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DEN TJUENDE NORSKE EPIDEMIOLOGIKONFERANSEN

BERGEN,

23.-24. AUGUST 2012

The 20th Norwegian Conference on Epidemiology
Bergen, 23-24 August 2012

Welcome to the 20th conference of the Norwegian Epidemiological Association (NOFE) in Bergen. This year's conference is being held in August and not later in the fall because we want to take advantage of the annual conference of the International Society for Clinical Biostatistics (ISCB), which will also be held in Bergen in August. The pre-symposium on Thursday is a joint arrangement between these two conferences; we can therefore offer a whole string of exciting lectures by international distinguished experts.

Registry-based epidemiology is the main topic of this year's conference. The aim of the pre-symposium is to provide insight into how the various registries, biobanks and national health surveys are used in scientific work. The Scientific Programme Committee of the pre-symposium has planned seven oral presentations with experts from Norway, Denmark, Sweden, Finland and the United States.

The main conference will cover future perspectives for registries, cohorts and biobanks in Norway. The invited speakers this year are Camilla Stoltenberg, Deputy Director-General at the Norwegian Institute of Public Health (FHI), Norway and Rolv Terje Lie, head of the Department of Public Health and Primary Health Care, University of Bergen, Norway. Moreover, Friday morning starts with a plenary session on the Cohort of Norway (CONOR). Four members of the steering group (Per Magnus, Grethe S. Tell, Steinar Krokstad and Inger Njølstad) will contribute through their lectures to more insight about the possibilities of the CONOR data and its biological material, which in turn may encourage more epidemiological research related to CONOR.

Other programme items include the 2012 Publication of the Year award, NOFE's annual meeting and Honorary Membership being awarded to two distinguished members.

The conference dinner this year will be at Fløien Folkerestaurant, which was inaugurated in 1925 – seven years after Fløibanen was built. The easiest access is to go to Vetrlidsallmenningen and walk the mosaic carpet of Finnish granite and white trondhjemite, leading into the station. Tickets to Fløibanen will be handed out at the registration. The Fløibanen will leave at 7:30 PM.

We are very grateful and would like to thank the Norwegian Institute of Public Health, the Medical Birth Registry of Norway and Bergen University College who have contributed financial support.

We wish all participants a successful conference!

The organizing committee for the NOFE conference 2012

Marjolein M. Iversen *(Bergen University College / Stavanger University Hospital and board member of NOFE)*

Anne Kjersti Daltveit *(Department of Public Health and Primary Health Care, University of Bergen / Norwegian Institute of Public Health)*

Astrid Lunde *(Department of Public Health and Primary Health Care, University of Bergen)*

Jannike Øyen *(Haukeland University Hospital / Department of Public Health and Primary Health Care, University of Bergen and board member of NOFE)*

The 20th Norwegian Conference on Epidemiology
Bergen, 23-24 August 2012

Pre-symposium on register-based epidemiology

Thursday, 23 August 23 (Grieghallen – Peer Gynt)

08:30-09:00	Registration / coffee
09:00-10:30	**Chair: Stein Atle Lie**
09:00-09:30	Rolv Skjærven: Generations: the importance of family-data in perinatal epidemiology
09:30-10:00	Timo Hakulinen: What can be achieved with a good population-based cancer registry?
10:00-10:30	Giske Ursin: How can cancer registries improve our biological understanding of cancer and cancer care?
10:30-11:00	Refreshments
11:00-13:00	**Chair: Stein Atle Lie**
11:00-11:30	Nancy L. Pedersen: Double delights through twin registry research
11:30-12:00	Kaare Christensen: Register-based research on the epidemiology of aging
12:00-12:30	Sven Cnattingius: The Birth Register – how do we find the most beautiful flowers in the garden?
12:30-13:00	Allen J. Wilcox: Heterogeneity of risk and selective fertility – Subtle biases produce serious confusions
13:00-14:00	Lunch / registration at Grand Selskapslokaler
14:00-	**Main NOFE Conference at Grand Selskapslokaler**

The 20th Norwegian Conference on Epidemiology
Bergen, 23-24 August 2012

Overview Main Conference

Thursday, 23 August – Main Conference (Grand Selskapslokaler vis a vis Hotel Norge)

13:00-14:00	Lunch / registration
14:00-14:15	Welcome
14:15-15:00	**"**When the entire country is a cohort – Future perspectives for registries, cohorts and biobanks in Norway**"** 1) Invited speaker: **Prof. Camilla Stoltenberg**, Deputy Director-General, Norwegian Institute of Public Health (FHI), Norway 2) Invited speaker: **Prof. Rolv Terje Lie**, Head of the Department of Public Health and Primary Health Care, University of Bergen (UiB), Norway
15:15-16:00	Oral presentations of submitted abstracts (parallel sessions, **A1-A3**, **B1-B3**, **C1-C3**)
16:00-16:15	Coffee break
16:15-17:00	NOFE grants the status of Honorary Membership to two distinguished members. Two presentations.
17:00-17:30	"The publication of the year" award
17:30-18:00	NOFE's annual meeting
20:00-	Conference dinner (Fløyen)

Friday, 24 August

09:00-10:15	***CONOR session,*** Invited speakers: **Prof. Per Magnus,** University of Oslo **Prof. Grethe Tell,** University of Bergen **Associate Prof. Steinar Krokstad,** HUNT Research Centre, Levanger **Prof. Inger Njølstad**, University of Tromsø
10:15-10:30	Coffee break
10:30-12:00	Oral presentations of submitted abstracts (parallel sessions, **A4-A9** and **B4-B9**)
12:00-13:00	Lunch
13:00-14:00	Oral presentations of submitted abstracts (parallel sessions, **A10-A13** and **B10-B13**)
14:00-14:30	Plenary: Oral presentation of submitted abstracts (**A14-A16)**
14:30-14:40	Concluding remarks
15:00	Bus departure to Flesland (Arrival approximately 15:30)

The 20th Norwegian Conference on Epidemiology
Bergen, 23-24 August 2012

Detailed Programme

Thursday, 23 August

08:30-9:00			Registration / coffee
Plenary session (Pre-symposium on register-based epidemiology, in cooperation with the ISCB-Conference) – Grieghallen			
09:00-10:30		Rolv Skjærven	Generations: the importance of family-data in perinatal epidemiology
		Timo Hakulinen	What can be achieved with a good population-based cancer registry?
		Giske Ursin	How can cancer registries improve our biological understanding of cancer and cancer care?
11:00-13:00		Nancy L. Pedersen	Double delights through twin registry research
		Kaare Christensen	Register-based research on the epidemiology of aging
		Sven Cnattingius	The Birth Register – how do we find the most beautiful flowers in the garden?
		Allen J. Wilcox	Heterogeneity of risk and selective fertility – Subtle biases produce serious confusions
13:00-14:00		**Lunch / registration (Grand selskapslokaler)**	
NOFE Plenary session (Grand selskapslokaler)			
14:00-14:15		Welcome	
14:15-15:00		**Camilla Stoltenberg** **Rolv Terje Lie**	When the entire country is a cohort – Future perspectives for registries, cohorts and biobanks in Norway
Parallel session A1-A3 **Topic: Mental health**			
15:15-15:30	A1	Audun Brunes	Personality, physical activity, and symptoms of anxiety and depression: The HUNT study
15:30-15:45	A2	Bjørn Heine Strand	Midlife vascular risk factors and their association with dementia deaths: Results from a Norwegian prospective study followed up for 35 years
15:45-16:00	A3	Makalani Myrtveit	Musculoskeletal disorders; Mental and somatic symptoms and disability pension awards: The Nord-Trøndelag Health Study (HUNT)
Parallel session B1-B3 **Topic: Life course epidemiology**			
15:15-15:30	B1	Sara Ghaderi	Long-term consequences of cancer in childhood, adolescence and young adults
15:30-15:45	B2	Ingrid Sivesind Mehlum	Socio-economic position in childhood and adulthood, intelligence, and health
15:45-16:00	B3	Petter Kristensen	The relationship between high birthweight and IQ in young adult age

Parallel session C1-C3 **Topic: Environmental epidemiology**			
15:15-15:30	C1	Karin Sygna	Road traffic noise exposure, sleep quality and mental health
15:30-15:45	C2	Cecilie Dahl	Do toxic metals in municipal drinking water increase the risk of hip fractures? The NOREPOS study
15:45-16:00	C3	Geir Aamodt	The association between urban green space and health in Oslo, Norway
16:00-16:15		Coffee break	
Plenary session			
16:15-17:00		**NOFE grants the status of Honorary Membership to two distinguished members. Nomination and two lectures**	
17:00-17:30		**"The publication of the year" award 2012, nomination and lecture**	
17:30-18:00		**NOFE's annual meeting**	

