	A1	Harry Vainio	Preventive health care and well-being
11:15-11:30	A2	Ketil L Hansen	The Population-based Study on Health- and Living Conditions in Areas with Mixed Sami and Norwegian Settlements – the SAMINOR 2 Questionnaire Study
11:30-11:45	A3	Ingvild Odsbu	Prenatal exposure to anxiolytics and hypnotics and language competence at three years of age
11:45-12:00	A4	Randi Selmer	Prenatal exposure to antidepressants and language competence at age three. Results from a large population based pregnancy cohort in Norway

Parallel session B1-B3 Posthuset

Topic: Various topics

10:45-11:00	B1	Unni Ringberg	General practitioners' referral rates are related to professional uncertainty and patient preferences: a study of reasons for 595 referrals
11:00-11:15	B2	Rajesh Shigdel	The combination of Cortical Porosity and FRAX improves the Diagnostic Sensitivity for Non-Vertebral Fractures in Women
11:15-11:30	B3	Milada Mahic	A pharmacoepidemiological cohort study of subjects starting strong opioids for chronic non-malignant pain – a study from The Norwegian Prescription Database
11:30-11:45	B4	Alexander Kudryavtsev	Injury Prevention and Safety Promotion master-level course in Arkhangelsk, Russia
11:45-12:00	B5	Andrej Grjibovski	Epidemiology of HIV infection in two Arctic provinces of Russia

Thursday (cont.)

Parallel Session 2

Parallel session A5-A7 Stornaustet

Topic: Mental health and cognitive function

12:15-12:30	A5	Ragnar Nesvåg	Gender differences in the prevalence and rate of comorbid substance use disorders among patients in treatment for psychotic illness: A five-year population-based study
12:30-12:45	A6	Karina Corbett	Does an unstable household income lead to poor cognitive outcomes?
12:45-13:00	A7	Inger-Johanne Bakken	Use of specialist mental health care services by patients with depressive and anxiety disorders in Norway – A population-based study

Parallel session B6-B8 Posthuset

Topic: Various topics (cont.)

12:15-12:30	B6	Ellen Årtun	Vigorous physical activity increases the risk of spinal pain in adolescents: A school-based two-year prospective cohort study in 11-13-year-old Danes

Topic: Register epidemiology

12:30-12:45	B7	Rupali Akerkar	The Norwegian Cardiovascular Disease Registry; some results from 2012
12:45-13:00	B8	Robert Wiik	Validity Analyses: Medical Quality Registries vs. Norwegian Patient Register

Thursday (cont.)

Parallel Session 3

Parallel session A8-A12 Stornaustet

Topic: Environmental epidemiology

14:00-14:15	A8	Kristine Vejrup	The Mercury inheritance; Does maternal consumption of seafood during pregnancy lead to mercury levels that may be harmful to the child?
14:15-14:30	A9	Guri Skeie	Intake of whole grains and incidence of oesophageal cancer in the Helga cohort.
14:30-14:45	A10	Karina S Olsen	Nutrigenomics: Plasma 25 hydroxyvitamin D level affect blood gene expression profiles in the Norwegian Women and Cancer Post-genome Cohort
14:45-15:00	A11	Torkjel Sandanger	Persistent organic pollutants in males in the Tromsø study 1979-2007
15:00-15:15	A12	Maysaa Nemer	Airway inflammation among female Palestinian hairdressers. A cross-sectional study

Parallel session B9-B13 Posthuset

Topic: Register epidemiology (cont.)

14:00-14:15	B9	Bjørn Heine Strand	What are the main causes of death behind the changes in educational inequalities in mortality in Norway the last 5 decades?
14:15-14:30	B10	Lillian Leistad	The Norwegian Patient Register: possibilities and challenges.
14:30-14:45	B11	Line Krane	Comparison of sickness absence trends among female health and care sector employees in Kristiansand, Norway and Aarhus, Denmark: a register study.
14:45-15:00	B12	Jon Michael Gran	An automated syndrome based surveillance system for infectious diseases in Norway
15:00-15:15	B13	Siri Håberg	Registry based influenza studies – a unique resource in influenza research

Thursday (cont.)

Parallel Session 4

Plenary session A13-A18 Stornaustet

Topic: Environmental epidemiology (cont.)

15:30-15:45	A13	Kristin Holvik	Low serum concentrations of vitamin E are associated with increased risk of hip fracture in older Norwegians. A NOREPOS study
15:45-16:00	A14	Tonje Braaten	Melatonin, mood and the polar night

Topic: Mother and child health

16.00-16:15	A15	Maria C. Magnus	Early childhood growth patterns and risk of developing asthma: the Norwegian Mother and Child Cohort Study
16:15-16:30	A16	Marte Handal	Prenatal exposure to selective serotonin reuptake inhibitors and motor development at three years of age. The Norwegian Mother and Child Cohort Study.
16:30-16:45	A17	Nina Gunnes	Interpregnancy Interval and Risk of Autistic Disorder
16:45-17:00	A18	Arthur Chortatos	Pregnancy complications and outcomes for women experiencing nausea alone or nausea and vomiting in pregnancy

Plenary session B14-B19 Posthuset

Topic: Cancer epidemiology

15:30-15:45	B14	Anna Subbotina	Cervical cancer epidemiology and survival in the Arkhangelsk region, Russia in 2000–2012: a registry-based study
15:45-16:00	B15	Leif Aage Strand	Cancer incidence among Norwegian military UN peacekeepers deployed to Kosovo
16:00-16:15	B16	Marta Román	Risk of Breast Cancer in Women with Screen Detected Benign Breast Lesions
16:15-16:30	B17	Marta Román	The Cumulative Risk of a False-Positive Screening Result in the Norwegian Breast Cancer Screening Program by Breast Center
16:30-16:45	B18	Tom Grotmol	Investigation of six testicular germ cell tumor susceptibility genes suggests a parent-of-origin effect in the tumor suppressor gene SPRY4
16:45-17:00	B19	Lene Angell Åsli	Potato consumption in a cohort of 74480 women. The Norwegian women and Cancer study.

ABSTRACTS

A1

Preventive health care and well-being

Harri Vainio, Professor, MD, PhD

Finnish Institute of Occupational Health, Helsinki, Finland

The global economic crisis is calling into question the sustainability of the European social welfare model as a whole and necessitating even greater cost-effectiveness of the health systems. Policy-makers are being called on to account for each and every area of public expenditure and are expected to maximize the value for money. The demands to cut public expenditure put the health systems at the heart of the public debate. Our health systems are designed for "curing" individual diseases once they become symptomatic. Most chronic diseases, such as cancer, coronary heart diseases, and diabetes, develop over decades before they become manifest with signs and symptoms. The knowledge and effective and reliable tools for disease prevention and health promotion are increasingly becoming available. Yet the shift from curative medicine to preventive health care is a major disruption to entrenched interests and practices in existing health systems, and requires a paradigm shift from disease (pathogenic) to health (salutogenic) systems both in the medical professions and in society at large. The transformation and governance issues raised by such disruptions are considerable.

A2

The Population-based Study on Health- and Living Conditions in Areas with Mixed Sami and Norwegian Settlements – the SAMINOR 2 Questionnaire Study

M. Brustad[1], **K. L. Hansen**[1], A. R. Broderstad[1,2], S. Hansen[1] and M. Melhus[1]

1) Centre for Sami Health Research, Department of Community Medicine, UiT The Arctic University of Norway
2) Department of Medicine, University Hospital of Northern Norway, Harstad, Norway

Objectives: To describe the method, data collection procedure and participation in The Population-based Study on Health- and Living Conditions in Areas with both Sami and Norwegian Settlement – the SAMINOR 2 Questionnaire Study.

Study design: Cross-sectional and semi-longitudinal.

Methods: In the year 2012, all inhabitants aged 18-69 years and living in selected municipalities with both Sami- and other Norwegian settlements in mid- and northern Norway were posted an invitation to participate in a questionnaire survey covering several health- and living-condition-related topics. The geographical area was similar to the area where the SAMINOR 1 study was conducted in 2003/2004 with the exception of one additional municipality. Participants could alternatively use a web-based questionnaire with identical questions and answer categories as the posted paper version.

Results: In total, 11,600 (28%) participated, and the participation rate was higher among those above the age of 50 (37% for women and 32% for men).

Some geographical variation in participation rates was found. Furthermore, participation rates increased with the level of education and income. By using data from the SAMINOR 1 data collection, no selection bias was found for ethnicity.

Conclusion: The knowledge generated from future theme-specific scientific work utilising the SAMINOR 2 data base has the potential to benefit the general population in this geographical area of Norway, and the Sami people in particular, by providing scientific-based insight into the health- and living conditions of the multi-ethnic population in this part of Norway.

A3

Prenatal exposure to anxiolytics and hypnotics and language competence at three years of age

Ingvild Odsbu, Marte Handal, Randi Selmer, Sonia Hernandez-Diaz and Svetlana Skurtveit

Department of Pharmacoepidemiology, Norwegian Institute of Public Health, Oslo, Norway
Department of Epidemiology, Harvard School of Public Health, Boston, MA, United States

Introduction: Very little is known about the potential impact of prenatal exposure to anxiolytics and hypnotics on infant neurodevelopment.

Aims: To examine if there was an association between use of anxiolytics/ hypnotics in pregnancy and language competence in the children at age three years.

Methods: The Norwegian Mother and Child Cohort Study is a prospective pregnancy cohort. The mothers received three questionnaires with questions regarding drug use covering the entire pregnancy. The mother and child were included in the study if the mother had completed all questionnaires during pregnancy and the questionnaire when the child was three years of age. A woman was defined as a user of anxiolytics/ hypnotics during pregnancy if she had reported use of benzodiazepines or benzodiazepine-like drugs during pregnancy. Children's language competence was measured at age three by maternal report on a validated language grammar scale. We used ordinal logistic regression with estimated standard errors allowing for clustering of multiple pregnancies.

Results: 45 266 women with 51 748 pregnancies were included in this study. The women reported use of anxiolytics and hypnotics in 395 pregnancies (0.8%). Of all children at age three years, 141 (0.3 %) were rated as not yet talking, 192 (0.4 %) talking in one-word utterances, 1,727 (3.3 %) talking in two-three-word phrases, 9,847 (19 %) talking in fairly complete sentences and 39,841 (77 %) talking in long and complicated sentences. Children whose mothers took no anxiolytics and hypnotics during pregnancy were reference group. Odds ratios of being in a group with lower language competence were 1.2 (0.9-1.5) and 1.7 (1.0-2.8) for anxiolytics and hypnotics use in one time period and at least two time periods, respectively.

Conclusions: The results show no clear association between prenatal use of anxiolytics and hypnotics and lower language competence in children at age three years.

A4

Prenatal exposure to antidepressants and language competence at age three. Results from a large population based pregnancy cohort in Norway

Svetlana Skurtveit[1,2], **Randi Selmer**[1], Christine Roth[1], Sonia Hernandez-Diaz[3] and Marte Handal[1]

1) Norwegian Institute of Public Health, Div. of Epidemiology, Oslo, Norway
2) University of Oslo, Norwegian Centre for Addiction Research, Oslo, Norway
3) Department of Epidemiology, Harvard School of Public Health, Boston, United States

Introduction: Limited information is available on the effect of maternal SSRI treatment in pregnancy on long term neurocognitive function in children.

Aim: To examine the association between maternal use of selective serotonin reuptake inhibitors (SSRI) in pregnancy and language competence in their children at age three years taking into account symptoms of anxiety and depression.

Method: The population based Norwegian Mother and Child Cohort Study recruited pregnant women from 1999 -2008 and collected data on SSRI use, symptoms of anxiety and depression and confounders of prospectively by self-reported questionnaires. The study population consisted of 45 266 women with 51 748 singleton pregnancies. The outcome, children's language competence, was measured by maternal report on a validated language grammar scale. Short- or long term use of SSRI during pregnancy in combination with symptoms of anxiety and depression during and after pregnancy and history of depression before pregnancy were investigated using ordinal logistic regression and estimated standard errors using the clustered sandwich estimator allowing for clustering for multiple pregnancies within the same woman.

Results: Women reported use of SSRI in 0.7% pregnancies, and 0.3 % reported long-term use. Of all children 0.3% were rated as not yet talking, or talking but unintelligible, 0.4 % talking in one-word utterances, 3.3 % talking in 2-3 –word phrases, 19 % talking in fairly complete sentences and 77 % talking in long and complicated sentences. Compared to children whose mothers took no SSRI and did not report depression the odds ratios (OR) for poorer language competence were 2.39 (1.56-3.64) and 2.64 (1.51-4.60) after long term SSRI use without and with reported depression, respectively.

