

Abstracts

Parallel session A

Population health I

001 WEALTH AND HEALTH IN EUROPE AND THE USA: A COMPARATIVE ANALYSIS

M. Avendano¹, M. M. Glymour², J. P. Mackenbach¹. ¹Department of Public Health, Erasmus Medical Centre, Rotterdam, The Netherlands; ²Department of Society, Human Development, and Health, Harvard School of Public Health, Boston, Massachusetts, USA

Background and Objectives: There are enormous variations across countries in wealth and health inequality, but it is not known whether these translate into variations in the distribution of health. This study examines the association between wealth and health across Europe and the USA.

Data and Methods: Data comprised nationally representative samples of men and women aged 50–74 who participated in the 2004 cross-sectional Survey of Health, Ageing and Retirement in Europe (n=21 569), the English Longitudinal study of Ageing (n=8680), and the United States Health and Retirement survey (n=13 667). Measures of health, wealth and demographics were directly comparable across countries. Outcomes comprised prevalence rates of heart disease, stroke, hypertension, diabetes, cancer, lung disease and functional limitations with instrumental activities of daily living (IADL), adjusted for health behaviour risk factors and depression. Analyses were conducted using logistic regression, entering interaction terms to allow estimates of the effect of wealth to differ according to country or region, and adjusting for confounders and potential mediators.

Results: Despite their lower wealth, European adults had better health than their US counterparts, particularly at the bottom of the wealth distribution. The health gap between the upper and bottom wealth tertiles was generally smaller in Continental Europe than in the English or US population. Odds ratios (OR) for cardiovascular disease were 1.49 (95% CI 1.32 to 1.68) in Continental Europe, 1.95 (95% CI 1.63 to 2.34) in England and 1.96 (95% CI 1.72 to 2.25) in the USA. Corresponding ORs for reporting >1 IADL limitations were 1.98 (95% CI 1.72 to 2.28) in Continental Europe, 3.32 (95% CI 2.68 to 4.11) in England, and 2.70 (95% CI 2.29 to 3.19) in the USA. The association between absolute wealth and health was significantly smaller in Continental Europe, and was curvilinear at higher levels of wealth in all countries. Associations were independent from income and education, and were attenuated but remained significant after adjustment for risk factors.

Conclusion: European adults are generally less wealthy but exhibit better overall health and smaller wealth inequalities in health than their US counterparts. Variations may reflect the impact of more egalitarian wealth distribution and healthcare access policies in some European countries than in the USA.

002 COMPARISONS OF HEALTH DETERMINANTS IN REGIONAL AREAS IN EUROPE

L. A. Gray¹, J. Merlo², H. Ohlsson², E. Regidor³, D. O'Reilly⁴, A. H. Leyland¹. ¹Medical Research Council Social and Public Health Sciences Unit, University of Glasgow, UK; ²Social Epidemiology and Health Economics, Malmö University Hospital, Lund University, Sweden; ³Department of Preventive Medicine and Public Health, Universidad Complutense de Madrid, Spain; ⁴Department of Epidemiology & Public Health, Queen's University Belfast, N Ireland

Background: Relative to Western Europe, the Glasgow area has high morbidity and mortality, which may be attributable to elevated rates of negative health-related behaviours, such as smoking and alcohol consumption. Overall, Glasgow is more deprived than other regions.

Objective: To investigate whether differences in health determinants between adults in Greater Glasgow and those in selected urban areas elsewhere in Europe can be explained by socioeconomic factors.

Design: Data on age, sex, area, smoking, body mass index, alcohol consumption, physical activity, and socioeconomic factors: educational qualifications and marital status were available from the Scottish Health Survey 2003 (Greater Glasgow (n=1267)); Health Survey for England

2004, 2003 and 2002 (Greater Manchester (n=1587), Tyne & Wear/Northumberland (n=1072), Merseyside/Cheshire (n=1512)); Northern Ireland Health and Wellbeing Survey 2001 (Eastern (n=2138)); Health Survey for Scania (Malmö (n=4053), Helsingborg (n=2565), Lund (n=4533) in Sweden) 2004; and Spanish Health National Survey 2001 (Madrid (n=1998), Barcelona (n=1538), Valencia (n=871), Seville (n=495), and Malaga (n=329)). Logistic regression analyses compared health determinants in Greater Glasgow to those in other regions by sex, unadjusted and adjusted for age and socioeconomic factors.