20:00- **Conference dinner (Fløyen)**

Friday, 24 August

Plenary session			
09:00-10:15	**D1**	**Per Magnus** **Grethe S. Tell** **Steinar Krokstad** **Inger Njølstad**	CONOR session. The 4 speakers are members of the CONOR Steering Group
10:15-10:30		Coffee break	
Parallel session A4-A9 **Topic: Cardiovascular disease**			
10:30-10:45	A4	Grace M. Egeland	Obesity and the hypertriglyceridemic-waist phenotype as predictors of cardiovascular disease in the Norwegian population
10:45-11:00	A5	Børge Moe	Occupational physical activity, metabolic syndrome, and risk of death from all causes and cardiovascular disease in the HUNT 2 cohort study
11:00-11:15	A6	Mona Dverdal Jansen	Association of genetic variants in loci 1p13 and 9p21 and fatal coronary heart disease in a Norwegian case-cohort study
11:15-11:30	A7	Jorunn Evandt	Traffic noise, insomnia and risk factors in the pathway to cardiovascular disease
11:30-11:45	A8	Inger Ariansen	Educational inequalities in cardiovascular risk factors during 30 years of Norwegian Counties Studies
11:45-12:00	A9	Despoina Theofylaktopoulou	Determinants of plasma levels of the interferon-γ induced inflammatory markers neopterin and kynurenine/tryptophan ratio, and kynurenines in The Hordaland Homocysteine Study
Parallel session B4-B9 **Topic: Perinatal**			
10:30-10:45	B4	Anne Britt Vika Nilsen	Factors associated with high maternal age when having the first baby
10:45-11:00	B5	Vigdis Aasheim	Expectations and experiences of childbirth in first-time mothers of advanced age
11:00-11:15	B6	Blandina T. Mmbaga	Causes of perinatal deaths at a tertiary care hospital in Northern Tanzania 2000-2010: A registry based study
11:15-11:30	B7	Michael Johnson Mahnade	Recurrence risk of perinatal mortality in Northern Tanzania: a registry-based study
11:30-11:45	B8	Annett Arntzen	Risk of stillbirth and infant mortality among immigrants in Norway
11:45-12:00	B9	Ragnhild Hovengen	Critical periods of weight development in infancy and childhood: A populationbased longitudinal study of schoolchildren in Norway
12:00-13:00		Lunch	

Parallel session A10-A13 **Topic: Cancer**			
13:00-13:15	A10	Per-Henrik Zahl	Over-estimated lead times in cancer screening has led to substantial under-estimation of overdiagnosis
13:15-13:30	A11	Anna V. Subbotina	Epidemiology of skin cancers in the Arkhangelsk region, Russia in 2000-2010
13:30-13:45	A12	Natalia A. Glukhareva	Stomach cancer in the Arkhangelsk region in 2000-2010
13:45-14:00	A13	Christine L. Parr	Meat intake, cooking methods, and risk of proximal colon, distal colon, and rectal cancer: the Norwegian Women and Cancer (NOWAC) cohort study
Parallel session B10-B13 **Topic: Other**			
13:00-13:15	B10	Hilde Kristin Refvik Riise	A poor self-rated health and a reduced health related quality of life are related to an increased risk of lung cancer
13:15-13:30	B11	Jørgen Meisfjord	Municipal health profiles: Communicating health statistics in a new way
13:30-13:45	B12	Marit Stordal Bakken	Increased hip fracture risk in older persons exposed to antidepressant drugs
13:45-14:00	B13	Jon Helgeland	Defining hospital stays
Plenary session A14-A15			
14:00-14:10	A14	Thomas S. Nilsen	The Norwegian Twin Registry
14:10-14:20	A15	Gerhard Sulo	Trends in hospitalization rates for the first acute coronary syndrome in Norway during 2001-2009: the CVDNOR project
14.20-14:30	A16	Gunnhild Åberge Vie	The health hazards of marriage. A cohort study of 12,500 Norwegian couples in the HUNT Study
14:30-14:40		**Concluding remarks**	
15:00		**Bus to Flesland (arrival approximately 15:30)**	

A1

Personality, physical activity, and symptoms of anxiety and depression: The HUNT study

Audun Brunes, Liv Berit Augestad, Sigridur Lara Gudmundsdottir

Norwegian University of Science and Technology

Purpose: To analyze the association between physical activity (PA), symptoms of depression and anxiety, and personality traits.

Methods: Cross-sectional study from a Norwegian population-based survey conducted in the period 2006–2008. The sample consisted of a total of 38,743 subjects aged ≥ 19 years, 56.1% women and 43.9% men. Demographic variables, PA, depression and anxiety (The Hospital Anxiety and Depression Scale), and personality (Eysenck Personality Questionnaire) were assessed by self-reporting measurements.

Results: Individuals who reported moderate and high PA had significantly lower scores on depression and anxiety compared with less physically active individuals ($p < 0.05$). Lower scores of HADS-defined depression and anxiety were found among physically active women compared with physically active men. There was a significant linear trend between extroversion and levels of PA ($p < 0.01$) and between neuroticism and PA ($p < 0.01$).

Conclusions: Subjects reporting regular leisure-time PA were less likely to report symptoms of HADS-defined depression and anxiety, but the association differed by gender. Personality may be an underlying factor in explaining this association.

Keywords: physical activity, anxiety, depression, personality, cross-sectional study

A2

Midlife vascular risk factors and their association with dementia deaths: Results from a Norwegian prospective study followed up for 35 years

Bjørn Heine Strand[1], Ellen Langballe[1], Vidar Hjellvik[1], Marte Handal[1], Øyvind Næss[1,6], Gunn Peggy Knudsen[1], Helga Refsum[2], Kristian Tambs[1], Per Nafstad[1,6], Henrik Schirmer[3], Astrid Liv Mina Bergem[4], Randi Selmer[1], Knut Engedal[5], Espen Bjertness[6,7] & The GENIDEM-Group

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Introduction: There is growing evidence that midlife risk factors for vascular disease also are risk factors for dementia, but there is still need for long-term observational studies to address this.

Aims: Our objective was to investigate the association of midlife vascular disease risk factors with a dementia diagnosis on the death certificate.

Methods: Participants were included in The Norwegian Counties Study (NCS) in the period 1974-78, aged 35-50 years at baseline. Information from NCS was linked with the Cause of Death Registry through year 2009 using the unique personal identification number. The study included 48 793 participants, 1.5 million person years and 464 dementia deaths (178 Alzheimer's; 286 non-Alzheimer's dementia). Cox regression and competing risks regression were used.

Results: Dementia diagnosis was associated with increased total cholesterol levels (>7.80 vs. <5.20 mmol/L: HR=2.02; 95 % confidence interval (1.37, 2.97)); diabetes (HR=2.13 (1.13, 3.98)) and low body mass index (<20 kg/m2 vs. 20-25 kg/m2: HR=1.87 (1.23, 2.86)) in midlife. The associations remained after adjustment for other vascular risk factors and educational level. Smoking status or blood pressure in midlife was not significantly associated with risk of dementia diagnosis.

Conclusions: People suffering from high cholesterol levels, diabetes or underweight in midlife are at increased risk of dying from or with dementia later in life. Our findings add to previous results suggesting that intervention in midlife may be important. To better understand the mechanisms involved in the associations between midlife underweight, diabetes, elevated cholesterol level and late-life dementia death, these links need to be further investigated.

A3

Musculoskeletal disorders; Mental and somatic symptoms and disability pension awards: The Nord-Trøndelag Health Study (HUNT)

Makalani Myrtveit[1,2], Jens Skogen[2,3], Arnstein Mykletun[2,3,4]

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Introduction: Musculoskeletal disorders are among the most frequent causes of disability pension (DP). Rheumatoid arthritis, ankylosing spondylitis and fibromyalgia have different etiology and present different symptomatology. Many individuals, but not all, suffering from these disorders get awarded disability pension. The cause of reduced work ability is not always clear.

Aims: We aimed to estimate the association between these disorders and subsequent DP, and to investigate how much of this association could be explained by socio-demographics, health related behavior and somatic (symptoms other than musculoskeletal) and mental symptoms. Finally, we wanted to compare somatic and mental symptom load between the three disorders.