Conclusions: Use of SSRI for extended pregnancy periods was associated with lower language competence in children by age three independently of depression. Reported long term depression had a moderate effect.

A5

Gender differences in the prevalence and rate of comorbid substance use disorders among patients in treatment for psychotic illness: A five-year population-based study

Ragnar Nesvåg[1], Gun Peggy Knudsen[1], Inger Johanne Bakken[1], Anne Høye[1,2], Eivind Ystrøm[1], Pål Surén[1], Anne Reneflot[1], Camilla Stoltenberg[1,3], Ted Reichborn-Kjennerud[1,3]

1) Norwegian Institute of Public Health, Oslo, Norway
2) Centre for Clinical Documentation and Evaluation Regional Health Authority of North Norway, Tromsø, Norway
3) Institute of Clinical Medicine, University of Oslo, Norway

Introduction: Women have a later onset of schizophrenia than men, while the lifetime morbidity risk is equal for men and women. Knowledge of gender distribution in bipolar disorder is less established. Men have a higher rate of substance use disorders (SUD) in the population and among patients with psychotic illness. The gender distribution of comorbid SUDs across diagnostic categories and age groups is not fully known.

Aims: To investigate gender differences in the five-year prevalence of schizophrenia and bipolar disorder with or without comorbid SUD in a large population-based sample of patients with psychotic illness in Norway.

Methods: Information on age, gender and SUD diagnoses was retrieved for all patients registered at least once with a psychotic illness in the Norwegian Patient Registry in the period 2008-2012. Gender differences in prevalence and rate of comorbid SUDs were analyzed using Pearson's Chi-Square statistics.

Results: More men than women were diagnosed with schizophrenia. The ratio was 2:1 for patients between 28 and 37 years of age by the end of 2012. More women than men were diagnosed with bipolar disorder across all age groups. The rates of comorbid SUD were higher for men than for women in both schizophrenia and bipolar disorder. The rate of non-alcohol drug use disorders (DUD) was higher than the rate of alcohol use disorders (AUD) in schizophrenia, while in bipolar disorder the rate of DUD and AUD was similar.

Conclusions: Schizophrenia and bipolar disorder differ with respect to gender distribution in prevalence, rate and SUD comorbidity. These results may guide further research into the etiology of psychotic disorders.

A6

Does an unstable household income lead to poor cognitive outcomes?

Karina Corbett[1], Ingrid S. Mehlum[1], Ian McKeague[2], Ezra Susser[2,3] and Petter Kristensen[1]

1) National Institute of Occupational Health, Department of Occupational Medicine and Epidemiology, Oslo, Norway
2) Mailman School of Public Health, Columbia University, Department of Epidemiology, New York, NY
3) New York State Psychiatric Institute, New York, NY

Introduction: Most researchers agree that growing up in a low-income family puts children at risk of lower cognitive functioning, but the strength of the association is often debated. This may be in part due to the difficult nature of capturing income over time. In past studies, income has most often been measured as an average over a given number of years, but since income can be quite volatile over the life course, measures that average income over many years may conceal an effect of variations in income and potentially underestimate effects of poverty. Further, since many factors may confound the relation between income and a child's cognitive ability, disentangling whether the income effect is a causal one is a challenge.

Aims: We investigated whether reductions in income were independent predictors of cognitive risk, conditional on level of absolute income. We also assessed whether there was a stronger effect of income instability for people who over time had a lower income level.

Method: Using rich national registry data we followed males born in Norway between 1968 and 1976, with data on IQ and parental household income, from birth up to age 18. Repeated measurements of annual household income over this period were used to construct an estimate of underlying income growth rates. Using functional regression, we regressed IQ measured at age 18 on our functional income predictor. We controlled for change in maternal marital status, parental unemployment, and number of times the family moved between municipalities. To further assess whether any income effect is causal, we used a sibling sample analyzed in mixed models in order to control for unmeasured stable factors within the family.

Results and discussion: Preliminary analyses suggest that an unstable household income increases risk of poor cognitive function. The effect is especially strong in families where income levels are poor. Further results will be presented at the conference.

A7

Use of specialist mental health care services by patients with depressive and anxiety disorders in Norway – A population-based study

Inger Johanne Bakken[1], Ragnar Nesvåg[1], Lilian Leistad[2], Arnstein Mykletun[1], Arne Holte[1]

1) The National Institute of Public Health
2) The Norwegian Directorate of Health

Introduction: Common mental disorders, such as depressive and anxiety disorders, are among the most costly reasons for receiving disability pension. Also, data from the Norwegian Prescription Database show that a high proportion of the population have been prescribed medication for such disorders. However, the extent to which specialist mental health care services provide help for this patient group is not well known.

Aims: Our objective was to assess the proportion of Norwegian men and women who visited specialist mental health care services for depressive and anxiety disorders in 2012 by using data from the Norwegian Patient Register (NPR).

Methods: NPR was searched for episodes 2008-2012 where ICD-10 codes for depressive (F32, F33) or anxiety disorders (F40, F41) were registered. We had access to information on gender, year of birth, county, and the number of episodes for each condition.

Results: In 2012, 1.4% of the Norwegian population born 1930-1999 had at least one specialist health care episode where depressive disorder was registered. The corresponding number for anxiety was 0.9%. Considerably more women than men were registered in all age groups and in both diagnostic groups. The proportion registered with depression peaked at 2.6% for women born 1990-1994, whereas women born 1980-1989 represented the group most frequently registered with anxiety disorder (1.8%). The diagnoses overlapped substantially; 18% of depression patients were also registered with anxiety while 25 % of anxiety patients were also registered with depression in the same calendar year. More than 50% of patients registered in 2012 had four or more contacts for depressive and/or anxiety disorder during 2008-20012.

Conclusions: The present study shows a high degree of overlap between depressive and anxiety disorder. Comparing the figures in the current study with data from the Norwegian Prescription Database shows that the majority of patients receive antidepressant prescriptions outside specialist health care.

A8

The Mercury inheritance; Does maternal consumption of seafood during pregnancy lead to mercury levels that may be harmful to the child?

Kristine Vejrup, Synnve Schjølberg, Anne Lise Brantsæter, Jan Alexander, Per Magnus, Margaretha Haugen

Norwegian Institute of Public Health, Oslo Norway

Background: The fetal and infant period is a particularly critical developmental window, and deficiencies of key nutrition during this period of brain growth may have long-term effects on children's neurodevelopment. Fish and seafood intake during pregnancy is of special interest owing to suggested benefits from nutrients such as polyunsaturated n-3 fatty acids (PUFAs), protein, selenium, iodine and vitamin D(5). On the other hand, seafood is also a well-known route of exposure to pollutants such as mercury, dioxins, polychlorinated biphenyls (PCB), and heavy metals which may adversely affect birthweight and language development.

Aims: The aim of this study was to examine the association between calculated maternal dietary exposure to mercury (Hg) in pregnancy and infant birthweight and language development in the Norwegian Mother and Child Cohort Study (MoBa). Here we present the first part of the project; our analysis of Hg exposure and birthweight.

Methods: The study sample consisted of 66,941 pregnant women who answered a FFQ asking about the diet during the first five months of pregnancy. In a validation subsample of 119 participants, estimated Hg intake showed agreement with blood mercury measurements. Exposure was calculated with use of a constructed database of Hg in food items and reported dietary intake during pregnancy. Multivariable regression models were used to explore association between maternal Hg exposure and infant birthweight, and to model associations with small for gestational age offspring.

Results: Median exposure to Hg was 0.15 µg/kg bw/week and the contribution from seafood intake was 88% of total Hg exposure. Women in the highest quintile compared with the lowest quintile of Hg exposure delivered offspring with 34 gram lower birth weights (95% CI: -46g, -22g) and had an increased risk of giving birth to small for gestational age offspring, adjusted odds ratio (OR) 1.19 (95% CI: 1.08, 1.30). Although seafood intake was positively associated with increased birthweight, stratified analyses showed negative associations between Hg exposure and birthweight within strata of seafood intake.

Conclusion: Although seafood intake in pregnancy is positively associated with birthweight, Hg exposure is negatively associated with birthweight. Seafood consumption during pregnancy should not be avoided, but clarification is needed to identify at what level of Hg exposure this risk might exceed the benefits of seafood.

A9

Intake of whole grains and incidence of oesophageal cancer in the Helga cohort

G Skeie[1], T Braaten[1], A Olsen[2], LM Nilsson[3], R Landberg[4], LA Åsli[1], T Bakken[1], E Lund[1]

1) Department of community medicine, University of Tromsø – The Arctic University of Norway, Tromsø, Norway
2) Danish cancer society research center, Copenhagen, Denmark
3) Department of public health and clinical medicine, Nutritional research, Umeå University, Umeå, Sweden
4) Department of Food Science, BioCenter, Swedish University of Agricultural Sciences, Uppsala, Sweden

Introduction and aim: Whole grains are a good source of dietary fibre, but beneficial effects might also stem from other components of the grain. Very few studies exist on intake of whole grains and incidence of oesophageal cancer, but studies on dietary fibre and oesophageal cancer suggest a protective effect. The aim of this work was to study the association between intake of whole grains and incidence of oesophageal cancer.

Methods: The Helga cohort has 120 000 participants from the Norwegian Women and Cancer study, The Northern Sweden Health and Disease study and the Danish Diet, Cancer and Health study, recruited in 1992-1999. After exclusions, 112 cases of oesophageal cancer, and 113 700 other cohort members were included in the analyses. They provided dietary information in semi-quantitative food frequency questionnaires at baseline, and also information about other risk factors. Cancer information was obtained by linkage to the respective cancer registries. The association between whole grain intake and cancer was analysed with Cox proportional hazards models.

Results: The median whole-grain intake was 47.4 g/day (5^{th}-95^{th} percentile: 13.3-101.1) in the non-cases, and 37.5 g/day (10.8-87.2) in oesophageal cancer cases. A decreased risk of oesophageal cancer was observed, hazard ratio=0.76 (confidence interval 0.58-0.99) p=0.04 per 30 g of whole grains. The hazard ratio for highest compared with lowest tertile of intake was 0.56(0.33-0.98) p=0.03. The analyses were adjusted for age at baseline, sex, smoking status, consumption of vegetables, red meat, processed meat, cakes and biscuits, and alcohol.

Conclusion: In this study, higher intake of whole grains was associated with lower risk of oesophageal cancer.

Acknowledgements: This work was supported by NordForsk – Centre of excellence programme HELGA (070015).
Key words: Whole grains, oesophageal cancer, cohort, epidemiology

A10

Nutrigenomics: Plasma 25 hydroxyvitamin D level affect blood gene expression profiles in the Norwegian Women and Cancer Post-genome Cohort

KS Olsen[1], C Rylander[1], M Brustad[1], L Aksnes[2,3], E Lund[1]

1) Department of Community Medicine, University of Tromsø, Norway
2) Department of Clinical Medicine, University of Bergen, Norway
3) Section for Paediatrics, Haukeland University Hospital, Bergen, Norway

Introduction: Vitamin D deficiency has been associated with increased risk of chronic diseases, but much is unknown about the molecular effects involved. Gene expression technology is increasingly being used to elucidate molecular mechanisms related to nutritional factors, but results from model organisms may not be applicable to the general population.

Aims: In this cross-sectional study of free-living, middle-aged Norwegian women, we aimed at identifying gene expression pathways in the blood associated with vitamin D status.

Methods: Blood samples and questionnaires were collected as a part of the Norwegian Women and Cancer Post-genome Cohort (218 women included). Plasma 25 hydroxyvitamin D (25(OH)D) concentrations were measured using high-performance liquid chromatography, and gene expression was measured using full-genome microarrays. Women with sufficient and deficient vitamin D status (25(OH)D>50 nmol/l (n=66) versus <37.5 nmol/l (n=83)) were compared to identify gene expression differences.

Results: In a targeted pathway-level analysis, several immunological processes, immune cell functions and major signaling pathways were differentially regulated according to vitamin D status ($p<0.01$). To a certain degree, results from in vitro studies were reflected in this population setting.

Conclusions: Deficient vitamin D status was associated with molecular pathways that may ultimately affect the onset of diseases involving the immune system. Gene expression analysis in a population setting may provide valuable input to the study of nutrition and health.