Results: Compared with Greater Glasgow, significantly lower rates of smoking in Greater Manchester (OR 0.67; 95% CI 0.45 to 0.99), Merseyside/Cheshire (OR 0.57; 0.38 to 0.86), Malmö (OR 0.61; 0.49 to 0.77), Helsingborg (OR 0.52; 0.41 to 0.67) and Lund (OR 0.38; 0.29 to 0.48); obesity in Eastern Northern Ireland (OR 0.56; 0.40 to 0.77), Malmö (OR 0.40; 0.30 to 0.54), Helsingborg (OR 0.43; 0.32 to 0.58), Lund (OR 0.32; 0.24 to 0.43), Madrid (OR 0.43; 0.31 to 0.59), Barcelona (OR 0.39; 0.28 to 0.55), Valencia (OR 0.49; 0.33 to 0.72) and Malaga (OR 0.49; 0.28 to 0.84); excess weekly alcohol consumption (OR 0.70; 0.53 to 0.92); and physical activity (OR 0.51; 0.39 to 0.68) in Eastern Northern Ireland among men, and smoking in Greater Manchester (OR 0.67; 0.49 to 0.91), Merseyside/Cheshire (OR 0.62; 0.44 to 0.87), Malmö (OR 0.62; 0.51 to 0.75), Helsingborg (OR 0.61; 0.50 to 0.76), Lund (OR 0.39; 0.32 to 0.48), Barcelona (OR 0.71; 0.57 to 0.90) and Malaga (OR 0.49; 0.33 to 0.74); and obesity in Eastern Northern Ireland (OR 0.72; 0.55 to 0.94), Malmö (OR 0.45; 0.35 to 0.58), Helsingborg (OR 0.40; 0.30 to 0.52), Lund (OR 0.36; 0.28 to 0.47), Madrid (OR 0.47; 0.36 to 0.62), Barcelona (OR 0.41; 0.30 to 0.56), and Valencia (OR 0.45; 0.31 to 0.64); excess weekly alcohol consumption (OR 0.72; 0.53 to 0.97); and physical activity (OR 0.72; 0.56 to 0.93) in Eastern Northern Ireland among women were not explained by survey year, age group or socioeconomic factors. Significantly higher rates of smoking among men in Madrid (OR 1.52; 1.20 to 1.93), Barcelona (OR 1.57; 1.23 to 2.01), Valencia (OR 1.61; 1.22 to 2.13), and Malaga (OR 1.50; 1.03 to 2.19) and among women in Eastern Northern Ireland (OR 1.57; 1.26 to 1.95) remained after adjustment. Significantly lower rates of obesity in Seville (OR 0.62; 0.41 to 0.94) and physical activity in Greater Manchester (OR 0.68; 0.47 to 0.98) among women emerged on adjustment.

Conclusion: Negative health-related behaviours were often, but not universally, elevated in Greater Glasgow compared with other urban areas in Europe, supporting the existence of a "Glasgow effect". Disparities could not be explained by differences in education and marital status although these are unlikely to entirely represent socioeconomic profiles.

003 FEMUR FRACTURES IN EUROPE: MYTHS AND TRUTHS ABOUT GEOGRAPHIC DIFFERENCES (A REVIEW STUDY)

M. F. Pina^{1,2}, J. Moreira¹, S. Alves^{1,3}. ¹Instituto de Engenharia Biomédica, Laboratório de Biomateriais, Universidade do Porto; ²Serviço de Higiene e Epidemiologia, Faculdade de Medicina, Universidade do Porto; ³Escola Superior de Tecnologia da Saúde do Porto, Instituto Politécnico do Porto, Portugal

Objectives: The objective of this study was to identify the geographical pattern of incidence rates, for men and women, of osteoporotic femur fractures in European Countries.