Methods: Data from the Nord-Trøndelag Health Study was linked to the Norwegian Insurance Database. Risk of receiving DP was calculated using cox proportional hazard ratios (HR). Subsequent adjustments were made for socio-demographics, health-related behavior and somatic and mental symptom load. How much of the association between the different disorders and DP was explained by each adjustment factor was also investigated. Symptom reporting was recorded for each disorder.

Results: Participants reporting musculoskeletal disorders had an increased risk of subsequent DP. The highest risk was found among individuals with fibromyalgia (HR 5.64). Socio-demographics, health-related behavior and somatic and mental symptom load explained 47.8% of this association in fibromyalgia, and much less in the other two disorders. Participants with musculoskeletal disorders reported more musculoskeletal and diffuse somatic complaints than the general population, and more anxiety and depression. Participants reporting fibromyalgia reported the greatest symptom load.

Conclusions: Socio-demographics, health-related behavior and somatic and mental symptom load explained substantially more of the association between DP and fibromyalgia than between DP and rheumatoid arthritis or ankylosing spondylitis. This indicated that fibromyalgia is a complex disorder where not only musculoskeletal problems but also other strains/stressors are important factors affecting work ability.

A4

Obesity and the hypertriglyceridemic-waist phenotype as predictors of cardiovascular disease in the Norwegian population

Grace M. Egeland[1,2], Marta Ebbing[1], Gerhard Sulo[2], Stein Emil Vollset[1,2], Geir E. Eide[3], Grethe S. Tell[1,2]

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Introduction: Adipose tissue was once considered biologically inactive but is now recognized as the largest endocrine organ representing 10-29% of body weight in the normal-weight adult. Obesity is a leading risk factor for cardiometabolic disease where fat deposits in proximity of the organs are considered to have greater metabolic consequences than subcutaneous fat.

Aims: Given that the hypertriglyceridemic-waist phenotype is a proxy indicator of visceral fat, the objectives were to evaluate the extent to which the hypertriglyceridemic-waist phenotype predicted future cardiovascular disease morbidity and mortality in Norway beyond that of conventional cardiovascular risk score algorithms.

Methods: A longitudinal follow-up Cohort of Norway study participants (n=185,400) was conducted using data linkages with CVDNOR which is a comprehensive assessment of hospitalizations and mortality attributed to cardiovascular disease through record linkages with national databases of hospitalizations, prescriptions, and cause-of-death. The outcomes of interest for the current analyses included acute coronary syndrome (unstable angina pectoris and acute myocardial infarction) and ischemic and hemorrhagic stroke. Kaplan-Meier survival curves evaluated the probability of remaining free of disease by presence of the phenotype. Multivariable analyses evaluated the extent to which the phenotype improved model fit of analyses considering conventional risk algorithms using Akaike's Information Criterion analyses.

Results: Analyses are ongoing and results will be presented.

Conclusion: The analyses will provide information relevant for enhancing screening and referral programs for high-risk individuals and in understanding the burden of cardiovascular disease attributed to obesity in Norway.

A5

Occupational physical activity, metabolic syndrome, and risk of death from all causes and cardiovascular disease in the HUNT 2 cohort study

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2) National Research Centre for the Working Environment, Copenhagen, Denmark

Introduction: Leisure time physical activity is associated with favourable effects on cardiovascular mortality among persons with metabolic syndrome, but the effect of occupational physical activity has not been extensively studied.

Aims: To prospectively examine the independent and combined effect of occupational physical activity and metabolic syndrome on all-cause and cardiovascular mortality in a large population-based cohort.

Methods: Data on 37,300 men and women participating in the Norwegian HUNT Study (1995-97) were linked with the Cause of Death Registry at Statistics Norway. Cox proportional hazard ratios (HR) with 95% confidence intervals (CI) were estimated.

Results: During a median follow-up of 12.4 years, a total of 1,168 persons died. Of these, 278 died from cardiovascular disease. Compared to the reference group of people without metabolic syndrome and occupations characterized by 'much walking and/or lifting', people with metabolic syndrome in the same occupational category had a HR of 1.79 (95% CI, 1.20-2.66) for cardiovascular death. Among persons with metabolic syndrome and sedentary work the HR was 2.74 (95% CI, 1.82-4.12) while among persons with metabolic syndrome and heavy physical work the HR was 3.02 (95% CI, 1.93-4.75). Associations with all-cause mortality were somewhat weaker, and were largely due to deaths from cardiovascular disease.

Conclusions: These findings suggest that both sedentary work and physically heavy work could increase the risk of death from cardiovascular disease in persons with metabolic syndrome.

A6

Association of genetic variants in loci 1p13 and 9p21 and fatal coronary heart disease in a Norwegian case-cohort study

Mona Dverdal Jansen[1], Gun Peggy Knudsen[2], Ronny Myhre[1], Gudrun Høiseth[3,4], Jørg Mørland[3], Øyvind Næss[1], Kristian Tambs[2], Per Magnus[1]

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Introduction: Several genome-wide association studies have indicated some loci and single nucleotide polymorphisms (SNPs) associated with coronary heart disease (CHD). Some of these SNPs have subsequently been found to be associated with incident CHD in a population-based study; however their association with fatal CHD has not been similarly investigated.

Aim: This study aimed to investigate whether selected SNPs show association with fatal CHD in a population-based case-cohort study.

Methods: Using the population-based Norwegian CONOR dataset, a case-cohort study was designed and genotype data for 2 953 subjects (829 cases and 2 124 controls) were obtained. Four SNPs (three from locus 1p13 and one from locus 9p21) were tested for association with fatal CHD using allelic and model associations. Cox proportional hazards models were used to estimate gender-specific hazard ratios and all major CHD risk factors were adjusted for. Complete case analyses, as well as analyses of datasets with imputed missing values, were used.

Results: In men there was a significant association between the rs1333049 (9p21) minor allele and fatal CHD, while the association for the rs14000 (1p13) minor allele was only significant prior to permutation testing. Men homozygous for the risk alleles on rs1333049 and rs14000 were found to have significantly increased hazard ratios in baseline and adjusted models with both complete case and imputed data analyses. No significant associations were observed between the other two SNPs (rs599839 and rs646776, 1p13) and CHD mortality in either gender.

Conclusion: This study indicates that rs1333049 is associated with fatal CHD in the Norwegian population. Our results suggest that rs14000 may be similarly associated; however this needs to be further validated.

A7

Trends in hospitalization rates for the first acute coronary syndrome in Norway during 2001-2009: the CVDNOR project

Gerhard Sulo[1], Jannicke Igland[1], Stein Emil Vollset[1,2], Ottar Nygård[3], Marta Ebbing[2], Grethe S. Tell[1]

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Background: There has been a substantial decline in coronary heart disease (CHD) mortality in Norway during last three decades. Data on incidence of CHD has not been available countrywide, so its relative contribution on reduced mortality in Norway is unknown.

Aim: To investigate trends in hospitalization rates for the first acute coronary syndrome (ACS) in Norway from 2001-2009**.**

Methods: Cardiovascular disease (CVD) in Norway (CVDNOR) is a research project collecting data on hospitalizations with a CVD or diabetes mellitus diagnosis from all hospitals in Norway during 1994-2009, including non-fatal and fatal incident and recurrent events. In the current analysis we present data on hospitalizations for a first ACS (ICD-10 codes I20.0, I21 or I22) from 2001 to 2009 (7 years censoring). Age standardized hospitalization rates for men, women and total were calculated using the Norwegian population in year 2000 as standard population. Crude hospitalisation rates in 10 year age strata are also reported.

Results: For both sexes, age standardized rates for the first ACS event increased during 2001-2003 and decreased after that. Age groups 55-64, 65-74 and 75-84 had a reduction in hospitalization rates of 3.3%, 17.7% and 14.6%, respectively, while the age group 85+ showed no changes (2009 compared to 2001).

Conclusions: Hospitalizations for the first ACS event have decreased during 2001-2009. The decline is mainly caused by a reduction in hospitalization rates in the 55-84 age groups. Other factors such as, geographic location and education will be included in further analyses.

A8

Educational inequalities in cardiovascular risk factors during 30 years of Norwegian Counties Studies

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Introduction: Educational inequality in cardiovascular disease (CVD) mortality is substantial in Norway.

Aims: The study aimed to investigate the trend of educational differences for established CVD risk factors.

Methods: We used data from 40-45-year old women and men who participated in regional Norwegian health examination surveys in 1974-78, 1985-88 and 2000-2003. To account for increasing educational attainment through the period we used regression based indices of inequality (Relative Index of Inequality and Slope Index of Inequality). For the evaluation of trends we selected two counties with data from all surveys, and for increasing the national relevance we assessed biomarkers measured in five counties, including Oslo, in 2000-2003.