A11

Persistent organic pollutants in males in the Tromsø study 1979-2007

Therese Haugdahl Nøst[1,2,3], Knut Breivik[1], Robin Vestergren[1,4], Vivian Berg[1,2,3], Ole-Martin Fuskevåg[3], Evert Nieboer[2,5], Jon Øyvind Odland[2], **Torkjel Manning Sandanger**[1,2]

1) NILU – Norwegian Institute for Air Research, Fram Centre, Tromsø, Norway
2) Department of Community Medicine, Faculty of Health Sciences, University of Tromsø, Tromsø, Norway
3) Department of Laboratory Medicine, Diagnostic clinic, University hospital of Northern Norway, Tromsø, Norway
4) Department of Applied Environmental Science (ITM), Stockholm University, Stockholm, Sweden
5) Department of Biochemistry and Biomedical Sciences, McMaster University, Hamilton, Ontario, Canada

Introduction: Human exposure to both newer and legacy persistent organic pollutants (POPs) has changed during the last century. Emissions of different POPs have changed over time, and the exposure routes have been through diet for the legacy POPs, whereas other routes have also been important for newer POPs. The legacy POPs were often observed to increase with age in cross-sectional studies and this association was likely reflecting birth-cohort differences in duration and intensity of exposure to these compounds. For newer POPs, conclusions of associations to age have not been consistent. Repeated measurements of individuals offer insight into changes with age, calendar time or birth cohort.

Methods: The present study presents five repeated serum samples from 53 men in the period 1979-2008 analyzed for a variety of POPs (PCBs, organochlorine pesticides, brominated flame retardants, and fluorinated substances). These archived samples originate from the Tromsø Study, which is a population-based health survey in Tromsø, Northern Norway.

Results: The summed concentrations of PCBs and pesticides decreased by 22%, 52%, 54%, and 68% from 1979 to 1986, 1994, 2001, and 2007, respectively. Whereas for the fluorinated substances, the median summed PFAS burdens increased 5-fold from 1979 to 2001 and decreased by 21% from 2001 to 2007. Thus, the composition of POPs in serum has changed over these almost thirty years. Brominated substances constituted little of the POPs burden relative to the other POPs analysed. The assessments of age, calendar time and birth cohort effects showed that calendar time was the dominating influence.

Conclusions: The observed trends during 1979 to 2007 likely reflect the overall trends in use and emissions of the different POPs, and the serum burden of the POPs analysed increased to 2001 and decreased to 2007. Trends for POPs likely differ depending on their changing emissions in combination with different persistences in sources, environment and humans.

A12

Airway inflammation among female Palestinian hairdressers. A cross-sectional study

Maysaa Nemer[1,2], Mayes Kasem[3], Liv IB Sikkeland[4], Petter Kristensen[1,5], Khaldoun Nijem[2], Johny Kongerud[4], Espen Bjertness[1], Marit Skogstad[3]

1) Section for Preventive Medicine and Epidemiology, Institute of Health and Society, University of Oslo, Oslo, Norway
2) Occupational Epidemiology and Biological Research Lab, Department of Biology, Hebron University, Hebron, Palestine
3) Department of Toxicology, National Institute of Occupational Health, Oslo, Norway
4) Department of Respiratory Medicine, Oslo University Hospital Rikshospitalet, Oslo, Norway
5) Department of Occupational Medicine and Epidemiology, National Institute of Occupational Health, Oslo, Norway

Introduction: Hairdressers are exposed to several potentially hazardous chemicals known to cause asthma and also permanently affect lung function. Asthma has been shown to be twice as prevalent among hairdressers compared to the general population. There is an increased risk of new-onset asthma even among non-atopic hairdressers.

Aims: In the present study we wanted to examine airway inflammation among female hairdressers in Hebron compared to an unexposed control group.

Methods: We included a non-smoking subgroup of hairdressers (n=30) aged 19-50 years (median: 35), from a cohort of hairdressers we previously have studied. Also 30 non-smoking control subjects from the university were included, aged 18-48 years (median: 28). Both groups answered a standardized questionnaire on respiratory symptoms, performed lung function tests and we collected induced sputum samples and measured exhaled NO.

Results: Nine of the hairdressers (30%) reported wheezing versus six in the control group (20%) (p=0.33). Cough was reported by four of the hairdressers (14%) versus one of the controls (3%) (p=0.06). Mean percent of predicted value for FEV_1 was 86% (SD=10.4) while it was 98% (SD=11.6) among the controls (p=0.003), and mean percent of predicted value for FVC was 93% (SD=13.2) among the hairdressers versus 99% (SD=12.5) among the controls (p=0.26).

Sputum analysis showed that hairdressers have a median number of 376 neutrophils/mg sputum (183-980 (25th to 75th percentiles)) (54% of total cells) while the controls have a median number of 162 neutrophils/mg sputum (96-258 (25th to 75th percentiles)) (41% of total cells) (p=0.04). Mean eNO was 20 ppb among the hairdressers versus 14 ppb among the controls (p=0.02).

Conclusions: Female hairdressers have higher prevalence of respiratory symptoms than unexposed women and seem to have signs of neutrophilic airway inflammation.

A13

Low serum concentrations of vitamin E are associated with increased risk of hip fracture in older Norwegians. A NOREPOS study

Kristin Holvik[1,2,3], Clara G Gjesdal[4,5], Grethe S Tell[2], Guri Grimnes[6], Berit Schei[7], Ellen M Apalset[2,4], Sven Ove Samuelsen[1,8], Rune Blomhoff[9], Karl Michaëlsson[10,11], Haakon E Meyer[1,12]

1) Division of Epidemiology, Norwegian Institute of Public Health, Oslo, Norway
2) Department of Global Public Health and Primary Care, University of Bergen, Norway
3) Surgical Department, Diakonhjemmet Hospital, Oslo, Norway
4) Department of Rheumatology, Haukeland University Hospital, Bergen, Norway
5) Department of Clinical Science, University of Bergen, Norway
6) Tromsø Endocrine Research Group, Department of Clinical Medicine, University of Tromsø, Norway
7) Department of Public Health and General Practice, Norwegian University of Science and Technology, Trondheim, Norway
8) Department of Mathematics, University of Oslo, Norway
9) Department of Nutrition, Institute of Basic Medical Sciences, University of Oslo, Norway
10) Department of Surgical Sciences, Section of Orthopedics, Uppsala University, Sweden
11) Uppsala Clinical Research Center, Uppsala University, Sweden
12) Institute of Health and Society, Medical Faculty, University of Oslo, Norway

Introduction: The increased oxidative stress associated with ageing influences the formation and survival of bone cells. Vitamin E, of which α-tocopherol is the most abundant form in human tissues, is a plant-derived lipid soluble substance with potent antioxidant properties. The relation between vitamin E concentrations in blood and risk of hip fracture has not previously been investigated in a community-based study.

Aim: We aimed to study the association between α-tocopherol concentrations in serum and risk of hip fractures in older men and women.

Methods: In the Norwegian Epidemiologic Osteoporosis Studies (NOREPOS) we performed a case-cohort analysis in 21,774 men and women aged 65-79 years (mean 72 y) who underwent baseline examinations in four community-based health studies during 1994-2001. Data on incident hip fractures were retrieved from electronic patient administrative systems. Frozen serum samples from baseline were analyzed in participants who suffered a hip fracture during median 8.2 years of follow-up (n=1168) and in sex-stratified random samples from baseline (n=1434). α-tocopherol was determined by high pressure liquid chromatography (HPLC)-fluorescence detection. Cox proportional hazards regression adapted for the case-cohort design was performed with adjustment for age, sex, and study center.

Results: We observed a linear inverse relation between serum α-tocopherol levels and hip fracture, with hazard ratio (HR) 1.11 (95% CI 1.04-1.20) per 10 µmol/l lower serum α-tocopherol. HR of hip fracture in the lowest (<22.6 µmol/l) compared with the highest (≥38.3 µmol/l) quartile of serum α-tocopherol was 1.51 (95% CI 1.17-1.95). Adjustment for serum concentrations of 25(OH)D and retinol, smoking, month of blood sample, body mass index, education, physical inactivity and self-rated health yielded similar results.

Conclusion: Low serum concentrations of α-tocopherol were associated with increased risk of hip fracture in older Norwegian men and women.

A14

Melatonin, mood and the polar night

Tonje Braaten, Torkjel Sandanger, and Eiliv Lund

Department of Community Medicine, UiT The Arctic University of Norway

Background: Whereas diurnal variations in melatonin concentrations are well documented, studies concerning seasonal variations according to latitude are rather scarce. Despite limited knowledge from polar areas, there is more evidence for seasonal changes in the *circadian phase* of melatonin than for changes in the *duration* of its secretion. A Norwegian study of midwinter insomnia supported the delayed phase hypothesis. To our knowledge, the present study is the first one to compare concentrations of melatonin in residents above and below the Arctic Circle based on regular measurements throughout one year.

Material and methods: We conducted this pilot study between 1997 and 2000. In total, 1196 citizens of Karmøy (Rogaland), Rødøy (Nordland), and Gamvik (Finnmark) were invited to participate, of whom 479 responded positively. The response rate was 78.4% in Gamvik, and 29.9 % in Karmøy and Rødøy. The participants were asked to deliver a sample of saliva and to fill in a two pages questionnaire each season during one year. The saliva samples should be collected between 22:00 and 23:00. After exclusions, we included 474 subjects who contributed between one and four saliva samples and completed questionnaires. We applied a generalized linear mixed model with a gamma link function to estimate the variation in level of melatonin according to season, location, and reported seasonal changes in mood and behavior.

Results: We observed significant seasonal variations in level of melatonin, with differing patterns according to location. In Gamvik, the average concentration declined steeply from the highest measured level in autumn to the lowest level in winter among the three locations. While the proportion reporting seasonal changes in mood and behavior remained quite stable across seasons in Karmøy (25-28%) and Rødøy (19-22%), the proportion within the Gamvik sample varied from 35% at the first wave in spring to 30% in winter, and 19% in autumn. The seasonal variations in mood were significantly associated with a decreased level of melatonin, which still persisted after controlling for location.

Discussion: If the finding of a decreased level of melatonin during the polar night is true, the crucial question is whether it reflects a delay or a depletion of the diurnal circadian rhythm in the secretion of the hormone. A delay may cause sleeping disturbances, while a depletion may affect the risk of certain diseases as well. In order to address this important question we need data from a larger study covering diurnal measurements within each season.

A15

Early childhood growth patterns and risk of developing asthma: the Norwegian Mother and Child Cohort Study

Maria C. Magnus[1], Hein Stigum[1,2], Pål Surén[3], Siri E. Håberg[1], Per Nafstad[1,2], Stephanie J London[4], Wenche Nystad[1]

1) Department of Chronic Diseases, Division of Epidemiology, Norwegian Institute of Public Health, Oslo, Norway
2) Department of Community Medicine, Medical Faculty, University of Oslo, Oslo, Norway
3) Department of Genes and Environment, Division of Epidemiology, Norwegian Institute of Public Health, Oslo, Norway
4) Epidemiology Branch, Division of Intramural Research, National Institute of Environmental Health Sciences, National Institutes of Health, Department of Health and Human Services, Research Triangle Park, North Carolina, USA

Introduction: A few studies indicate that adverse growth patterns during sensitive time periods of early childhood might influence the risk of asthma.

Aim: To examine the association of early childhood growth patterns the first 36 months of life with asthma development.

Methods: We used data from the Norwegian Mother and Child Cohort Study to examine the association of early childhood growth with asthma at 36 months of age (44,366 children in analysis) and with asthma at 7 years of age (14,952 children in analysis). Change in gender and age standardized height and weight z-scores from birth-6 months, 6-12 months, and 12-36 months was classified into normal (change in z-score -0.67 to 0.67) accelerated (change in z-score >0.67) and decelerated (change in z-score <-0.67) growth. We used multivariable log binomial regression to calculate adjusted relative risks(aRR) and 95% confidence intervals(CI).

Results: A total of 2,465(5.7%) children had asthma at 36 months, while 761(5.2%) had asthma at 7 years. The overlap of children with asthma at 36 months who still had asthma at 7 years was ~40%. Preliminary analysis indicates that accelerated weight gain between birth and 6 months increased risk of asthma at 36 months, while accelerated weight gain between 12 and 36 months decreased risk of asthma at 36 months. Decelerated weight gain the first 6 months was associated with decreased risk of asthma at 36 months. Both decelerated weight gain and decelerated height gain between 12 and 36 months was associated with increased risk of asthma at 36 months. For asthma at 7 years, accelerated weight gain between 12 and 36 months was associated decreased risk, while decelerated height gain between 12 and 36 months was associated with increased risk.