Methods: The information was selected from articles published in scientific journals, according to the following parameters: studies conducted in European Countries, based on hospital admissions, of individuals (aged ≥50 years) with femur fractures caused by low energy impact, and diagnosis code ICD9CM (International Disease Codes, 9th revision, clinical modification) 820–820.9. To be included, the studies should have the incidence rates for men and women available from any period between 1995 and 2005 and published in English, French, German, Spanish, Portuguese or Italian languages.

Results: Thirty studies from 20 different countries were selected. Fractures increase with age and are higher in women than in men in all the studies. Mean age of fractures was 70.5 and 79.6 year old for men and women respectively, ranking from 59.3 in Serbia Montenegro to 80.7 in Spain, for men and 72.6 in Serbia Montenegro to 82.5 in Sweden. For men the higher rates were observed for Lithuania, Norway and Sweden; for women, in Iceland, Norway and Sweden. The lower rates observed in men and women were in Russia and Greece.

Conclusions: No continuous increase of the incidence rates, from south to north Europe, as it is describe in the literature, was observed. There is northwest-southeast gap (first quartile), in both genders, from UK to Greece. Mediterranean countries, such as Portugal, Spain or Italy are in the second quartile, while Norway, Sweden and Iceland are in the fourth quartile. Limitations of the study are: few studies from east European countries, and some studies referred to regional data, while others to national data.

Maternal and child health I

004 SMOKING DURING PREGNANCY AND LOW BIRTHWEIGHT OUTCOMES IN MASSACHUSETTS FROM 1989 TO 2004: AN EPIDEMIOLOGICAL STUDY

Z. Kabir^{1,2}, G. N. Connolly¹, L. Clancy², B. C. Cohen³, H. K. Koh¹. ¹Harvard School of Public Health, Boston, USA; ²Research Institute for a Tobacco Free Society, Dublin, Ireland; ³Massachusetts Department of Public Health, Boston, USA

Background: The state of Massachusetts introduced a comprehensive tobacco control programme (MTCP) in January 1993. Tobacco smoke is a serious health hazard, particularly for pregnant women. Low birthweight (LBW) is a common condition that has been shown consistently to be causally related to smoking during pregnancy. Since the exposure (smoking during pregnancy) of interest occurs earlier than the outcome (LBW) in our study, any association observed between smoking and LBW is most likely to be causal.

Methods: We calculated population-attributable-risk (PAR), using the conventional formula in addition to the effect measure, which is relative risk (RR) in this study. Because the database used (Massachusetts Community Health Information Profile) captures almost all the pregnant women including their smoking status across the state, and also links the birth files with the death files, this database is a valuable resource for calculating the overall smoking prevalence among pregnant women, as well as infant mortality rates (IMR). Multiple births and pregnant women with unknown smoking status were excluded from the analysis. LBW was classified into three groups (0–1499 g, 1500–2499 g and ≥2500 g).

Results: Approximately 91 000 and 78 250 live-births occurred in 1989 and 2004, respectively. Almost 22% of mothers smoked during pregnancy in 1989, reducing to 7.4% in 2004 (66% decline), and the youngest mothers (15–24-year-olds) smoked the greatest. IMR among smoking mothers declined from 11.6/1000 live-births in 1989 to 5.7 in 2004 (>50% decline), while IMR in non-smoking mothers decreased from 6.7 in 1989 to 4.2/1000 live-births in 2004 (37% decline). The very LBW babies among smokers showed an annual decline of 8.4% (95% CI –9.1 to –7.7). In the 15-year study period, the RR of LBW among smokers decreased from 2.0 to 1.71 (a 29% overall decline). Consequently, PAR decreased from 18% to 5% over the 15-year period contributing to almost 300 fewer LBW babies between 1989 and 2004.

Conclusions: Approximately 300 fewer LBW babies were born between 1989 and 2004 in Massachusetts that could be attributed to reductions in smoking prevalence during pregnancy. In general, IMRs in Massachusetts are one of the lowest in the US, but US has one of the highest IMRs among the industrialised nations. Such positive health gains in Massachusetts can also in part be due to the beneficial impacts of the MTCP. The 2010 US Healthy People Objectives may be achieved in Massachusetts, but the fact that almost 5800 pregnant mothers (mostly young) continue smoking is worrying.