Results: From 1974-76 to 2000-2003 the mean blood pressure and total serum cholesterol levels decreased and mean BMI increased in all educational groups. The proportion of leisure-time physical inactive increased in the lowest educational groups. The prevalence of daily smoking decreased in all educational groups for men, and amongst the highest educational groups in women.

Trough the period inverse educational gradients were found for serum lipids, blood pressure, smoking, physical inactivity and body mass index. The educational differences increased for smoking (relative differences doubled) and for leisure-time physical activity. On the other hand, the educational differences decreased for systolic blood pressure and serum total cholesterol.

Conclusions: This study suggests increased educational differences over time for smoking and physical inactivity, indicating that these two factors may become the most important of the modifiable risk factors that contribute to educational inequality in CVD morbidity and mortality.

A9

Traffic noise, insomnia and risk factors in the pathway to cardiovascular disease

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Introduction: In Norway it is estimated that about 1.7 million people are exposed to traffic noise at levels exceeding recommended guideline values at their home. It is estimated that 5 % of the population experience sleep disturbances as a result of environmental noise. Exposure to traffic noise has also been associated with hypertension and cardiovascular disease (CVD). Furthermore, poor sleep has been associated with increased risk of type 2 diabetes and CVD. However, whether insomnia serves as an intermediate factor between exposure to night-time traffic noise and risk factors for CVD is still uncertain.

Aims: The main aims of this project are to study the associations between 1) nocturnal traffic noise and sleep disturbances, 2) nocturnal traffic noise and sleep medication use, and 3) sleep disturbances induced by traffic noise and risk factors for CVD.

Methods: Risk factors for CVD were measured in the Oslo Health Study (HUBRO) (2000-2001). A follow-up study of HUBRO, "Health and Environment in Oslo" (HELMILO) (2009-2010) (n = 13 019) added self-reported data on, among others, sleep problems. The noise levels outside each participant's dwelling were calculated using the Nordic Prediction Method for railway and road traffic noise in combination with a geographical information system. The noise data will be linked to individual use of sleep medication according to the Norwegian Prescription Database. Potential confounders will be included in the analyses.

Results: Only preliminary results are available. Data from HELMILO showed that 19 % of the subjects reported various degrees of disturbance from road traffic noise at night-time. Among those who were disturbed 37 % reported to experience inadequate sleep three times or more per week compared with 16.4 % among those who were not disturbed. These data will be analyzed further related to noise exposure and presented at the conference.

A10

Over-estimated lead times in cancer screening has led to substantial under-estimation of overdiagnosis

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Introduction: Mathematical models for tumor growth yields lead time estimates varying from 2 to 9 years (breast cancer) and from 5 to 12 years (prostate cancer). In contrast, observed lead time for clinical breast cancer when screening with mammography is about 1 year.

Aims: To study the difference between mathematical and observed lead time and to show that adjusting overdiagnosis for mathematical lead time will systematically underestimate the level of overdiagnosis.

Methods: First we calculate bias in mathematical lead time estimates (compared to clinical lead time) when the proportion on overdiagnosed tumors varies from 0 to 50 % and this is ignored. Second we study how the quantification of overdiagnosis is diluted by comparing cohorts with and without screening by long follow-up after screening has stopped. Finally, we study if there are many slow-growing tumors with potentially long lead time using data from national mammography screening programs in Norway, Sweden, UK and USA.

Results: Mathematical lead time estimates are up to 13 times higher than observed lead time for clinical disease if you ignore overdiagnosis. Overdiagnosis is underestimated by up 54% when using the standard method of comparing cohorts with long follow up after screening has stopped. Finally, the incidence rates from the start-up of mammography screening of 3 million women show similar proportions of slow-growing tumors at all age groups supporting the theory that screening detects many cancers that would go in spontaneous regression.

Conclusion: The standard statistical models for calculating lead times based on the theory that all tumors grow is erroneous for breast and prostate cancer. The standard method of estimating overdiagnosis by comparing cumulative incidence rates of cohorts with and without screening long after screening has stopped to adjust for long lead times is biased.

A11

Epidemiology of skin cancers in the Arkhangelsk region, Russia in 2000-2010

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Introduction: Skin cancer is the most common cancer in fair-skinned populations, and its incidence is rising worldwide, especially at high latitudes.

Aims: To describe the epidemiology of skin cancers in the Arkhangelsk region, Northwest Russia, and estimate malignant melanoma survival using data from the Arkhangelsk Regional Cancer Registry.

Methods: Only first primary malignancies of same morphology were included. In 98.4% of cases, diagnosis was morphologically verified. Kaplan-Meier method was used for estimating survival.

Results: During 2000-2010, 712 new cases of malignant melanoma and 4134 cases of non-melanoma skin cancer (of which 84% and 13% were basal cell carcinoma and squamous cell carcinoma, respectively) were identified. Stage distribution of melanoma was: T1 15%, T2 29%, T3 26%, T4 30%; N0 76%, N1 11%, N2 9%; M1 9%. Basal cell carcinoma was diagnosed T1 in 99%, 0.03% had distant metastases. Squamous cell carcinoma stage distribution was T1 65%, T2 22%, T3 7%, T4 6%; N0 97%, N1 3%, 1% had distant metastases. The most common site of melanoma for men was trunk (56%) and lower limb (19%), for women lower limb (36%) and trunk (33%). Non-melanoma skin cancers were located on head and neck (75%) and trunk (14%). Crude incidence increased from 4.23 to 4.62 per 100 000 for melanoma for men, and from 4.67 to 9.40 for women; from 16.78 to 24.98 for non-melanoma skin cancer for men and from 28.54 to 42.83 for women. Standardized incidence rate of melanoma increased from 3.82 to 5.63 (R^2=0.71), and of non-melanoma skin cancer from 18.19 to 24.97 (R^2=0.71) for both sexes. One-year melanoma survival was 81.6% (95%CI 78.4-84.4), and 5-year survival 61.3% (56.9-65.4).

Conclusions: Incidence of all skin cancers has been rising in 2000-2010, especially among women. Survival rates are relatively low, probably due to large proportion of advanced stages at diagnosis.

A12

Stomach cancer in the Arkhangelsk region in 2000-2010

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Introduction: Stomach cancer (SC) is one of the most common cancer types. There have been no register-based studies on stomach cancer in Northwest Russia.

Aims: To assess the incidence of and mortality from SC in the Arkhangelsk region, Russia during 2000-2010 as well as to study factors which influence the survival from SC.

Methods: All new cases of SC that occurred during 2000-2010 in Arkhangelsk region were extracted from digital database of Arkhangelsk regional cancer registry. Incidence and mortality were calculated per 100 000 with adjustment for age. Survival was assessed by Life-table method, Kaplan-Meier method and Cox regression model.

Results: Altogether, 5926 cases of SC were observed. Of them, 2658 (44.9%) were among women and 3268 (55.1%) were among men. Mean age at diagnosis was 67.0 years (min. 19 years max. 105 years). There were 3393 (57.4%) cases of SC among urban residents and 2533 (42.6%) among rural residents. The most common type of tumor was adenocarcinoma – 3405 cases (57.5%). Stage of disease was determined for only 4861 (82%) cases. Age-adjusted incidence of SC decreased from 32.9 per 100 000 in 2000 to 25.2 per 100 000 in 2010 year. Age-adjusted mortality from SC increased from 13.4 in 2000 to 20.5 in 2010 year. One-year survival was 27%. Five-year survival was 17%. Median survival was 6 months (95% CI 5.6-6.4). Stage of disease influenced the survival significantly, $p<0.001$ (stage 1 – reference group, stage 2 HR 3.4 95% CI 2.5-4.5, stage 3 HR 6.8 95% CI 5.1-9.0, stage 4 HR 14.7 95% CI 11.1-19.5).

Conclusions: Age-adjusted incidence of SC decreased, but age-adjusted mortality increased. Only stage of cancer influenced survival of SC significantly in the Arkhangelsk region of Russia.

A13

Meat intake, cooking methods, and risk of proximal colon, distal colon, and rectal cancer: the Norwegian Women and Cancer (NOWAC) cohort study

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Introduction: Intake of red and processed meat is an established risk factor for colorectal cancer (CRC), but the epidemiologic evidence is still limited for subsites, in particular of the colon. It also remains unclear why meat seems to increase CRC risk.

Aims: To examine associations between meat intake and risk of proximal colon, distal colon, and rectal cancer, taking into account additional information about meat cooking methods. We also estimate the effect of measurement error in food frequency questionnaire (FFQ) data.