Conclusions: Children who develop asthma have a different early childhood growth pattern compared to children who do not develop asthma.

A16

Prenatal exposure to selective serotonin reuptake inhibitors and motor development at three years of age. The Norwegian Mother and Child Cohort Study

Marte Handal[1], Svetlana Skurtveit[1], Kari Furu[1], Sonia Hernandez Diaz[2], Eva Skovlund[1], Wenche Nystad[1], and Randi Selmer[1]

1) Norwegian Institute of Public Health, Div. of Epidemiology, Dep. of Pharmacoepidemiology, Oslo, Norway
2) Harvard school of Public Health, Dep. of Epidemiology

Introduction: Limited information is available on the effect of prenatal selective serotonin reuptake inhibitors (SSRIs) exposure on long term neurodevelopment.

Aims: To determine the association between prenatal exposure to SSRIs and motor development in children aged three taking into account the effect of symptoms of anxiety and depression before, during and after pregnancy.

Methods: The prospective population-based Norwegian Mother and Child Cohort Study recruited pregnant women from 1999 - 2008. In the present study the mother and child were included if the mother had completed all three questionnaires during pregnancy and the questionnaire when the child was three years of age. 45 003 women with 51 404 children were included. Exposure was defined as self-reported SSRI use in pregnancy. The outcome, maternal reports of fine and gross motor development at three years of age, was measured by items from the Ages and Stages Questionnaire. Ordinal logistic regression with estimated standard errors allowing for clustering of multiple pregnancies per woman was used as the statistical analysis.

Results: 381 women (0.7%) reported use of SSRIs during pregnancy, of these 159 reported SSRI use on at least two questionnaires (prolonged use). A shift towards delayed motor development was observed after SSRI exposure. Children of mothers who reported prolonged SSRI use had an increased risk of delay in fine motor development, odds ratio 1.42 (95% CI, 1.07-1.88) compared to women who did not use SSRIs after adjusting for symptoms of anxiety and depression before and during pregnancy. Stratifying on depression after pregnancy had no impact on the estimated effect of SSRIs. Similar results were found when studying gross motor development.

Conclusions: Prolonged prenatal exposure was associated with a delay in motor development at three years of age, but not to the extent that the delay was of clinical importance.

A17

Interpregnancy Interval and Risk of Autistic Disorder

Nina Gunnes[1], Pål Surén[1], Michaeline Bresnahan[2,3], Mady Hornig[2,4], Kari Kveim Lie[1], W. Ian Lipkin[2,4], Per Magnus[1], Roy Miodini Nilsen[5,6], Ted Reichborn-Kjennerud[1,7], Synnve Schjølberg[1], Ezra Saul Susser[2,3], Anne-Siri Øyen[1,8], and Camilla Stoltenberg[1,5]

1) Norwegian Institute of Public Health, Oslo, Norway
2) Department of Epidemiology, Mailman School of Public Health, Columbia University, New York, NY, USA
3) New York State Psychiatric Institute, New York, NY, USA
4) Center for Infection and Immunity, Mailman School of Public Health, Columbia University, New York, NY, USA
5) Department of Global Public Health and Primary Care, University of Bergen, Bergen, Norway
6) Centre for Clinical Research, Haukeland University Hospital, Bergen, Norway
7) Institute of Psychiatry, University of Oslo, Oslo, Norway
8) Nic Waals Institute, Lovisenberg Diakonale Hospital, Oslo, Norway

Introduction: A California study from 2011 reported increased odds of autistic disorder in children conceived within a year after the birth of a sibling.

Aims: The purpose of the present study was to assess the association between interpregnancy interval and risk of autistic disorder using nationwide registry data on pairs of singleton full siblings born in Norway.

Methods: We defined interpregnancy interval as time from birth of the first-born child to conception of the second-born child in a sibship. The primary outcome was autistic disorder in the second-born child. Asperger's disorder and pervasive developmental disorder not otherwise specified (combined into one outcome) and autism spectrum disorder (i.e., the entire spectrum as an outcome) were also considered separately. Analyses were restricted to sibships in which the second-born child was born in 1990–2004. Odds ratios (ORs), with associated 95% confidence intervals (CIs), were estimated by fitting ordinary logistic models (using ≥ 36 months as the reference category) and logistic generalized additive models.

Results: The study sample included 223,476 singleton full-sibling pairs. In sibships with interpregnancy intervals shorter than 9 months, 0.25% of the second-born children were diagnosed with autistic disorder, compared with 0.13% of the second-born children in sibships with interpregnancy intervals of 36 months or longer. In the logistic regression, the adjusted OR of autistic disorder for interpregnancy intervals < 9 months was 2.18 (95% CI = 1.42–3.26). Risk of autistic disorder was also increased for interpregnancy intervals of 9–11 months (adjusted OR = 1.71 [95% CI = 1.07–2.64]). Results from the generalized additive regression confirmed the results from the logistic regression.

Conclusions: Consistent with the previous report from California, interpregnancy intervals shorter than one year were associated with increased risk of autistic disorder in the second-born child. A possible explanation is depletion of micronutrients in mothers with closely spaced pregnancies.

A18

Pregnancy complications and outcomes for women experiencing nausea alone or nausea and vomiting in pregnancy

Arthur Chortatos[1,2], Margaretha Haugen[3], Per Ole Iversen[2], Åse Vikanes[4], Per Magnus[4], Marit B Veierød[1,2]

1) Department of Biostatistics, Institute of Basic Medical Sciences, University of Oslo, Blindern, Oslo, Norway
2) Department of Nutrition, Institute of Basic Medical Sciences, University of Oslo, Blindern, Oslo, Norway
3) Division of Environmental Medicine, Norwegian Institute of Public Health, Nydalen, Oslo, Norway
4) Division of Epidemiology, Norwegian Institute of Public Health, Nydalen, Oslo, Norway

Introduction: Nausea and vomiting in pregnancy (NVP) and nausea alone (NP) are symptoms that approximately 80% of pregnant women experience, especially in the first trimester. Large cohort studies examining pregnancy outcomes for women with these conditions are few, and results often contradictory.

Aims: To examine the effect of NP and NVP upon pregnancy complications, gestational and birth outcomes as compared to women symptom free (SF).

Methods: Data regarding incidences of nausea and/or vomiting were assessed from questionnaires answered in the first trimester by 51,675 singleton pregnancies in the Norwegian Mother and Child Cohort Study (MoBa). Gestational, pregnancy and birth outcomes were self-reported in gestational weeks 15, 18-22, and 6 months post-partum, and from the Medical Birth Registry of Norway. We present adjusted odds ratios (ORs) from logistic regressions performed.

Results: Of 51,675 pregnancies included, 20,371 (39%) experienced NP while 17,070 (33%) experienced NVP. Initial analyses indicate women with NP and NVP had significantly increased odds ((OR=1.72, 95% CI 1.63, 1.81) and (OR=1.79, 95% CI 1.69, 1.89)), respectively, for experiencing pelvic girdle pain during gestation, compared to SF women. When observing birth outcomes, the NP and NVP groups had infants with significantly higher mean birth weights (79g, 49g respectively) compared to SF women. Additionally, the NP and NVP groups had significantly increased odds ((OR=1.20, 95% CI 1.10, 1.30) and (OR=1.16, 95% CI 1.06, 1.26)), respectively, for giving birth to a child large for gestational age while conversely having decreased odds ((OR=0.72, 95% CI 0.59, 0.87) and (OR=0.70, 95% CI 0.57, 0.85)), respectively, for giving birth to a child with low birth weight (≤ 2500 g) compared to SF women. Women with NVP had increased odds (OR=1.34, 95% CI 1.28, 1.40) for having a girl compared to SF women.

Conclusions: NP or NVP were not associated with unfavourable pregnancy outcomes.

B1

General practitioners' referral rates are related to professional uncertainty and patient preferences: a study of reasons for 595 referrals

Unni Ringberg[1], Nils Fleten[1], Olav Helge Førde[1,2]

1) Faculty of Health Sciences, Department of Community Medicine, UiT The Arctic University of Norway
2) Centre of Clinical Documentation and Evaluation, Northern Norway Regional Health Authority, Tromsø

Introduction: The large variation in referral rates to secondary care among general practitioners (GPs) is partly unexplained.

Aims: To explore reasons for referral and their associations with patient, GP and health care characteristics.

Methods: A cross-sectional study with data from 44 randomly chosen GPs in Northern Norway (2008-2010).GPs scored the relevance of nine predefined reasons for 595 referrals from 4350 consecutive consultations on a four-level Likert scale. Associations between reasons for referral and covariates were examined by multivariable ordered regression analysis.

Results: Ninety three per cent of patients were referred due to medical necessity; simultaneous reasons for referral were given as patient preference (43.7%), to avoid overlooking anything (27.5%), and to reassure the patient (14.6%). Medical necessity was inversely associated with referring to reassure the patient and due to patient preference (Adjusted Odds Ratio (OR) = 0.49 and 0.68, respectively). GPs with the highest referral rates referred significantly more frequently to avoid overlooking anything, due to deficient medical knowledge, and because relevant specialists were easily accessible (per one percent referral rate increase: OR =1.04, 1.05 and 1.09, respectively). Female GPs referred to reassure the patient and due to deficient medical knowledge significantly more often than male GPs, but referred significantly more seldom because specialists were easily accessible (OR=1.97, 2.22 and 0.30, respectively).

Conclusions: There are striking differences in reasons for referral between male and female GPs and high and low referrers, which probably reflect difficulties in handling professional uncertainty. The inverse association between referring due to medical necessity and referring to reassure the patient or due to patient preference may demonstrate consideration and acquiescence towards patients, and was especially shown among female GPs. Future medical education should increase the focus on medical decision-making in the curriculum, concentrating more on professional uncertainty and shared decision-making.

B2

The combination of Cortical Porosity and FRAX improves the Diagnostic Sensitivity for Non-Vertebral Fractures in Women

R Shigdel[1], LA Ahmed[1], R Joakimsen[2,3], P Eldevik[4], EF Eriksen[5], R Zebaze[6], Å Bjørnerem[1]

1) Department of Health and Care Sciences
2) Department of Clinical Medicine, University of Tromsø
3) Department of Internal Medicine
4) Department of Radiology, University Hospital of North Norway, Tromsø, Norway
5) Department of Clinical Endocrinology, Oslo University Hospital, Oslo, Norway
6) Endocrine Centre, Austin Health, University of Melbourne, Australia

The Fracture Risk Assessment tool (FRAX), developed by the World Health Organization, helps to determine the patients those may need medical treatment for bone fragility. The algorithm calculates the 10-year probability of a major osteoporotic fracture based on easily obtained clinical risk factors including femoral neck aBMD and has performed well in some cohorts but not in others. However, microarchitecture, particular cortical porosity is important for bone strength, and may improve fracture risk assessment, but is not included in FRAX. We therefore hypothesized that women with fractures can be better distinguished from controls by the combination of cortical porosity and FRAX, than by either factor alone.

In a nested case-control design, from the Tromsø Study, Norway, 183 postmenopausal women aged 54-94 years with fractures (hip, humerus and forearm) and 210 age-matched controls, had FRAX score for 10-year probability of a major osteoporotic fracture assessed including femoral neck aBMD measured using densitometry (based on the cohort from Sweden), and cortical porosity quantified in computed tomography images of the subtrochanteric femoral site using StrAx 1.0 software. The fracture risk was calculated as odds ratio (OR) using logistic regression analysis, and fracture sensitivity using the area under receiver operator curve (AUC).

Women with fractures exhibited higher mean cortical porosity than controls [43.8% (SEM 0.4) versus 40.3% (SEM 0.3)], and higher mean FRAX scores than controls [20.8% (SEM 0.6) versus 12.4% (SEM 0.4)] (both $p < 0.001$). Each standard deviation (SD) increase in cortical porosity increased the risk of fracture with OR of 2.20 (95% CI 1.72-2.81) $p < 0.001$ and the AUC was 0.69 (95% CI 0.64-0.74). Each SD increase in FRAX score increased the risk of fracture with OR of 4.57 (95% CI 3.25-6.42) $p < 0.001$ and the AUC was 0.81 (95% CI 0.77-0.86). However, when cortical porosity was combined with FRAX the AUC increased by 0.03 (95% CI 0.003-0.05), $p = 0.03$, and AUC for this combination was 0.84 (95% CI 0.80-0.88).