005 ALTERNATIVE COMPLEMENT PATHWAY ACTIVATION FRAGMENT BB IN EARLY PREGNANCY AS A PREDICTOR OF PREECLAMPSIA

A. Lynch¹, J. Murphy², T. Byers¹, R. Gibbs¹, M. Neville¹, P. Giclas², J. Salmon³, V. M. Holers¹. ¹University of Colorado at Denver and Health Sciences Centre (UCDHSC); ²National Jewish Medical and Research Centre, Denver Colorado; ³Hospital for Special Surgery, Weill Medical College, Cornell University New York, USA

Objectives: Preeclampsia is a multisystem disease classically defined on the basis of hypertension and proteinuria. As shown in animal studies, complement activation is associated with inflammation in the placenta and contributes to the production of antiangiogenic factors and adverse pregnancy outcomes. The association between complement activation in humans and adverse pregnancy outcomes is unclear. The purpose of this study was to determine if elevated levels of Bb in early pregnancy are predictive of preeclampsia.

Design: This was a prospective study relating blood samples drawn in early pregnancy to later incidence of preeclampsia. Analysis used multivariate logistic regression to adjust for established risk factors for preeclampsia.

Setting: An academic medical centre hospital and two affiliated prenatal clinics in Denver, Colorado, USA.

Participants: Plasma samples were drawn at less than 20 weeks gestation from 701 women and the cohort was followed throughout pregnancy for the development of preeclampsia.

Main Outcome Measure: Preeclampsia.

Results: Preeclampsia developed in 4.6% of the cohort. Women with elevated Bb (>90th percentile) were substantially more likely to have preeclampsia later in pregnancy than women who had levels <90th percentile (unadjusted RR 3.3, 95% CI 1.6 to 7, p=0.0009). Other significant risk factors for preeclampsia included nulliparity (RR 2.1, 95% CI 1 to 4), a high BMI (p=0.006 for trend) and maternal medical disease (RR 4.4, 95% CI 2 to 10). Risk factors specific to multiparous women that were significantly associated with preeclampsia included a history of pregnancy-related hypertension (RR 5, 95% CI 1.6 to 16) and a change of partner (RR 5.1, 95% CI 1.7 to 15). Adjustment for risk factors did not attenuate the association between an elevated Bb and preeclampsia (adjusted OR 3.8, 95% CI 1.6 to 9, p=0.002) in the full cohort.

Conclusions: An elevated Bb in early pregnancy is a biomarker for increased risk of preeclampsia. This observation suggests that events linked to activation of the complement pathways in early pregnancy are associated with the pathogenesis of preeclampsia.

006 INFERTILITY, INFERTILITY TREATMENT AND FETAL GROWTH RESTRICTION: DANISH NATIONAL BIRTH COHORT

J. L. Zhu¹, C. Obel^{1,2}, B. H. Bech¹, J. Olsen³, O. Basso⁴. ¹The Danish Epidemiology Science Centre, University of Aarhus, Denmark; ²Perinatal Epidemiological Research Unit, Aarhus University Hospital, Denmark; ³Department of Epidemiology, UCLA, USA; ⁴National Institute of Environmental Health Sciences, National Institutes of Health, USA

Context: Singletons born after infertility treatment have an increased risk of being small-for-gestational-age (SGA) and dying in the perinatal period. Part of the increased risk may be related to the underlying infertility.

Objective: To assess the risk of SGA and perinatal mortality as a function of time to pregnancy and infertility treatment.

Design and Setting: Danish National Birth Cohort.

Participants: From the Danish National Birth Cohort (1997–2003), we identified 51 041 singletons born of fertile couples (time to pregnancy ≤12 months), 5787 born of infertile couples who conceived naturally (time to pregnancy >12 months), and 4317 born of infertile couples who conceived after treatment.

Main Outcome Measures: SGA, defined a priori as the lowest 5% of birth weight by sex and gestational age, and perinatal mortality. We also investigated all levels of fetal growth by using a multiple regression model on birth weight adjusted for gestational age.