Methods: In the population-based NOWAC cohort we examined associations of meat intake and incidence of CRC, including subsites, in 84 538 women who completed a mailed questionnaire incorporating a validated FFQ during 1996-1998 or 2003-2005 at age 41-70 years (baseline or exposure update). Follow-up was through 2009. Hazard ratios (HRs) were estimated by Cox regression and corrected for diet measurement error using 220 NOWAC women with both FFQ and repeated 24-hour recall data, and the SAS macro BLINPLUS.

Results: There were 674 cases of CRC (459 colon, of which 242 proximal and 167 distal, and 215 rectal) with follow-up ≥ 1 (median 11.1) years. Processed meat intake ≥60 vs. <15 g/day was associated with significantly increased risk of CRC in all subsites. The risk increase was higher for distal (113%) than proximal (69%) colon cancer, and higher for rectal (71%) than total colon (54%) cancer. The effect of processed meat was mainly driven by sausage intake. Most associations were strengthened by calibration, but were not statistically significant due to wider confidence intervals. Our study did not support an association between CRC risk and intake of red meat, dishes with meat, chicken, or meat cooking methods.

Conclusions: High intake of processed meat was associated with increased risk of CRC in all subsites, but with differences in magnitude.

A14

The Norwegian Twin Registry

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Norway has a long standing tradition in twin research, but the data collected in several population-based twin studies were not coordinated centrally or easily accessible to the scientific community. In 2009 the Norwegian Twin Registry (NTR) was established at the Norwegian Institute of Public Health (NIPH) in Oslo, with initial funding from NIPH and University of Oslo and Oslo University Hospital. The principal reasons for establishing the registry are to create a single resource for Norwegian twin data and promote research that exploits the value inherent in twin designs and create a resource for studies in genetic epidemiology. As of today the Norwegian Twin Registry contains 47 989 twins covering birth years 1895-1960 and 1967-1979; 31 440 of these twins have consented to participate in medical research (comprising 5439 monozygotic pairs, 6702 dizygotic same sexed pairs and 1655 dizygotic opposite sexed pairs). In addition DNA from around 4800 twins is banked at the NIPH biobank. New studies are continuously adding new data to the registry. The value of the Norwegian twin data are greatly enhanced by the linkage opportunities offered by Norway's many nationwide registries spanning a broad array of medical, demographic and socioeconomic information.

Access to data from the NTR is applied for through an application (www.fhi.no/tvilling) and granted by a steering committee which reviews applications according to a set of NIPH guidelines.. NTR also has responsibility to evaluate ethical aspects of all projects (even though they have been approved by the applicant's ethical review board) to ensure that they follow the proper consent procedures. Access to biological samples is more restricted, being a limited resource, and results from analyses must be returned to NTR for general use. Access fees are charged to cover administrative and data management costs incurred by the project.

A15

Determinants of plasma levels of the interferon-γ induced inflammatory markers neopterin and kynurenine/tryptophan ratio, and kynurenines in The Hordaland Homocysteine Study

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Introduction: There is a growing interest in the role of the interferon-γ mediated inflammatory markers neopterin and kynurenine/tryptophan ratio (KTR) and the metabolites of the kynurenine pathway in age related diseases. However, little is known about their determinants.

Aims: We investigated age, sex, renal function, body mass index (BMI), smoking, and physical activity as potential determinants of neopterin, KTR and several kynurenines in a population based study.

Methods: Cross-sectional analyses were performed among 3,723 middle aged (46-47 years) and 3,329 elderly participants (70-72 years). Differences in plasma concentrations of neopterin, tryptophan, and the kynurenines kynurenine, anthranilic acid, kynurenic acid, 3-hydroxykynurenine, 3-hydroxyanthranilic acid, and xanthurenic acid across subgroups of determinants were tested by Mann-Whitney U test. Associations were further investigated by multiple linear regression.

Results: Neopterin, KTR and all kynurenines, except 3-hydroxyanthranilic acid and xanthurenic acid, were 17 to 32% higher in elderly than in middle aged participants, whereas tryptophan was 5% lower. Men had higher concentrations (8-18%) of tryptophan and all kynurenines, except 3-hydroxykynurenine and anthranilic acid, compared to women of the same age. After adjustment for age, gender and lifestyle factors, reduced renal function was associated with 21% higher neopterin and KTR, and 17-31% higher concentrations of kynurenines except 3-hydroxyanthranilic acid. Additionally, KTR, tryptophan and all kynurenines, except anthranilic acid, were 3 to 16% higher in obese, and 3 to 7% higher in overweight compared to normal weight individuals in the multivariate model. Lastly, heavy smokers had 4 to 15% lower levels of tryptophan and all kynurenines, except 3-hydroxykynurenine ($P<0.001$ for all differences).

Conclusions: In the current study, age and renal function were the strongest determinants for plasma neopterin, KTR and most kynurenines, whereas gender, BMI, and smoking were associated to a lesser extent with most kynurenines. Additionally, KTR was moderately positively associated with BMI.

A16

The health hazards of marriage. A cohort study of 12,500 Norwegian couples in the HUNT Study

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Introduction: Spouses' health are associated, but it is not known to what extent this reflects factors already there when the couples initially came together or if spouses influence one another's health.

Aim: To study the risk of work disability – a measure of substantially reduced health – within couples, taking account of baseline health, lifestyle and socioeconomic factors.

Methods: A Norwegian cohort of 12,511 couples aged 20-67 (HUNT2 Study, aged 20 or more in 1995-97), was followed until the end of 2007, identifying all new cases of disability pension (DP). Health was assessed with self-rated health, chronic somatic conditions, somatic symptoms, mental health and lifestyle. The clustering of spousal DP was assessed with a conditional intraclass correlation coefficient (ICC) and median odds ratio (MOR). The relative risk of receiving DP following the partner's timing of DP was evaluated with cox regression models.

Results: About 16% of the DP propensity could be attributed similarities between spouses. Having a disability retired spouse was associated with an increased risk of receiving DP, Hazard ratio (HR) 1.68 (95% CI 1.47-1.93) for men and HR 1.58 (95% CI 1.39-1.79) for women. The risk of DP was evenly increased both before and after the partner's DP, for both men and women. The association was attenuated, but remained, after adjustment for health, lifestyle and education.

Conclusions: There was a substantial clustering of disability pensions within couples – robust to adjustment for health, lifestyle and education. The risk of DP was increased both before and after the spouse received DP, and was independent of whom of the couple was pensioned first. These results support that spousal similarities in health are partially caused by mutual influence. From a clinical perspective, the family situation thus needs to be taken into account when addressing health promotion and work participation.

B1

Long-term consequences of cancer in childhood, adolescence and young adults

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Introduction: Cancer is one of the most common causes of death in young people in developed countries. However, due to improvement in childhood cancer treatment during the past few decades, the number of long-term survivors of cancer in young ages (0-24 years) is growing rapidly.

Aim: The study aim was to explore the relationship between cancer in children (0-14 years), adolescents (15-19 years) and young adults (20-24 years) and long-term outcomes.

Method and materials: All children born alive in Norway during 1965-85, approximately 1.3 million individuals, were defined as our study cohort and followed up from birth into adulthood by linking compulsory national registers (including the Cancer Registry of Norway, the Cause of Death Registry and data from the National Insurance Scheme). All cancer cases were identified, and the risk of early death (within five years after diagnosis) and the medical long-term consequences (in five years survivors) were explored. Sub-hazard ratios were estimated using competing risk models. For rare outcomes, standardized incidence ratios were used.

Preliminary results: A total of 5,828 individuals were diagnosed with cancer (56.3 % males). A total of 1,415 individuals died from cancer (60.2 % males) within five-years after diagnosis. In general, sub-hazard ratios of early deaths among the cancer patients decreased from 1965. Except for all hematopoietic malignancies, adolescents and young adult patients had lower risks of cancer death than children. 70 % of childhood cancer patients survived at least five years (55.2 % males). Elevated risks of developing subsequent malignancies and disabilities among the cancer patients were observed.

Conclusion: The risk of cancer death among the cancer patients has been substantially reduced since 1965. There was, however, an increased risk of developing subsequent malignancies and other chronic diseases among those surviving cancer at young ages.

B2

Socio-economic position in childhood and adulthood, intelligence, and health

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Introduction: Socio-economic position (SEP) in childhood and in adulthood, and intelligence are all predictors of adult health. However, the relationships between them have been much debated.

Aim: To study these relationships, using a Norwegian birth cohort.