We infer that in this independent general population, FRAX perform well, and a combination of cortical porosity and FRAX improve the diagnostic sensitivity.

B3

A pharmacoepidemiological cohort study of subjects starting strong opioids for chronic non-malignant pain – a study from The Norwegian Prescription Database

Olav Magnus S. Fredheim[1,2,3], Petter C. Borchgrevink[1,2], **Milada Mahic**[4], Svetlana Skurtveit[4,5]

1) Pain and Palliation Research Group, Department of Circulation and Medical Imaging, Faculty of Medicine, Norwegian University of Science and Technology, Trondheim, Norway
2) National competence centre for complex symptom disorders, Center for Pain and Complex Disorders, St. Olav University Hospital, Trondheim, Norway
3) Department of Emergency Medicine, Oslo University Hospital, Oslo, Norway
4) Department of Pharmacoepidemiology, Division of Epidemiology, The Norwegian Institute of Public Health, Oslo, Norway
5) Norwegian Centre for addiction research, University of Oslo, Oslo, Norway

Introduction and aim: Clinical studies of short duration have demonstrated that strong opioids improve pain control in selected patients with chronic non-malignant pain. However, high discontinuation rates, high dose escalation and other indications for development of addiction have been indicated. The aim of the present study was to determine discontinuation rates, dose escalation and patterns of co-medication with benzodiazepines.

Methods: The Norwegian prescription database provides complete national data at an individual level on dispensed drugs. A complete national cohort of new users of strong opioids was followed for five years after initiation of therapy with strong opioids.

Results: Of 17248 persons who were new users of strong opioids in 2005 (0,003% of the Norwegian population), 7229 were dispensed a second prescription within 70 days and were assumed to be intended long-term users. 1233 persons in the study cohort were still on opioid therapy five years later. This equals 24% of the study cohort who were still alive. 34% more than doubled their opioid dose from the first to the fifth year. 21% decreased their annual opioid dose by 25% or more while 21% kept a stable dose (± 24%). Ten percent reached above 1065 DDD/year at the end of follow up and this was associated with high annual doses of benzodiazepines.

Conclusion: It is an issue of major concern that large dose escalation is common during long term treatment and that high doses of opioids are associated with high doses of benzodiazepines. These findings make it necessary to question whether the appropriate patient population receives long term opioid treatment.

B4

Injury Prevention and Safety Promotion master-level course in Arkhangelsk, Russia

Alexander V Kudryavtsev[1,2], Odd Nilssen[1], Yury Sumarokov[1,2], Johan Lund[3], Børge Ytterstad[1]

1) Department of Community Medicine, University of Tromsø, Tromsø, Norway
2) International School of Public Health, Northern State Medical University, Russia
3) Institute of Health and Society, University of Oslo, Oslo, Norway

Introduction: The Global Burden of Disease Studies emphasize injury as a major and increasing public health concern. In Europe, the injury rates vary dramatically by gross national product, and Russia is on the worst end. When the first Russian Master in Public Health programme was started in 2007 in Arkhangelsk, Russia under the auspices of University of Tromsø, Norway, an elective 5 ECTS course on Injury Prevention and Safety Promotion was included into its curriculum. B. Ytterstad, University of Tromsø, and J. Lund, University of Oslo, were invited to be the main teachers. To secure sustainability of the course, local teachers were recruited and training-the-trainers programme was implemented.

Methods: A description and evaluation of the first master level course on Injury Prevention and Safety Promotion in a Russian University.

Results: The course aims at providing students with knowledge of concepts and definitions used in Injury Prevention and Safety Promotion as well as with the basic knowledge of injury epidemiology and surveillance. In 2007-2010, 53 students passed the course. 77% of them were females. The majority of students were medical doctors (51%), psychologists (11%), pedagogues (9%), dentists (6%), and nurses (6%). The training-the-trainers programme was run during 2008-2010. Four Russian students of excellence in the 2007-year course were the trainees. The programme consisted of in-class teaching under supervision of the main teachers, training in pedagogics, and participation in international conferences on injury topics. The proportion of in-class teaching by Russian trainees increased from 23% in 2008 to 86% in 2010. In 2012, the take-over programme was completed and the course became a full responsibility of Russian teachers. Student evaluation of the course was performed on yearly basis and touched upon issues of the course content, organization, and pedagogic approach. The evaluation was based on visual analogue scales (range 1-10). The mean ranking on the scale 'Overall impression of the course' was 8.7, on 'Content of the course' - 8.1, on 'Lecturer's pedagogic skills' – 8.3.

Conclusion: There is a demand for knowledge on Injury Prevention and Safety Promotion in the Northwestern of Russia. The course in this field attracts students with varying education, and some of them are interested and capable to become teachers, researchers, and practitioners of Injury Prevention and Safety Promotion. We hope that our positive experience can be used by others to spread safety concepts globally.

B5

Epidemiology of HIV infection in two Arctic provinces of Russia

Tatiana Balaeva[1,2], Vera Utyugova[3], Anna Subbotina[1,3], **Andrej Grjibovski**[1,2,4]

1) University of Tromsø, Norway
2) Northern State Medical University, Arkhangelsk, Russia
3) Northern (Arctic) Federal University, Arkhangelsk, Russia
4) Norwegian Institute of Public Health, Oslo, Norway

Introduction: Russia has more HIV positive people than any other country in Europe. However the intensity of epidemic is various in different parts of the country.

Aim: To describe the development of HIV- epidemic during last 20 years on the territories with high and low HIV prevalence in Northwest Russia.

Methods: Data about all revealed HIV cases during 1990-2010 were obtained from Regional AIDS Centers in Murmansk (3178 cases) and Arkhangelsk (643 cases) regions.

Results: The proportion of females steadily increased and reached 41% in Murmansk and 33% in Arkhangelsk region by 2010. Most of infected people were aged 21-30 years (63% in Murmansk region, 56% in Arkhangelsk region). In 2010, in Murmansk 42% of new HIV cases were registered among unemployed and 26% among prisoners. Similar pattern was observed in Arkhangelsk. Until 1999, the transmission of HIV through sexual contacts was dominant in both regions. However in the Arkhangelsk area – only due to heterosexual contacts while in Murmansk 21% of sexual transmission was among men who have sex with men (MSM). Since 1995 in Murmansk region and 1996 in Arkhangelsk region the first cases were revealed among injecting drug users (IDU). However, while in Murmansk region this route of transmission is dominant, in Arkhangelsk region the proportion of HIV cases among IDUs decreased and heterosexual spread of HIV has become dominant again.

Conclusion: HIV epidemic in two Arctic Russian provinces has similarities connected with various aspects of socio-economic crisis that took place in the country during post Soviet period. At the same time particularities of geographic place and economic development have caused the differences in the intensity of the epidemic. Detailed data on the HIV trends in the two areas will be presented.

B6

Vigorous physical activity increases the risk of spinal pain in adolescents: A school-based two-year prospective cohort study in 11-13-year-old Danes

Ellen Årtun[1], Jan Hartvigsen[1,2], Chris Maher[3], Paulo Ferreira[4], Manuela Ferreira[3], Lise Hestbæk[1,2]

1) Department of Sports Science and Biomechanics, Faculty of Health Science, University of Southern Denmark, Odense, Denmark
2) Nordic Institute of Chiropractic and Clinical Biomechanics, Odense, Denmark
3) George Institute for Global Health, Sydney Medical School, University of Sydney, Australia
4) Faculty of Health Science, University of Sydney, Australia

Introduction: Physical activity could be a potentially modifiable risk factor for spinal pain in adolescents, but the current evidence for an association between physical activity and spinal pain is contradictory.

Aims: To determine if various levels of physical activity at age 11-13 predicted incident cases of spinal pain over the following 2 years.

Methods: This study was a school-based prospective cohort study that was nested within a study to facilitate physical activity. Of 1,348 invited participants aged 11-13 from 14 schools in Denmark, we included those who reported at baseline that they had never had spinal pain (n=181), had a complete dataset and completed the follow-up questionnaire (n=144). Baseline data were collected in 2010 and at follow-up 2 years later. Physical activity was measured objectively using an accelerometer for a week at baseline. An e-survey including separate questions for neck pain, mid back pain, and low back pain was completed during school time at baseline and follow-up. Potential confounders included in the multivariable analyses were sex, anthropometry, participation in contact/collision sport, physical fitness, and psychological factors, all measured at baseline.

Results: The 10% of students with the highest percentage of the day spent in vigorous physical activity had an increased risk of developing spinal pain with a relative risk (RR) of 1.35 (95% CI 1.06-1.70) in the bivariate analysis and RR=1.45 (95% CI 1.05-2.00) in the multivariable analysis. The percentage of the day spent in sedentary activity, and moderate and vigorous physical activity combined were not predictive for the development of spinal pain.

Conclusions: Vigorous physical activity increases the risk of developing spinal pain in adolescents. Physical activity is beneficial for other health purposes, so the type and quality of physical activity that is optimal in order to reduce the spinal pain in adolescents should be investigated in future studies.

B7

The Norwegian Cardiovascular Disease Registry; some results from 2012

Rupali Akerkar[1], Grace M Egeland[1,2], Jannicke Igland[1,2], Randi M Selmer[1], Sidsel Graff-Iversen[1], Grethe S Tell[1,2], Marta Ebbing[1]

1) Norwegian Institute of Public Health, Bergen, Norway
2) Department of Global Health and Primary Health Care, University of Bergen, Norway

Introduction: The Norwegian Cardiovascular Disease Registry (NCVDR) was established in 2012 in order to provide data for health statistics and epidemiological research on cardiovascular disease such as stroke, ischemic heart disease (IHD), other heart disease and peripheral artery disease. The NCVDR consists of a core registry housed and maintained by the Norwegian Institute of Public Health, and of several medical quality registries on specific manifestations of or treatments for cardiovascular disease (CVD) housed and maintained by the hospital trusts. The core NCVDR consists of data on patients registered with any relevant ICD-10 diagnosis code associated with CVD in the Norwegian Patient Registry (NPR) and/or the Cause of Death Registry (CoDR), and of data from the Central Population Registry. Data from these sources are linked using the Norwegian unique 11 digit personal ID number (the birth number).

Aims: First, to describe the incidence of patients with different manifestations of CVD leading to any hospitalizations or outpatient visits in Norwegian hospitals. The conditions studied are stroke, ischemic heart disease (IHD), atrial fibrillation and heart failure. Second, to examine short- (28 days) and longer (up to 20 months) time survival in patients hospitalized with stroke or acute myocardial infarction (AMI). Third, to examine short- and longer time survival in patients with AMI as main diagnosis with or without diabetes mellitus as secondary diagnosis.

Methods: The study population consists of all patients ≥18 years registered in the core NCVDR during 2012 with either stroke, IHD, atrial fibrillation or heart failure as their main diagnosis at any hospitalization or outpatient visit. Short time survival will be calculated as percentage of patients alive 28 days after their first hospitalization for stroke or AMI in 2012. Kaplan-Meier methods are used for calculating the survival plot for up to 20 months, with starting time defined as the first date of hospitalization for stroke or AMI, and closing time defined as the date of death, emigration or 31 August 2013 whichever occurred first. Expected survival will be estimated using the survival probability in the general population similar to the patients with respect to age and gender.

Results: During 2012, a total of 339 121 patients with median (mean) age of 65 (61) years of whom 52% males were registered in the core NCVDR. Of these, 168 612 (51% males) were ≥18 years. Further analyses will be performed according to the aims.

Conclusions: The NCVDR will provide valuable data for health statistics and epidemiological research on CVD in the total Norwegian population.

B8

Validity Analyses: Medical Quality Registries vs. Norwegian Patient Register

Robert Wiik, Senior Adviser, Cand. Polit.

Norwegian Patient Register (NPR), Norwegian Directorate for Health

Introduction: Norwegian Patient Register at the Norwegian Directorate for Health would like to present the national system for mutual validation of medical quality registries and NPR, including a brief review of the results so far. NPR is a central health register that collects data on all in- and outpatients from Norwegian public hospitals and public-financed episodes from private hospitals. Established in 2013, the validation system is administered by "Senter for klinisk dokumentasjon og evaluering" (SKDE)/Helse Nord RHF, while NPR is responsible for performing the analyses. The validations are free of charge for the quality registers.