Results: Among fertile couples, the perinatal mortality rate was 5.0 per 1000 births and the proportion of SGA was 4.3%. Crude estimates suggested an increased risk of both outcomes among infertile couples (treated and untreated), but the odds ratios (ORs) of perinatal death among infertile couples were attenuated after adjustment for maternal age and body mass index (1.32, 95% CI 0.95 to 1.84 in untreated and 1.26, 95% CI 0.86 to 1.85 in treated couples). The elevated risk of SGA among infertile couples persisted after adjustment for maternal age, parity and smoking (OR 1.24, 95% CI 1.10 to 1.40 among untreated, and OR 1.40, 95% CI 1.23 to 1.60 among treated). The risk of SGA increased with TTP, and a longer TTP was associated with a small reduction in birth weight across the whole distribution.

Conclusion: The increased risk of SGA observed among infertile couples with or without infertility treatment suggests that infertility may be a marker of risk for intrauterine growth restriction. Treatment per se seems to have little effect on fetal growth.

Older people I

007 THE QUALITY OF HEALTH CARE RECEIVED BY OLDER PEOPLE IN ENGLAND

N. Steel, S. Maisey. Faculty of Health, University of East Anglia, UK

Objectives: To measure the extent to which people aged over 50 years received a broad range of effective healthcare interventions, for common

health conditions in both primary and secondary care, in England in 2004–5.

Design and Setting: Cohort study. Interviewers collected data using face-to-face interviews in participants' homes as part of The English Longitudinal Study of Ageing (ELSA).

Participants: 8688 people completed an interview. Participants were representative of the older population of England.

Interventions: Participants were asked questions about their health status, then whether they had received the healthcare specified by 32 indicators of quality of care in 14 conditions, plus 7 questions about patient-centred care. Quality indicators were originally developed at RAND in the USA to measure basic health care for older adults, and were then adapted for use in England.

Main Outcome Measures: The percentage of eligible quality indicators achieved for each quality indicator, and also aggregated by condition, domain of care, and overall across all conditions.

Results: 62.5% (95% CI 61.2 to 63.1) of quality indicators were achieved overall. Quality varied greatly by condition, and the percentage of indicators achieved for each condition, in order of quality from highest to lowest was: warfarin monitoring 100 (92.0 to 100), ischaemic heart disease 82.6 (79.0 to 85.8), poor hearing 79.1 (77.1 to 80.9), pain 78.0 (72.5 to 82.8), diabetes 76.1 (74.3 to 77.8), smoking 74.1 (71.6 to 76.4), hypertension 72.5 (68.6 to 76.1), stroke 65.4 (53.8 to 75.8), depression 63.6 (57.5 to 69.4), patient-centred care 58.6 (57.5 to 59.7), poor vision 57.1 (53.0 to 61.1), osteoporosis 52.8 (49.8 to 55.8), incontinence 51.3 (48.6 to 54.1), falls 43.7 (37.8 to 49.6), osteoarthritis 29.0 (26.2 to 31.9). Indicators were classified by the domain of care to which they referred, and the percentage of indicators achieved was 79.8 (77.6 to 81.9) for the screening and prevention domain, 64.0 (63.0 to 65.1) for treatment and follow-up, and 60.3 (58.3 to 62.3) for diagnosis.

Conclusions: Over one third of the population of England aged over 50 years are not receiving basic recommended care for common conditions. This lack of care has serious implications for the health of the public. Quality of care is substantially worse for some conditions than others, and initiatives to improve the quality of healthcare received by older adults are needed.

008 THE EFFECTS OF NEIGHBOURHOOD DEPRIVATION ON COGNITIVE FUNCTION IN OLDER PEOPLE: ANALYSES FROM THE ENGLISH LONGITUDINAL STUDY OF AGEING

I. A. Lang¹, D. J. Llewellyn², K. M. Langa³, R. B. Wallace⁴, F. A. Huppert⁵, D. Melzer¹. ¹Epidemiology & Public Health Group, Peninsula Medical School, Exeter, UK; ²Institute of Public Health, University of Cambridge, UK; ³University of Michigan, USA; ⁴College of Public Health, University of Iowa, USA; ⁵Department of Psychiatry, University of Cambridge, UK

Background: Cognitive function in older people is associated with individual socioeconomic status and education. Living in a deprived area is known to affect health, but whether it affects cognitive function is unclear.

Objective: To assess the relationship between cognitive function, socioeconomic status, and neighbourhood deprivation.