Methods: All persons live-born in Norway 1967–1976 (N= 626 928) were followed up in several national registers. The present study included all males born in 1967–71, with data on parental education, general ability, and own education, who were healthy at age 18-19 years and at risk of sickness absence at start of follow-up (N = 99 787). Health outcome was the 4-year risk (2000–2003) of at least one spell of sickness absence. Parental education level and taxable income during childhood served as indicators of childhood SEP, whereas own education level at the age of 28 years and type of work in 2000 were indicators of adult SEP. Intelligence test scores (IQ) were recorded at military conscription (age 18–19 years). Risk differences (RDs) were estimated using generalized linear models.

Results: A total of 22 270 subjects (24%) had sickness absence during follow-up. There were consistent gradients according to all predictors (childhood and adult SEP, and IQ), stronger for own education (RD 35 percent points, pp, between highest and lowest category) and IQ (RD 39 pp), than for parental education and income (RD 25 and 15 pp, respectively). All effects were weakened when the other predictors were included in the analyses. Adjusted RDs of parental education and income were considerably reduced (to 5 and 3 pp, respectively), while own education and IQ both retained quite strong effects (adjusted RDs 23 and 17 pp, respectively).

Conclusion: These results suggest that most of the effect of childhood SEP was mediated via IQ and adult SEP, while the effect of IQ was only in part mediated through adult SEP.

B3

The relationship between high birthweight and IQ in young adult age

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Introduction: Higher birthweights have been associated with higher IQ in a curvilinear fashion. However, the shape of the curve is disputed, in particular whether an IQ dip observed in high birthweight groups is explained by between-family socioeconomic differences.

Aim: To study the relationship between birthweight and IQ with a focus on high birthweights.

Methods: All persons live-born in Norway 1967-1976 were followed up in several national registers. The present study included all males with data on birthweight and gestational age in the Medical Birth Registry of Norway, and intellectual capacity score measured at military conscription (age 18-19 years). Birthweight was standardized for gestational age and categorized into eight z-score groups between 4 SDs below and 4 SDs above the mean (zBW). Intellectual capacity score was transformed into IQ units. The analysis was restricted to 89 055 men from 42 515 families where two to six brothers had data on zBW and IQ. We applied random-effects and fixed-effects regression with mother's identity as panel variable. Mean family (brothers) zBW, year of birth, birth order, parental education level, maternal income, maternal age, and mother's number of births were included as covariates.

Results: Grand mean IQ was 101.5 (SD 13.8). IQ was lowest in the lowest zBW group, increasing to a maximum 102.5 for zBW 1-2, thereafter decreased to 100.8 for zBW 3-4. Compared to the reference (zBW 0-1) the coefficient for the highest zBW group was +0.2 (95% CI -1.0 to +1.4) in random-effects and +1.8 (+0.3 to +3.2) in fixed-effects regression. The main explanation for this discrepancy was that brothers of high zBW men had lower IQ scores than men without high zBW brothers.

Conclusions: The IQ dip in high birthweight groups may be explained by between-family differences. Within-family analysis rather suggests that moderately higher IQ extends into the highest birthweights.

B4

Factors associated with high maternal age when having the first baby

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Introduction: Postponement of childbirth is a common phenomenon in modern societies. In Norway, the mean age at first birth was 28 years in 2011.Delaying childbirth is problematic for several reasons; the ability to conceive spontaneously or even by assisted reproduction technologies decreases age increases. For those who become pregnant at an advanced age, the risk of medical complications and interventions increase. Consequently, postponing childbirth may be associated with suffering for the individual and costs for the society.

Aim: To describe characteristics of women who gave birth to their first child at an advanced and very advanced maternal age, including their socio-demographic background, social relationships, health behavior, physical and mental health, and reproductive history.

Method: Cross-sectional data from the Norwegian Mother and Child Cohort Study. The sample included 41 236 nulliparous women. Data were collected by the first questionnaire distributed in week 17 of pregnancy during the recruitment period 1999–2008. Descriptive variables in relation to age was investigated, by means of bivariate and multivariate logistic regression analyses. Main outcome measures. Advanced (33–37 years) and very advanced (≥38 years) maternal age.

Results: Women who had their first baby at an advanced or very advanced age differed from the younger women with regard to a wide range of background characteristics. Problems related to physical aging were more common (infertility, physical health problems, sleep problems, depression and fatigue). Of the socio-demographic factors; high annual income and low level of education were most strongly correlated with high maternal age, followed by single status, unemployment, unsatisfactory relationship with partner and unplanned pregnancy.

Conclusions: Besides having more age-related reproductive and physical health problems, women who had their first baby at an advanced or very advanced age constituted a heterogeneous group characterized by either socioeconomic prosperity or vulnerability.

B5

Expectations and experience of childbirth in first-time mothers of advanced age

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Introduction: Whereas the higher rates of medical complications in first-time mothers of advanced age are well described, less is known about their experience of childbirth.

Aims: To investigate the associations between advanced maternal age in primiparous women and their antenatal expectations as well as their postnatal assessment of the birth experience.

Methods: The study is based on the National Norwegian Mother and Child Cohort Study (MoBa) conducted by the Norwegian Institute of Public Health. 30 065 nulliparous women were recruited between 1999 and 2008 from hospitals and maternity units. Data on maternal background characteristics and expectations on the upcoming birth were collected by means of questionnaires in gestational weeks 17 and 30, and the experience of childbirth was assessed at 6 months after the birth. Data were also retrieved from the national Medical Birth Register. Advanced age was defined as ≥32 years and the reference group as 25-31 years. Descriptive analyses over the age span and multiple logistic regression analyses were conducted.

Results / Conclusion: Results will be presented at the conference.

B6

Causes of perinatal deaths at a tertiary care hospital in Northern Tanzania 2000-2010: A registry based study

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Background: Perinatal mortality reflects maternal health as well as antenatal, intrapartum and newborn care, and is an important health indicator. Different classification systems of perinatal deaths have been developed, but due to lack of data, few systems have been applied on perinatal deaths in developing countries. This study aimed at classifying causes of perinatal deaths in order to identify possible areas of prevention of such deaths.

Methods: A total of 1958 stillbirths and early neonatal deaths above 500 g between July 2000 and October 2010 registered in the Medical Birth Registry and neonatal registry at Kilimanjaro Christian Medical Centre (KCMC) in Northern Tanzania were studied. The deaths were classified according to Neonatal and Intrauterine deaths Classification according to Etiology (NICE).

Results: Overall perinatal mortality was 57.7/1000, of which 1219 (35.9/1000) stillbirths and 739 (21.7/1000) early neonatal deaths. Major causes of perinatal mortality were unexplained asphyxia (n=425, 12.5/1000), obstetric complications (n=303, 8.9/1000), maternal disease (n=287, 8.5/1000), unexplained antepartum stillbirths after 37 weeks of gestation (n= 219, 6.5/1000), and unexplained antepartum stillbirths before 37 weeks of gestation (n=184, 5.4/1000). Among the obstetric complications, obstructed/prolonged labour was the leading condition (251/303, 82.8%). With respect to maternal disease, preeclampsia/eclampsia was the leading condition (253/287, 88.2%). After excluding women who were referred for delivery at KCMC due to medical reasons, perinatal mortality was reduced to 45.6/1000. This reduction was mainly due to fewer deaths from obstetric complications (from 8.9 to 2.1/1000) and maternal disease (from 8.5 to 5.5/1000).

Conclusion: The distribution of causes of death in this population suggests a large potential for prevention. Early identification of mothers at risk of pregnancy complications through antenatal care screening, teaching pregnant women to recognize signs of pregnancy complications, timely access to obstetric care, monitoring of labour for fetal distress, and proper newborn resuscitation are all important in order to improve perinatal outcomes.

B7

Recurrence risk of perinatal mortality in Northern Tanzania: a registry-based study

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Introduction and objective: Perinatal mortality is as high as 5% in many countries in sub-Saharan Africa. Little is known about heterogeneity of risk reflected in the tendency of mothers to re-experience perinatal deaths in subsequent deliveries. We compared the risk of a perinatal loss between women who did, and women who did not lose their baby in a previous pregnancy.

Methods: A prospective cohort study was conducted at Kilimanjaro (KCMC) Medical Birth registry. A total of 19,811 women who delivered singletons in two or more separate births at the KCMC hospital between 2000 and 2008 were followed for subsequent deliveries up to 2010. We used a unique maternal hospital number to identify these mothers. Women who had a multiple birth, or who were referred from rural areas for various medical reasons were excluded. We estimated perinatal mortality in a subsequent delivery depending on the outcome of the first delivery.