Aims: The main purpose is to document in which degree data units in the medical quality registries and NPR can be matched. This includes analyses of completeness as well as quality and practices of medical coding.

Methods: NPR use encrypted personal identification numbers to match patients from quality registries and NPR. In addition, information on e.g. date of arrival, date of operation, age, sex or institution may be used to match cases that lack a personal identification number. Due to juridical, technical or other reasons, it is not always possible to match the registers by personal identification numbers. In such cases, there is a "light" version of the validation system: NPR counts the number of incidents based on a given criteria, such as ICD-10 and medical/surgical procedure codes, and compares with corresponding data published by the quality registers.

Results and Conclusions: As of 15 September 2013 the following quality registries have been validated: Ryggkirurgiregisteret [spinal surgery], Cerebral pareseregisteret i Norge [Cerebral Palsy Register of Norway] and Hofteproteseregisteret [The Norwegian Arthroplasty Register]. The main results from these validations will be presented at the NOFE conference.

B9

What are the main causes of death behind the changes in educational inequalities in mortality in Norway the last 5 decades?

Bjørn Heine Strand[1], Ólöf Anna Steingrímsdóttir[1], Kåre Bævre[1], Else-Karin Grøholt[1], Inger Ariansen[1], Øyvind Næss[1,2]

1) Norwegian Institute of Public Health, Division of epidemiology, P.O. Box 4404 Nydalen, NO-0403 Oslo
2) University of Oslo, Institute of Health Management and Economics, Faculty of Medicine, Norway

Introduction: Our aim was to determine if educational inequalities in mortality have continued to increase in Norway in the decade after millennium, and what causes of death are the main drivers of the increased inequality.

Methods: The whole Norwegian population aged 45-74 years in three educational groups were followed up over five decades (1961-69, 1970-79, 1980-89, 1990-99, 2000-09) for total and cause specific mortality (lung cancer, other cancers, chronic lower respiratory diseases (COPD), cardiovascular disease (CVD), suicide, other external causes, other causes). 708,449 deaths occurred and 51.86 million person years were included.

Results: In men, absolute educational inequalities in mortality were stable from the 1990-99 to the 2000-09 after steady and significant ($p<0.01$) increases in all the previous decades back to the 1960s. In women inequalities continued to increase also in the last decade. Educational inequalities in CVD mortality decreased substantially the last decade 2000-09, in both men and women. In men, the CVD mortality decrease was similar in size to the increase in inequality for all other causes, which explains that educational inequality in total mortality have flattened out from 1990-99s to 2000-09 in men. However, in women the increased inequalities for all other causes of deaths, especially for deaths due to lung cancer and COPD, was larger than the decrease in CVD inequalities. In sum this led to an increase in absolute inequalities ($p<0.01$) among women from the 1990-99 to 2000-09.

Conclusions: Inequalities continue to widen among women in the post millennium-decade, while in men inequalities stopped increasing. Inequalities in CVD mortality decrease substantially in the last decade 2000-09 in both men and women, while inequalities in lung cancer and COPD continued to rise, especially among women. If inequalities in smoking are reduced, the mortality inequalities may decrease in the coming decades.

B10

The Norwegian Patient Register: possibilities and challenges

Lilian Leistad and Turid Bugge Strøm

The Norwegian Directorate for Health, Department of the Norwegian Patient Register (NPR)

Introduction: The Norwegian Patient Register is a central health register subjected to The Norwegian Directorate of Health. It contains administrative, medical, and social information for everyone waiting for or has received treatment in the specialist health service, including public hospitals, private hospitals and private specialist. In 1997, the reporting of data began with the somatic sector and has gradually been expanded to include data from sectors as psychiatry, inebriation, rehabilitation, accidents and injuries. Until 2007, the data collected was based on a patient identification number and could only be linked to individuals within the same institution and calendar year. The reporting of encrypted national ID numbers from the Norwegian Patient Register began in 2008, and made it possible to link stays to individuals. As a result, a patient can be followed both over time and between institutions. The quality of the personal identification number reported to NPR has increased yearly in all sectors. In 2012 the proportion of personal identification number reported to NPR was 96.4 % in somatic sector.

Aims: The main purpose is to give a brief introduction of the Norwegian Patient Register, and to present the many possibilities in using data from this register, and the challenges when combining data from several registries.

Methods: The Norwegian Patient Register release data for research projects, administration and control of the specialized health services, quality indicators, and validity analysis of medical quality registries. To access data from The Norwegian Patient Register, the applicant must complete the application form in "Altinn". The processing of sensitive information, including medical information, generally requires a concession from the Norwegian Data Inspectorate and the Regional Committee for Medical and Health Research Ethics. It is recommended to contact the Norwegian Patient Register for guidance before the application is emitted, in order to assure good processing. Formal decisions are taken concerning the release and linkage of all data to ensure that the dissemination of data is carried out in accordance with applicable regulation. For information and application, visit our website www.npr.no.

Results: According to the application, the data will be released as statistics, anonymous information or as personally identifiable information, either as SPSS files or as tables in Excel format. In studies where data from The Norwegian Patient Register is linked to other personally identified or pseudonymised registers, there are different rules for the release of data and depends on registers involved. Selected data from different sectors in the register and examples of linkages studies will be presented at the conference.

Conclusion: The possibility to follow a patient over time and between sectors, has led to new opportunities within epidemiological research and service projects. To achieve high quality of the master data, a good collaboration between the register, health trust and system providers is therefore very important. Furthermore, the exchange of data between the register and the users of data are important in order to improve the data quality regularly, aiming both to promote the public health and to improve the living conditions in general.

B11

Comparison of sickness absence trends among female health and care sector employees in Kristiansand, Norway and Aarhus, Denmark: a register study

Line Krane[1], Roar Johnsen[2], Nils Fleten[1], Claus Vinther Nielsen[3,4], Christina M. Stapelfeldt[3,4], Chris Jensen[5] and Tonje Braaten[1]

1) Department of Community Medicine/University of Tromsø, Tromsø, Norway
2) Department of Public Health and General Practice/University of Trondheim, Trondheim, Norway
3) Section of Social Medicine and Rehabilitation, Department of Public Health/Aarhus University, Aarhus, Denmark
4) Clinical Social Medicine and Rehabilitation/Marselisborg Center, Public Health and Quality Improvement, Central Denmark Region, Aarhus, Denmark
5) National Center for Occupational Rehabilitation, Rauland, Norway

Introduction: Sickness absence is a growing public health problem in Norway and Denmark, with the highest absence rates in Norway. The economic burden of sickness absence is considerable, and the authorities in both countries want to reduce the costs.

Aims: The aim of this study is to compare time trends in sickness absence patterns of municipal employees in the health and care sectors in Norway and Denmark.

Methods: Data recorded in 2004-2008 in the personnel registers of the municipalities of Kristiansand, Norway and Aarhus, Denmark were extracted for 3181 and 8545 female employees, respectively. Age-specific comparative statistics on sickness absence rates and number of sick leave episodes were calculated for each year of the study period.

Results: There was an overall increasing trend in sickness absence rates in Denmark ($p=0.002$), which was highest in the 20-29-year ($p=0.01$) and 50-59-year age-groups ($p=0.03$). Sickness absence rates in Norway were stable, except for an increase in the 20-29-year age-group ($p=0.004$). In both Norway and Denmark, the mean number of sick leave episodes increased ($p<0.0001$ and $p<0.0001$, respectively) in all age-groups except 30-39 and 60-67 years. The proportion of employees without sickness absence was higher in Norway than in Denmark. Both short-term and long-term absence increased in Denmark ($p=0.003$ and $p<0.0001$, respectively), while in Norway short-term absence increased ($p=0.09$).

Conclusions: We found an overall increase in sickness absence rates in Denmark, while the largest overall increase in sick leave episodes was found in Norway. In both countries, the largest increases were observed among young employees. The results indicate that the two countries are converging in regard to sickness absence measured as rates and episodes.

B12

An automated syndrome based surveillance system for infectious diseases in Norway

Jon Michael Gran[1,2], Cathrine Slorbak[2], Inger Cappelen[2]

1) Department of Biostatistics, Institute of Basic Medical Sciences, University of Oslo
2) Department of Infectious Disease Epidemiology, Norwegian Institute of Public Health

Introduction: The "Sykdomspulsen" project was started in 2010 by the Norwegian Institute of Public Health (NIPH) to supply real-time surveillance of infectious diseases based on diagnosis made in the primary health care service, using data from the Norwegian Health Economics Administration (HELFO). Through HELFO, data is available from 2006, and, starting from the fall of 2013, NIPH will receive daily updated data on selected diagnosis (defined by ICPC-2 codes).

Aims: The aim of the project is to develop an automated system for discovering infectious disease outbreaks, which can contribute to early detection and information on outbreak characteristics. Initially the focus will be on influenza, respiratory and gastrointestinal diagnoses.

Methods: Statistical methods are applied to detect possible outbreaks both temporally and spatially, initially on daily data down to county level, in total and for selected age groups. We especially consider temporal methods based on Poisson regression, such as the Farrington algorithm, and spatial algorithms using SaTScan. Weighting methods for handling reporting delays between the primary health care service and HELFO, scheduled to be up to 14 days, are also included.

Results and conclusions: Initial results on influenza are consistent with the existing sentinel reporting system at NIPH, but additionally the HELFO data contribute with much more detailed local information together with information by age groups and gender. The statistical disease detection algorithms easily detects seasonal influenza outbreaks, but algorithms for less well behaved diseases like respiratory and gastrointestinal infections need more careful calibration and follow-up. Even though the lengths of reporting delays are decreasing, it still cause some challenges in the real-time aspect of the system.

B13

Registry based influenza studies – a unique resource in influenza research

Siri E. Håberg, Lill Trogstad, Inger Johanne Bakken, Nina Gunnes, Sara Ghaderi, Per Magnus, and Camilla Stoltenberg

Norwegian Institute of Public Health, Norway

Introduction: Population based studies are an important contribution in studies of safety and benefits of influenza vaccinations and both short and long term consequences of influenza illness.

Aims: We use Norwegian routine data sources to study influenza vaccinations and influenza illness in the complete Norwegian population, by including information on vaccinations, influenza diagnosis and other health outcomes, pregnancies and birth outcomes. Pregnancy related outcomes and neurological outcomes, such as narcolepsy, are the main outcomes.

Methods: We have established the RegFlu study: A study in which information from the Norwegian Immunization registry (SYSVAK), The Norwegian Patient Registry (NPR), Surveillance system for Infectious diseases (MSIS), The Medical Birth Registry of Norway (MBRN), primary care information (KUHR-data), the Norwegian Prescription Database (NorPD) and other national data sources are linked to provide individual data on influenza vaccinations, influenza illness and outcomes of interest.

Results: So far, one study has been published on influenza vaccinations and influenza infection during pregnancy and the risk of fetal death (NEJM Jan 2013). Additional studies on influenza vaccination and pregnancy outcomes are on-going. We are also investigating outcomes in children and adults related to neurological, developmental and autoimmune disorders.

Conclusion: The RegFlu study is a unique resource for population studies of influenza vaccination and influenza illness.

B14

Cervical cancer epidemiology and survival in the Arkhangelsk region, Russia in 2000–2012: a registry-based study

Anna Subbotina[1,2,3], Andrej Grjibovski[2,3,4], Mikhail Valkov[1]

1) Northern State Medical University, Arkhangelsk, Russia
2) International School of Public Health, Northern State Medical University, Arkhangelsk, Russia
3) University of Tromsø, Tromsø, Norway
4) Department of International Public Health, Norwegian Institute of Public Health, Oslo, Norway

Introduction: No studies on epidemiology and survival from cervical cancer in the Northwest Russia were reported previously.

Aims: To describe epidemiology and estimate survival from cervical cancer in the Arkhangelsk region in 2000-2012 and to assess factors associated with the survival.

Methods: Data were extracted from the Arkhangelsk regional cancer registry. One and 5-year cervical cancer specific survival rates were calculated using Kaplan-Meyer method. Cox proportional regression model was used for estimating hazard ratios.