Design: Nationally representative cross-section.

Setting/Participants: 7126 community-dwelling individuals aged 52 or over in urban areas who participated in Wave 2 of the English Longitudinal Study of Ageing (ELSA).

Exposure and Outcome Variables: We assessed the relationship between cognitive function score and index of multiple deprivation (IMD 2004) at Super Output Area level, adjusting for a wide range of possible health, lifestyle and sociodemographic confounders.

Results: Analyses were conducted separately by gender and age group (52–69 and ≥70). All groups showed an effect of IMD independent of the effects of education and socioeconomic status. For example, in fully adjusted models, women aged 70 or over had a standardised cognitive function score (z-score) which was 0.20 (95% CI 0.01 to 0.39) lower in the bottom 20% of wealth compared to the top, 0.44 (95% CI 0.20 to 0.69) lower in the least educated group compared to the most educated, and 0.31 (95% CI 0.15 to 0.48) lower if inhabiting an area in the bottom 20% of IMD compared to the top 20%.

Conclusions: The area in which older people live, independently of their own socioeconomic circumstances, is associated with their cognitive function. The mechanisms by which this effect operates are unclear, and longitudinal analysis is needed to explore the nature of this relationship more fully.

009 THE VALUE OF PSA TESTING IN MEN AGED 65 YEARS AND OLDER

D. Connolly¹, A. Black², A. Gavin³, P. F. Keane¹, L. J. Murray². ¹Department of Urology, Belfast City Hospital; ²Cancer Epidemiology & Prevention Research Group, Centre for Clinical and Population Sciences, Queen's University Belfast; ³Northern Ireland Cancer Registry, Queen's University Belfast, Ireland

Introduction and Objectives: Many men aged 65 years and over have histological prostate cancer. Only a small proportion may present clinically with the disease and relatively few will die from prostate cancer. The widespread use of PSA testing may lead to increased diagnosis of prostate cancer in this group, in many of whom the disease may not have caused harm. We assessed initial PSA levels and the risk of clinically detected prostate cancer and prostate specific mortality in this population, in a region where PSA screening is not recommended.

Methods: The Northern Ireland Cancer Registry (NICR) maintains an electronic register of PSA tests performed in Northern Ireland, which is linked to the NICR database of incident cancers occurring within the region. All men who were aged 65 years or older and had their first PSA between 1994 and 1998 were included. These men were followed up for prostate cancer diagnosis and mortality until 31 December 2003. The absolute risk of cancer based on the level of first PSA was determined. Hazard ratios for prostate cancer and mortality based on initial PSA levels were calculated using Cox proportional hazards models with adjustment for age group.

Results: Of 36 003 men included, 2153 (6.0%) were diagnosed with prostate cancer within the follow-up period. Mean (SD) age was 74.9 (6.7) years and mean (SD) follow-up was 5.4 (2.9) years. 13 074 (36.3%) men died, with prostate cancer being the primary cause of death in 673 men (5.1% of all deaths). Within age groups, the absolute risk and hazard ratio of cancer increased incrementally with PSA level. Prostate specific mortality remained low (<5/1000 person-years) at all PSA categories <15.0 ng/ml. All cause mortality was similar in PSA categories <10.0 ng/ml, and was much greater than prostate specific mortality in all PSA categories.

Conclusions: The risk of prostate cancer and prostate specific mortality is related to initial PSA level. However, in men over 65 years, death from prostate cancer was infrequent compared to other causes, even when initial PSA was markedly elevated (up to 20.0 ng/ml). A conservative approach to invasive investigation may be appropriate in the majority of men older than 65 years.