Results: A perinatal loss increased a woman's likelihood to be recorded with a next pregnancy in our data from 19% to 31%. The recurrence risk of perinatal death for women who had already lost one baby was 9.1% compared with a much lower risk of 2.8% for women who already had a surviving child, for a relative risk of 3.2 (95% CI: 2.2–4.7). Recurrence contributed 15% of perinatal deaths in subsequent pregnancies. Preeclampsia, placental abruption, placenta previa, induced labour; preterm delivery and low birth weight in a previous pregnancy were also associated with increased perinatal mortality in the next pregnancy.

Conclusions: Some women in Africa carry a very high risk of losing their child in a pregnancy. Strategies of perinatal death prevention may attempt to target pregnant women who are particularly vulnerable or already have experienced a perinatal loss.

B8

Risk of stillbirth and infant mortality among immigrants in Norway

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Introduction and aims: Epidemiological studies have described pregnancy outcomes of immigrant women in European receiving countries, with conflicting results. Some groups have the same or even better perinatal health than the population of the receiving country, other have poorer pregnancy outcomes.

We have identified pregnancy outcomes among ethnic minority groups in Norway. By comparing the Norwegian majority population with the largest minority groups who gave births in the period 1980 to 2010, we'll find whether negative pregnancy outcomes differ with ethnicity.

Methods: Information from the Medical Birth Registry of Norway on all births was linked to the Country of Birth File and information from Statistics Norway on parents' education. Women in the eight largest immigrant groups and Norwegian women who gave births in Norway from 1980 to 2010 were identified (N = 1,790,167). The main outcome measure was stillbirth and infant mortality, and the differences between the ethnic groups were estimated as rates and relative risks approximated as odds ratios in logistic regression.

Results: Compared with the majority population, the relative risks of stillbirth were 1.7 (95% CI=1.39-2.11) for Sri Lankans, 1.6 (1.36-1.96) for Somali and 1.5 (1.34-1.74) for Pakistani women. For the Iraqis (0.7, 0.57-0.97) and Vietnamese (0.8, 0.62-1.13) women the stillbirth risk was below the reference group. The relative risk for infant mortality was 2.2 (95% CI=1.71-2.71) for Somali, 2.1 (1.79-2.41) for Pakistani, 1.7 (1.26-2.29) for Sri Lankans and 1.6 (1.19-2.22) for infants of Iraqis women. Only the Philippines had equal risk of infant mortality than the Norwegians, but not significant (1.0, 0.73-1.41).

Conclusion: Within the Norwegian objective of social inequality of health, integration and equal rights is a central part. This includes social equity in pregnancy outcomes. If the pattern of pregnancy outcomes among minority groups differs significantly from the rest of the population, it may be necessary to materialize specific strategies to meet the needs of those groups.

B9

Critical periods of weight development in infancy and childhood: A populationbased longitudinal study of schoolchildren in Norway

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Introduction: Identification of critical ages where children are at particular risk for becoming overweight is most relevant for primary prevention. Rapid infant growth and early onset of overweight has been associated with overweight at 7-9 years. Population based longitudinal studies addressing differences in growth curves between overweight and not overweighed children at 8-9 years are however scarce.

Aims: The objectives of the present study are to explore characteristics of early childhood growth for becoming overweight or obese at 8-9 years, identification of critical ages for the onset of overweight and gender differences.

Methods: Child Growth in Norway is a nationwide monitoring study of weight, height and waist circumference in third graders (8-9 years). The participating rate is 90%. From 3214 participants in 2010, up to 13 measurements of height and weight between birth and 8-9 years of age were collected from health records. Growth curves were compared between children with overweight and children with a normal BMI at age 8-9. Growth curves were modeled with regression splines, and analyzed using multi-level techniques.

Results: The growth curves from birth indicate that the overweight group at 8-9 years already the first year (3-6 months) had significantly higher BMI than those not being overweight at 8-9 years. The difference excelled from 4 years. The group having waist to height ratio (W/Hr) ≥0.5 at 8-9 years showed similar results.

Conclusion: The study indicates early infancy to be the first critical period for the onset of overweight at 8-9 years**.**

B10

A poor self-rated health and a reduced health related quality of life are related to an increased risk of lung cancer

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Introduction: Self-rated health and health-related quality of life (SF-12) have shown to be good predictors of various health- related outcomes including cardiovascular disease and mortality. No previous studies have studied the association between these health measures and the risk of cancer.

Aim: The aim of this study was to investigate whether self-rated health and SF-12 were associated with later development of cancer.

Methods: The study had a follow-up design. Data from the health survey in Hordaland 1997-99, Norway, was merged with data from the Cancer Registry in Norway by using a personal identification number. The respondents (N = 25 532) filled out a questionnaire including questions on life-style factors and quality of life and were followed over a ten years period. The risk of cancer was estimated using Cox-regression models.

Results: Respondents with poor self-rated health had an increased, but non-significant, risk of overall cancer**.** Analysis was done on different subgroups of cancer, and a marked and significant increased risk was found between those who rated their health as poor and lung cancer with a crude hazard ratio of 6.13. Low scores on physical function, role physical, bodily pain and general health in SF-12 also showed a marked and significant increased risk for lung cancer. The associations for self-rated health, physical function and general health with development of lung cancer remained significant after adjusting for relevant variables.

Conclusion: The results suggest that respondents with poor self-rated health have an increased risk for developing lung cancer. The effect of a poor self-rated health seems to be related to reduced physical function and general health. Due to the explorative analysis of the specific cancer types, these findings need to be confirmed.

B11

Municipal Health Profiles: Communicating Health Statistics in a New Way

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Introduction: According to the Norwegian Public Health Act, which entered into force on January 1st 2012, Norwegian municipalities and counties were tasked with producing overviews of health and impact factors. An evidence-based approach to this work requires access to relevant, scientifically based and easily understandable statistics, and the Norwegian Institute of Public Health was commissioned to make available data from national registers.

Aims: The main aim was producing a set of key indicators providing a snapshot of the overall health of the local population, and highlight potential problems through comparison with the county and national averages.

Methods: Underlying data were central health records and other relevant data on health and impact factors. To ensure that statistics were comparable in time and space, different methods were used: presenting statistics as averages over several years, age- and sex standardization, and harmonizing time-series with respect to municipal mergers and border-changes. The main traits of each municipality were summarized in computer-generated health profiles.

Results: Each of Norways 430 municipalities received an individual health profile in the form of a 4-page leaflet with textual and graphical presentation of key indicators. The profile may also serve as an advert for the Municipal Health Statistics bank (Kommunehelsa statistikkbank) which contains more complete statistics.

Conclusions: The health profiles have been well received and are perceived as statistics presented in an intuitive and popular, yet scientifically based manner, and act as a trigger for further study of available statistics. The project has also generated a number of research questions related to both inter- and intra-municipal variation in health and influencing factors.

Going forward, we will focus on some challenges related to data access: i) censoring of small numbers in data from data providers, ii) linking to socioeconomic status and iii) statistics on ghettofication.

B12

Increased hip fracture risk in older persons exposed to antidepressant drugs. A nationwide cohort study in Norway

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Introduction: Hip fractures are highly prevalent in older persons, with great implications for morbidity and mortality. Hip fractures are usually caused by a combination of osteoporosis and a fall, and antidepressant drug exposure may affect both conditions.

Aims: To examine associations between antidepressant drug exposure and hip fracture risk in older persons and to estimate the attributable risk of antidepressant drug exposure on hip fracture risk.

Methods: Design: Nationwide prospective cohort study including the Norwegian population aged 60+. For the study period, 2005-2010, data was obtained regarding all prescriptions of antidepressants, by items' generic name, ATC code and Defined Daily Dose (The Norwegian Prescription Database), and date of primary hip fracture (The Norwegian Hip Fracture Register).

Exposures: Any antidepressant (N06A); tricyclic antidepressants (TCAs) (N06AA), serotonin reuptake inhibitors (SSRIs) (N06AB) and other antidepressants (N06AG + N06AX).

Main outcome measures: Standardized incidence ratio (SIR) of hip fracture.

Statistical analysis: Hip fracture incidences during person time exposed and unexposed to antidepressant drugs were compared by calculating SIR. SIR >1 indicates increased hip fracture risk during antidepressant drug exposure.

Results: The study population comprised approximately 900,000 persons, of about 40,000 (4.4%) experienced a primary hip fracture. Increased risk of hip fracture was found for persons exposed to any antidepressant drug. Being exposed to SSRIs increased risk more than being exposed to TCAs. The excess fracture risk was higher in exposed men, than exposed women. Generally, SIR decreased with increasing age.