Results: Altogether, 1,457 cases of cervical cancer were registered in 2000–2012 in the Arkhangelsk region, and a total number of 558 deaths from cervical cancer occurred. Age at diagnosis ranged from 20 to 91 years. In 2000-2012, crude incidence increased from 14.8 to 21.2 per 100.000, and age-standardized incidence increased from 11.4 to 17.4; crude mortality increased from 2.9 to 7.1 per 100.000, and age-standardized mortality increased from 2.3 to 5.0. One-year cervical cancer specific survival constituted 79 % (95 % CI 76–81 %), 5-years survival 60 % (95 % CI 57–63 %). 5-years survival was 71 % for those younger than 40, 60 % for 40–59 years, and 50 % for those who were 60 and older. One-year survival for patients with stage I was 98 %, stage II 89 %, stage III 60 % and stage IV 15 % (95 % CI 10–22). Five-years survival for stage I was 93 %, stage II 61 %, stage III 33 %, and stage IV 6 %. Significant predictors of survival were age, morphology and stage.

Conclusions: From 2000 to 2012, an increase in incidence and mortality from cervical cancer was observed. Survival from cervical cancer in the Arkhangelsk region is below European average. The significant predictors of poorer survival are stage, morphology and age at diagnosis.

B15

Cancer incidence among Norwegian military UN peacekeepers deployed to Kosovo

Leif Aage Strand, MSc, PhD[1,2], Jan Ivar Martinsen[2] Einar Borud MD, PhD, MPH[1]

1) Norwegian Armed Forces Medical Services, N-2058 Sessvollmoen, Norway
2) Cancer Registry of Norway

Objective: In 2001, there were several media reports of leukaemias among European personnel deployed to the Balkans, and excess cases of Hodgkin´s lymphoma were found among Italian UN personnel deployed to Bosnia and Kosovo. A link between cancer and exposure to depleted uranium (DU) was suggested, which spurred several studies on cancer risk among Balkan peacekeepers. The studies turned out to be negative, but the debate about possible cancer- and other health risks caused by DU continues.

Aims: The aim of this study was to investigate cancer incidence in a cohort of 6076 Norwegian peacekeepers (4.4% women) deployed to Kosovo during 1999–2011.

Methods: The cohort was followed from 1999 throughout 2011 for cancer in the Cancer registry of Norway. Average follow-up was 10.6 years for men and 10.2 years for women. Standardized incidence ratios (SIR) for cancer were calculated from national rates.

Results: Overall cancer risk was similar to that of the general Norwegian population (SIR 1.02), based on 67 observed cases in men and 2 in women. For the cohort as a whole, no cancers exceeded the national rates significantly, but in men, melanoma of skin reached an elevated SIR of 1.90 (95% CI 0.95–3.40). A 5-fold risk of bladder cancer was observed among those who served for 1 year or more.

Conclusion: Our results did not support the suggestion of increased cancer risk caused by DU.

B16

Risk of Breast Cancer in Women with Screen Detected Benign Breast Lesions

Marta Román[1], Sofie Sebuødegård[1], Solveig Hofvind[1,2]

1) Screening department, Cancer Registry of Norway, Oslo, Norway
2) Oslo and Akershus University College of Applied Sciences

Introduction: Mass screening of breast cancer involves occasional finding of benign breast lesions in which malignancy is ruled out. Few studies have evaluated how screen detected benign breast lesions influence subsequent breast cancer risk.

Aims: To explore breast cancer incidence in women with previous screen detected benign lesions.

Methods: Retrospective cohort study of 63,140 women participating in the Norwegian Breast Cancer Screening Program who had no prior diagnosis of breast cancer and had undergone at least one additional assessment with a benign outcome between 1996 and 2011. All women studied had signed an informed consent agreeing to use data for quality assurance and research. Breast cancer rates were defined as number of cases per 100 women. Rates were calculated by type of benign breast lesion and breast density. The Chi-square test was used to compare rates.

Results: A total 1,316 women developed breast cancer during the study period. The rate of breast cancer was higher in women with at least one prior benign breast biopsy compared to women with only additional imaging as further assessment (2.6% vs. 2.0%; p-value <0.01). Among women with a benign breast biopsy, the rate of breast cancer was higher in women with atypical hyperplasia compared to proliferative lesions without atypia and non-proliferative lesions (rates= 4.1%, 3.2% and 2.6%, respectively) (p-value <0.01). The breast cancer rate was higher in women with dense breasts compared to intermediate and low breast density (rates= 3.7%, 2.4%, and 1.2%, respectively) (p-value <0.01). The highest rate was observed among women with dense breast and proliferative lesions (8.2%).

Conclusions: The breast cancer rate was higher in women with proliferative benign lesions, and in women with dense breast. The data suggest an interaction between breast density and the type of benign lesion. These results could be useful to design future screening strategies based on individual risk.

B17

The Cumulative Risk of a False-Positive Screening Result in the Norwegian Breast Cancer Screening Program by Breast Center

Marta Román[1], Sofie Sebuødegård[1], Solveig Hofvind[1,2]

1) Screening department, Cancer Registry of Norway, Oslo, Norway
2) Oslo and Akershus University College of Applied Sciences

Introduction: False-positive screening results are a disadvantage of mammographic screening. Studying the variation in the cumulative false-positive risk among the breast clinics is important to understand the performance of the Norwegian Breast Cancer Screening program (NBCSP).

Aims: To explore the cumulative false-positive risk among women attending ten biennial screening examinations by breast center.

Methods: Retrospective cohort study of 618,636 women aged 50-69 years who underwent 1,941,159 screening examinations. The NBCSP includes 19 counties and 16 breast clinics. The breast clinics include one county, except for Agder (West and East), Trøndelag (North and South) and Tromsø (Troms and Finnmark). The study period was 1996-2010. Generalized linear models were used to estimate the cumulative probability of a false-positive screening result, and the cumulative risk of undergoing an invasive procedure with benign outcome, for up to ten biennial screening examinations. Variability across counties was measured by using the extremal quotient (EQ), calculated as the highest to lowest ratio, the EQ for the values between the 75 and 25 percentiles (EQ_{75-25}), and the coefficient of variation (COV), defined as the ratio of the standard deviation relative to the mean.

Results: The average cumulative false-positive risk was estimated at 23%. A 4-fold variation was observed in the estimated risk among breast centers (EQ=3.9: 41.5% vs. 10.7%). The EQ_{75-25} was 1.5 (28.9% vs. 18.6%), and the COV was 0.33. The estimated cumulative risk of undergoing an invasive procedure with benign outcome was 5.3%. The variation among breast centers was higher. The COV was 0.41 while the EQ was 4.3 (12.4% vs. 2.9%). The EQ_{75-25} was 1.9 (8.6% vs. 4.5%).

Conclusions: The cumulative risk of a false-positive screening result and the cumulative risk of undergoing an invasive procedure with benign outcome varied substantially between the breast centers. Reducing to a minimum the variability would improve the effectiveness of the NBCSP.

B18

Investigation of six testicular germ cell tumor susceptibility genes suggests a parent-of-origin effect in the tumor suppressor gene SPRY4

Tom Grotmol[1], Robert Karlsson[2], Wenche Kristiansen[3], Kristine E. Andreassen[1], Elin L. Aschim[3], Roy M. Bremnes[4], Olav Dahl[5], Sophie D. Fosså[6], Olbjørn Klepp[7], Carl W. Langberg[8], Arne Solberg[9], Steinar Tretli[1], Patrik Magnusson[2], Hans-Olov Adami[2], Trine B. Haugen[3], Fredrik Wiklund[2]

1) Cancer Registry of Norway, Oslo, Norway
2) Department of Medical Epidemiology and Biostatistics, Karolinska Institute, Stockholm, Sweden
3) Faculty of Health Sciences, Oslo and Akershus University College of Applied Sciences, Oslo, Norway
4) Department of Oncology, University Hospital North Norway, Tromsø, Norway
5) Department of Oncology, Haukeland University Hospital, Bergen, Norway
6) Department of Clinical Cancer Research, Oslo University Hospital, Radium Hospital, Oslo, Norway
7) Department of Oncology, Ålesund Hospital, Helse Sunnmøre HF, Ålesund, Norway
8) Department of Oncology, Oslo University Hospital, Ullevål, Oslo, Norway
9) Department of Oncology, St Olavs University Hospital, Trondheim, Norway

Introduction: Testicular germ cell tumor (TGCT) is the most common malignancy in young men. Genetic components and conditions during pregnancy are known to play an etiologic role. Recent genome-wide association studies have identified single nucleotide polymorphisms (SNPs) associated with TGCT risk in the genes *ATF7IP, BAK1, DMRT1, KITLG*, *SPRY4*, and *TERT*.

Aims: To validate these associations in a Scandinavian population, and explore effect modification by parental sex and differences in associations between the two major histological subtypes, seminoma and nonseminoma.

Methods: A total of 118 SNPs in the six genes were genotyped in a population-based Swedish-Norwegian sample comprising 831 TGCT case-parent triads, 474 dyads, 712 singletons and 3922 population controls. 734 additional SNPs were imputed using reference haplotypes from the 1000 genomes project. SNP-TGCT association was investigated using a likelihood-based association test for nuclear families and unrelated subjects implemented in the software package UNPHASED. Forward stepwise regression within each gene was applied to determine independent association signals. Effect modification by parent-of-origin and effect differences between histological subtypes were explored.

Results: We observed strong association between SNPs in all six genes and TGCT (lowest P-value per gene: *ATF7IP* 6.2×10^{-6}; *BAK1* 2.1×10^{-10}; *DMRT1* 6.7×10^{-25}; *KITLG* 2.1×10^{-48}; *SPRY4* 1.4×10^{-29}; *TERT* 1.8×10^{-18}). Stepwise regression indicated three independent signals for *BAK1* and *TERT*, two independent signals for *SPRY4*, and one independent signal for *DMRT1*, *ATF7IP* and *KITLG*. A significant parent-of-origin effect was observed for rs10463352 in *SPRY4* (maternal odds ratio=1.72, paternal odds ratio=0.99, interaction P=0.0013). No significant effect differences were found between seminoma and nonseminoma.

Conclusion: A genetic variant in the tumor suppressor gene *SPRY4* only influenced TGCT risk when inherited maternally, most likely because *SPRY4* is silenced, by imprinting or some other epigenetic mechanism, in the fathers of TGCT cases. Parent-of-origin effects have to our knowledge not been reported before in the development of this cancer form.

B19

Potato consumption in a cohort of 74480 women. The Norwegian women and Cancer study

Lene Angell Åsli, Tonje Braaten, Guri Skeie

UiT The Arctic University of Norway. Faculty of Health Sciences. Department of community medicine

Introduction: Previous studies of potato consumption have shown that age, income, education, geography and household structure are important determinants.

Aims: The aim of this study is to gain a better understanding of factors influencing the consumptions of potatoes among women in the Norwegian Women and Cancer study.

Methods: A cross-sectional study in the Norwegian Women and Cancer cohort study using a postal questionnaire on diet, lifestyle and health was performed. The association between potato consumption and age, income, education, geography, household structure, diabetes and dieting was investigated in 74480 women, aged 41-70. The statistical method used was logistic regression analysis where all variables were mutually adjusted.

Results: Preliminary results show that boiled potatoes are used more frequently outside Oslo, and there is a clear north-south gradient in the consumption, where people living in the north have, compared to Oslo, the highest odds for being high consumers (OR: 3.86, 95 % CI: 3.36-4.44). Women living in households with children have a lower odds of having a high potato consumption than women only living with a partner (OR: 0.86, 95 % CI: 0.83-0.90), however single people have the lowest odds of all for being high consumers (OR: 0.38, 95 % CI: 0.36-0.41). Diabetics have lower odds for having a high consumption compared to those without diabetes (OR: 0.66, 95 % CI: 0.58-0.74). The odds for being high consumers decreases with education and income and increases with age. In a sub-cohort with 22810 women, results show that the women who are trying to reduce their weight have a lower odds of being high consumers than those who are not on a diet (OR: 0.66, 95 % CI: 0.62-0.70).

Conclusions: In addition to age, income, education, geography and household structure, there are also health-related factors like dieting and diabetes influencing the potato consumption.

B20

Trend in sunscreen use among women aged 40-70 years in Norway: 1997-2007

Reza Ghiasvand[1], Elisabete Weiderpass[2,3,4,5], Eiliv Lund[4], Marit B. Veierød[1]

[1]Department of Biostatistics, University of Oslo, Oslo, Norway
[2]Department of Etiological Research, Cancer Registry of Norway, Oslo, Norway
[3]Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm, Sweden
[4]Department of Community Medicine, UiT The Arctic University of Norway, Tromsø, Norway
[5]Department of Genetic Epidemiology, Folkhälsan Research Center, Helsinki, Finland

Introduction: The incidence of cutaneous malignant melanoma (CMM) is increasing rapidly in several western populations. In Norway, CMM has had the highest increase in incidence rate among all cancers, in spite of several campaigns against excessive exposure to sun that encourage people to protect themselves by using sunscreens and avoiding sun. Data on the prevalence and trend of sunscreen use in Norway are lacking.