Conclusions: This study indicates increased hip fracture risk in persons exposed to antidepressants, especially SSRIs. These associations need to be further explored in clinical studies. SSRIs are extensively prescribed for older persons, necessitating careful evaluation of potential risks and benefits for individual patients.

B13

Defining hospital stays

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Introduction: The Norwegian Knowledge Centre for the Health Services has estimated 30-day mortality and readmission rates for Norwegian hospitals. Double counting of patients and omitting hospital stay may bias the results in studies based on hospital admission data.

Aim: The aim was to define continuous hospital stays when calculating 30 days mortality and readmission rates, in order to eliminate bias.

Methods: Nation-wide patient administrative data were retrieved for patients discharged during 2005-2009. Each record was an admission to a ward within a hospital department. The admissions were aggregated to higher levels: stays at a department, hospital stays and, if necessary, stays involving more than one hospital.

We developed an algorithm that concatenates the ward admissions to a chain of admissions. The input is a serial number, a patient identifier, date of admission, date of discharge, hospital, department and further optional parameters. The algorithm is implemented in *R*, and is adapted to parallel processing in order to handle large datasets. One of the properties of the algorithm is that different time tolerances for concatenating the ward admissions can be given. When an episode of care includes ≥ 2 hospitals, the outcome can be assigned to each hospital by the fraction of time spent at each hospital (weighted outcome), thus all admissions and all patients are utilized.

Results: With the choice of 8 hours time tolerance we found 12,500,949 hospital stays involving one or more hospitals out of 19,777,661 ward admissions (including 3,676,933 patients).

Conclusion: The algorithm can be used to aggregate large patient administrative data sets, with acceptable running times. This can also be applied to large epidemiological cohorts, where for instance subjects are moving during follow up. The tolerance limit can be adjusted to suit the purpose and the data at hand.

C1

Road traffic noise exposure, sleep quality and mental health

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Introduction: Noise is the environmental factor affecting the largest proportion of the Norwegian population. Road traffic is the main source of noise annoyance. One of the more serious effects of environmental noise is sleep disturbances. There is some evidence that environmental noise may be associated with milder psychological conditions, and some, but diverging evidence of an association with anxiety and depression. Further, there is a well acknowledged interrelationship between sleep quality and mental health. Although poor sleep quality has been defined as a component of mental disorders, some studies indicate that sleep disturbances also may be an independent risk factor for reduced mental health. Thus, sleep quality may be a mediating factor in the relationship between environmental noise and mental health. We have found no study that has examined the role of sleep quality in the association between road traffic noise and mental health.

Aims: The aim of the study was to examine the relationships between road traffic noise, sleep quality and psychological distress among inhabitants in Oslo.

Methods: The study was based on a survey on noise and health outcomes conducted in 2000 (n=2459). The road traffic noise exposure (day-evening-night level, L_{den}) of the subjects was calculated at the most exposed façade of the home address. Mental distress (Hopkins Symptom Checklist) was measured along with somatic health, sleep quality, noise sensitivity and socio-economic variables. Multivariate regression analyses were conducted, adjusted for other risk factors and stratified by sleep quality.

Results: There were more subjects with poor sleep quality in the highest noise category compared to lower noise categories. A relationship between reduced mental health and road traffic noise was found among subjects with poor sleep quality.

Conclusions: An association between noise exposure, sleep quality and mental health was found. However, further studies are needed to disentangle causal mechanisms.

C2

Do toxic metals in municipal drinking water increase the risk of hip fractures? The NOREPOS study

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Introduction: After several decades with increasing hip fracture incidence, the rates have leveled off and are even declining in some Western countries. At the same time there has been a reduction in pollutants, such as the toxic metals cadmium, lead and aluminum in the environment. Geographic variations in fracture rates indicate that a decreased exposure to harmful environmental factors in some areas could be contributing to this decline. Our aim was to investigate a possible effect of cadmium, lead and aluminum in municipal drinking water on the incidence of hip fracture in the Norwegian population. We were also interested in examining possible interactions because the concentration and uptake of metals may depend on other water quality factors related to bone health.

Methods: Using Geographic Information Systems, a survey of trace metals in 556 Norwegian waterworks was linked to hip fractures from hospitals throughout the country (1994-2000). Between ages 50-85, 5,469 men and 13,588 women had suffered a hip fracture. Poisson regression (incidence rate ratios) was used to investigate the effects of cadmium, lead and aluminum on the incidence of hip fractures. Models were adjusted for age, region, water source and other water quality factors. Multiplicative interactions between water quality factors were examined, controlling for false discovery rate (FDR).

Results: In men and women, respectively, incidence rates of 32 and 56 per 10,000 personyears were found between 1994-2000. Men exposed to a higher than average concentration of cadmium in drinking water had an increased incidence of hip fracture (IRR=1.14, 95% CI: 1.04, 1.24). An increased risk was also seen in men with a higher than average concentration of aluminum (IRR=1.08, 95% CI: 1.01, 1.16). The effects of high lead or high aluminum varied between levels of pH. When the pH was low, a high concentration of these metals significantly increased the risk of hip fracture in women. Furthermore, high cadmium combined with high zinc or high phosphorous also increased the risk compared to low cadmium. In both genders, an increased risk was found with high lead when either the iron or aluminum concentrations were high.

Conclusions: An increased risk of hip fractures was seen in both genders when exposed to a higher concentration of cadmium, lead and aluminum in municipal drinking water; however the effects of these toxic metals varied significantly depending on the concentration of other components in the water, especially among women.

C3

The association between urban green space and health in Oslo, Norway

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Introduction: The evidence that nature and green areas have a positive effect on a variety of different health outcomes has grown substantial. At the same time, the increasing urbanization in Europe and the need for urban densification puts pressure on urban green areas. In Norwegian urban areas the green vegetated areas are scaled back since the densification policy started in the 1990ies and large areas were fragmented.

Aims: The aim of this study was to investigate possible associations between self-reported health, psychological distress and the degree of greenness in Oslo, Norway. In addition we wanted to investigate possible associations with other life-style related diseases such as cardiovascular diseases, diabetes and musculoskeletal pain.

Methods: Data were obtained from the Oslo Health Study (HUBRO). We included only participants below 70 years (n=15364). Only 8696 (57%) participants were included in the analyses due to missing values. The green structure data were derived from SPOT-satellite images from 2006. The green land cover was categorized in two main categories and ten subcategories with automatic classification of satellite data combined with other data sources. With this classification method all green areas were involved in the analysis regardless to ownership. Potential confounders included were age, sex, ethnicity, education, physical activity, use of alcohol, occupation, negative life events, and social support (individuals) and mean income percentage living in own house, and mean education (neighborhoods). Data were analyzed using logistic regression analysis.

Results: For men and women mental disorder decreased significantly with increasing greenness ($p=0.035$ and $p=0.001$, respectively). For women only we observed that general health deteriorated with increasing greenness ($p < 0.001$) and diabetes and the percentage of women with complains increased with increasing greenness ($p=0.027$ and $p = 0.012$).

Conclusions: In our study there were several gender differences in the relationship between greenness and health.

D1

Methodological papers describing the population based HUNT Study, Norway

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Introduction: The Nord-Trøndelag Health Study (HUNT) includes large total population-based cohorts from the 1980ies, covering 125 000 Norwegian participants; HUNT1 (1984-86), HUNT2 (1995-97) and HUNT3 (2006-08). Data on adults from HUNT2 and HUNT3 are pooled together with several other regional consent-based data sets in the Cohort of Norway (CONOR). The HUNT Study was primarily set up to address arterial hypertension, diabetes, screening of tuberculosis, and quality of life. However, the scope has expanded over time. In the latest survey a state of the art biobank was established, with availability of biomaterial for decades ahead. The three population based surveys now contribute to important knowledge regarding health related lifestyle, prevalence and incidence of somatic and mental illness and disease, health determinants, and associations between disease phenotypes and genotypes.

Aims: To present the work with methodological papers in the HUNT Study and the related CONOR project.

Methods: A methodological cohort profile paper covering the adult part of the HUNT Study is published in International Journal of Epidemiology. A comparable CONOR paper has been published in 2007. Papers covering the Young-HUNT Study, the HUNT Biobank and a paper comparing participants to non-participants in HUNT are forthcoming.

Results: The described methodological papers give an excellent overview of the material in the HUNT Study and in CONOR.

Conclusions: Methodological papers are of great value for a lot of researchers using population based data in Norway.

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