Aims: To examine trends in sunscreen use among women in different age groups and birth-cohorts in Norway during 1997-2007 in a large population-based cohort study.

Methods: In the Norwegian Women and Cancer (NOWAC) cohort study, we examined the sunscreen use in 148,962 women aged 40-70 who completed a mailed questionnaire including questions about sunscreen use in Easter and in the summer in Norway or outside Norway in southern latitudes during 1997 – 2007. Prevalence of sunscreen use in each calendar year, and for each 5-year age group and for birth-cohorts were calculated, and odds ratios were estimated by logistic regression.

Results: Sunscreen use in Norway increased from 1997 to 2007 (P for trend < 0.001). The highest increase was in women aged 60 year or more, and among women aged 50-59 years, with an increase from 54 and 68 per cent in 1997 to 75 and 81 per cent in 2007, respectively. However, in all calendar years younger women used more sunscreen that older women (P for trend < 0.001). Prevalence of sunscreen use was higher in younger birth-cohorts with odds ratio=1.21 (95% confidence interval: 1.06 – 1.37) in birth-group 1956-1960 compared with birth-group 1927-1936. We found similar trends for sunscreen use in Easter and in southern latitudes.

Conclusions: The increase in sunscreen use along with the increase in CMM incidence may be due to the sunscreen-sunburn paradox, i.e. higher prevalence of sunburn among sunscreen users.

21th conference of the Norwegian Epidemiological Association

Participants

Surname of Participant	First name	Affiliation	Participant's Email
Ahmed	Sheikh Mashhood	UiT The Arctic University of Norway, Institute for Community Medicine	mashhood.a.sheikh@uit.no
Akerkar	Rupali	Norwegian Institute of Public Health	Rupali.Akerkar@fhi.no
Anda	Erik	UiT The Arctic University of Norway, Institute for Community Medicine	Erik.anda@uit.no
Bakken	Inger Johanne	Norwegian Institute of Public Health	Inger.Johanne.Bakken@fhi.no
Borch	Kristin Benjaminsen	UiT The Arctic University of Norway, Institute for Community Medicine	kristin.benjaminsen.borch@uit.no
Borud	Einar K.	Norwegian Armed Forces Medical Services	eborud@mil.no
Braaten	Tonje	UiT The Arctic University of Norway, Institute for Community Medicine	tonje.braaten@uit.no
Cappelen	Inger	Norwegian Institute of Public Health	Inger.cappelen@fhi.no
Carlsson	Maria	Nordland Hospital	Maria.Carlsson@nordlandssykehuset.no
Chortatos	Athanasios	University of Oslo, Institute of Basic Medical Sciences	athanasios.chortatos@medisin.uio.no
Corbett	Karina	National Institute of Occupational Health, Department of Occupational Medicine and Epidemiology	Karina.corbett@stami.no
Dalen	Ingvild	Stavanger University Hospital (Helse Stavanger), Research Department	ingvild.dalen@sus.no
Ghaderi	Sara	University of Bergen/Norwegian Institute of Public Health	Sara.ghaderi@fhi.no
Ghiasvand	Reza	Universitety of Oslo, Department of Biostatistics	reza.ghiasvand@medisin.uio.no
Gilman	Andrew	UiT The Arctic University of Norway, Institute for Community Medicine	andygilman@shaw.ca
Graff-Iversen	Sidsel	Norwegian Institute of Public Health	Sidsel.Graff-Iversen@fhi.no
Gran	Jon Michael	University of Oslo, Institute of Basic Medical Sciences	j.m.gran@medisin.uio.no
Grjibovski	Andrei	Norwegian Institute of Public Health	andrei.grjibovski@fhi.no
Grotmol	Tom	Cancer Registry of Norway	Tom.Grotmol@kreftregisteret.no
Gunnes	Nina	Norwegian Institute of Public Health	Nina.Gunnes@fhi.no
Gunnes	Nina	Norwegian Institute of Public Health	Nina.gunnes@fhi.no
Handal	Marte	Norwegian Institute of Public Health	Marte.handal@fhi.no
Hansen	Ketil	UiT The Arctic University of Norway, Institute for Community Medicine	Ketil.lenert.hansen@uit.no
Hofvind	Solveig	Cancer Registry of Norway	Solveig.Hofvind@kreftregisteret.no
Holvik	Kristin	Norwegian Institute of Public Health	Kristin.Holvik@fhi.no
Hovengen	Ragnhild	Norwegian Institute of Public Health	ragnhild.hovengen@fhi.no
Håberg	Siri Eldevik	Norwegian Institute of Public Health	SiriEldevik.Haberg@fhi.no
Håberg	Siri Eldevik	Norwegian Institute of Public Health	SiriEldevik.Haberg@fhi.no
Jacobsen	Bjarne	UiT The Arctic University of Norway, Institute for Community Medicine	Bjarne.jacobsen@uit.no
Jacobsen	Ioanna D.	UiT The Arctic University of Norway, Department of Clinical Dentistry	Ioanna.d.jacobsen@uit.no

Kollerud	Ruby Del Risco	Oslo kommune/University of Oslo	ruby.kollerud@hel.oslo.kommune.no
Kovalenko	Anton	UiT The Arctic University of Norway, Institute for Community Medicine	drkovalenko@rambler.ru
Krane	Line	UiT The Arctic University of Norway, Institute for Community Medicine	line.krane@uit.no
Kranstad	Katrine	Norwegian Institute of Public Health	Katrine.kranstad@fhi.no
Krum-Hansen	Sanda	UiT The Arctic University of Norway, Institute for Community Medicine	sanda.krum-hansen@uit.no
Kudryavtsev	Alexander V	UiT The Arctic University of Norway, Institute for Community Medicine and Northern State Medical University	Ispha09@gmail.com
Leistad	Lilian	The Norwegian Directorate of Health	Lilian.Leistad@helsedir.no
Leon	David	London School of Hygiene & Tropical Medicine	David.Leon@lshtm.ac.uk
Lund	Eiliv	UiT The Arctic University of Norway, Institute for Community Medicine	Eiliv.lund@uit.no
Lunde	Ane	Norwegian Institute of Public Health	ane.lunde@fhi.no
Løchen	Inger-Christine	Norwegian Armed Forces Medical Services	ilochen@mil.no
Løchen	Maja-Lisa	UiT The Arctic University of Norway, Institute for Community Medicine	maja-lisa.lochen@uit.no
Magnus	Maria Christine	Norwegian Institute of Public Health	Maria.Christine.Magnus@fhi.no
Magnus	Per	Norwegian Institute of Public Health	Per.Magnus@fhi.no
Magnusson	Karin	University of Oslo, Institute of Health and Society and Norwegian National resource center for rehabilitation in rheumatology, Diakonhjemmet Hospital	Magnusson_karin@hotmail.com
Mahic	Milada	Norwegian Institute of Public Health	Milada.mahic@fhi.no
Manskow	Unn Sollid	University hospital of North Norway	Unn.Elisabeth.Manskow@unn.no
Myklebust	Berit Skare	Norwegian Institute of Public Health	beritskare.myklebust@fhi.no
Nafstad	Per	University of Oslo, Department of Community Medicine	per.nafstad@medisin.uio.no
Nemer	Maysa	University of Oslo	maysa.nemer@gmail.com
Nesvåg	Ragnar	Norwegian Institute of Public Health	Ragnar.Nesvag@fhi.no
Nilsen	Thomas Sevenius	Norwegian Institute of Public Health	thomassevenius.nilsen@fhi.no
Norvik	Jon Viljar	UiT The Arctic University of Norway, Department of Medical Biology	jno031@post.uit.no
Nost	Therese Haugdahl	UiT The Arctic University of Norway, Institute for Community Medicine	Therese.Haugdal.Nost@nilu.no
Nystad	Wenche	Norwegian Institute of Public Health	wenche.nystad@fhi.no
Næss	Øyvind	Norwegian Institute of Public Health	oyvind.naess@fhi.no
Odland	Jon Øyvind	UiT The Arctic University of Norway, Institute for Community Medicine	Jon.oyvind.odland@uit.no
Odsbu	Ingvild	Norwegian Institute of Public Health	Ingvild.odsbu@fhi.no
Olsen	Karina Standahl	UiT The Arctic University of Norway, Institute for Community Medicine	karina.s.olsen@uit.no
Parr	Christine L.	Norwegian Institute of Public Health	Christine-Louise.Parr@fhi.no
Ringberg	Unni	UiT The Arctic University of Norway, Institute for Community Medicine	unni.ringberg@uit.no
Roman	Marta	Cancer Registry of Norway	Marta.Roman@kreftregisteret.no

Romundstad	Pål	Norwegian University of Science and Technology, Institute for Community Medicine	pal.romundstad@ntnu.no
Roo	Lisa De	University of Bergen, Department of Global Public Health and Primary Care	lisa.de.roo@igs.uib.no
Samuelsen	Per-Jostein	UiT The Arctic University of Norway, Institute for Community Medicine	pes022@post.uit.no
Sandanger	Torkjel	UiT The Arctic University of Norway, Institute for Community Medicine	Torkjel.sandanger@uit.no
Schøning	Bente Evjen	EPINOR – National research school in population based epidemiology	bente.evjen.schoning@uit.no
Selmer	Randi	Norwegian Institute of Public Health	randi.selmer@fhi.no
Sharashova	Ekaterina	UiT The Arctic University of Norway, Institute for Community Medicine	Ekaterina.e.sharashova@uit.no
Shigdel	Rajesh	University of Tromsø, Department of Health and Care Sciences	Rajesh.shingdel@uit.no
Skeie	Guri	UiT The Arctic University of Norway, Institute for Community Medicine	Guri.skeie@uit.no
Skjeret	Geir	Norwegian Armed Forces Medical Services	gskjeret@mil.no
Skjærven	Rolv	University of Bergen, Department of Global Public Health and Primary Care	Rolf.Skjarven@igs.uib.no
Skoglund	Eva	Norwegian Institute of Public Health	eva.skoglund@fhi.no
Steen	Chloé Beate	National Institute of Occupational Health, Department for the Chemical and Biological Work Environment	chloe.steen@stami.no
Strand	Leif Åge	Norwegian Armed Forces Medical Services	leif.age.strand@kreftregisteret.no
Strand	Bjørn Heine	Norwegian Institute of Public Health	BjornHeine.Strand@fhi.no
Straume	Bjørn	UiT The Arctic University of Norway, Institute for Community Medicine	bjorn.straume@uit.no
Subbotina	Anna	UiT The Arctic University of Norway	anna.v.subbotina@uit.no
Sulo	Enxhela	University of Bergen, Department of Global Public Health and Primary Care	enxhela.sulo@igs.uib.no
Sweta	Tiwari	UiT The Arctic University of Norway, Institute for Community Medicine	sweta.tiwari@uit.no
Søgaard	Anne Johanne	Norwegian Institute of Public Health	Anne.Johanne.Sogaard@fhi.no
Tell	Grethe S	University of Bergen, Department of Global Public Health and Primary Care	Grethe.Tell@igs.uib.no
Thalabard	Jean-Christophe	Sorbon Paris Citè	jean-cristophe.thalabard@mi.parisdescartes.fr
Tretli	Steinar	Cancer Registry of Norway	Steinar.Tretli@kreftregisteret.no
Tverdal	Aage	Norwegian Institute of Public Health	Aage.Tverdal@fhi.no
Vainio	Harry	The Finnish Institute of Occupational Health	Harri.Vainio@ttl.fi
Vangen-Lønne	Anne Merete	UiT The Arctic University of Norway, Department of Clinical Medicine	am.vanglon@gmail.com
Vejrup	Kristine	Norwegian Institute of Public Health	Kristine.Vejrup@fhi.no
Wiederpass	Elisabete	UiT The Arctic University of Norway, Institute for Community Medicine	Elisabete.Weiderpass.Vainio@ki.se
Wiik	Robert	Norwegian Patient Register (NPR), Norwegian Directorate for Health	Robert.Wiik@helsedir.no
Årtun	Ellen	University of Southern Denmark, The Institute of Sports Science and Clinical Biomechanics	eaartun@health.sdu.dk
Åsli	Lene Angell	UiT The Arctic University of Norway, Institute for Community Medicine	Lene.a.asli@uit.no