Gastrointestinal disease

010 DEVELOPING A POPULATION PREDICTIVE MODEL FOR OESOPHAGITIS AND GASTRODUODENAL EROSIONS IN SUBJECTS WITH UNINVESTIGATED DYSPESIA

G. R. Law¹, R. M. Zagari², D. Forman³, F. Bazzoli². ¹Biostatistics Unit, Centre for Epidemiology and Biostatistics, University of Leeds, UK; ²Department of Internal Medicine and Gastroenterology, University of Bologna, Italy; ³Cancer Epidemiology Group, Centre for Epidemiology and Biostatistics, University of Leeds, UK

Background: Oesophagitis, peptic ulcer disease and other gastroduodenal erosions pose a significant risk of morbidity and mortality. There are a number of approaches to detecting a lesion, but visualising the lesion with an upper gastrointestinal endoscopy is the most accurate approach. Endoscopy is costly and invasive: a decision to use this approach should be made with evidence. Primary care studies have shown that individual dyspeptic symptoms, or subgroups based on the predominant symptom, were of little value in predicting one of these lesions. Furthermore, until recently the prevalence of lesions in the general population and their association with risk factors were unknown.

Objective: To estimate the risk of oesophagitis, a peptic ulcer, or other gastroduodenal lesions in people with dyspepsia and reflux symptoms through an assessment of demographic and lifestyle factors, a symptom profile and laboratory tests in a population-based sample.

Design: Regression models applied to a large cross-sectional, population-based survey.

Setting: During 2000–4, 1069 adults (out of 1533 invited) living in Loiano and Monghidoro, two rural villages near Bologna in Northern Italy, undertook an endoscopy. Participants also had a 13C-urea breath test to detect *Helicobacter pylori*, and completed a validated questionnaire on upper gastrointestinal symptoms, demographics, lifestyle and family and past medical history.

Main Outcome Measure: Oesophagitis, peptic ulcer or other gastroduodenal erosions observed during endoscopy.

Results: There were 746 people with no lesion, 118 with oesophagitis, and 106 with peptic ulcer or gastroduodenal erosions. Reflux symptoms alone were found to significantly raise the risk of oesophagitis (OR 3.73, 95% CI 2.10 to 6.62) but not for peptic ulcer or gastroduodenal erosions (1.52, 0.79 to 2.91). Dyspeptic symptoms with reflux symptoms were associated with an increased risk for both peptic ulcer or gastroduodenal erosions (reflux not predominant symptom: 2.08, 1.06 to 4.10; reflux predominant 1.93, 1.11 to 3.36) and oesophagitis (2.27, 1.09–4.71; 3.78, 2.22 to 6.43). Dyspeptic symptoms alone were not associated with an increased risk of either peptic ulcer or gastroduodenal erosions or oesophagitis (1.31, 0.83–2.74; 1.69, 0.91 to 3.12).

Conclusions: This study compared the prevalence of lesions in the oesophagus, stomach and duodenum between people with and without symptoms in the general population. These results, along lifestyle and demographic factors and *Helicobacter pylori* testing, will inform clinical decision-making in the management of uninvestigated patients with upper gastrointestinal symptoms. These findings suggest that a new, more appropriate, definition of dyspepsia might be warranted.

011 SMOKING AND GASTRIC CANCER: SYSTEMATIC REVIEW AND META-ANALYSIS OF COHORT STUDIES

R. Ladeiras-Lopes¹, R. Santos-Pereira¹, T. Pinheiro-Torres¹, N. Lunet². ¹Porto University Medical School; ²Department of Hygiene and Epidemiology, Porto University, Portugal

Objective: To review systematically and summarise quantitatively the evidence from cohort studies addressing the association between smoking and gastric cancer, updating a previous meta-analysis published in 1997.

Design: Systematic review and meta-analysis.

Data Sources: PubMed [(smoke OR smoking OR nicotine OR tobacco OR lifestyle OR lifestyles OR cigarette OR diet OR alcohol) AND (gastric cancer OR stomach cancer OR cardia cancer)] and reference lists hand searching.

Study Selection: Published cohort and nested case-control studies addressing the association between smoking and gastric cancer. Papers written in English were reviewed and only studies evaluating cigarette smoking were included. Preference was given to the longest follow-ups when results from the same study were published more than once.

Data Extraction: Conducted by at least two reviewers and discrepancies resolved by consensus. When sex-specific estimates were available they were considered separately as if obtained from different studies.

Data Analysis: Combined risk estimates and 95% confidence intervals were computed with STATA version 9.2, using a random effects model. Heterogeneity was quantified using the I^2 statistic, and stratified analysis according to study characteristics was performed.

Results: Twenty seven studies (23 cohort and 4 nested case-control analyses) were included in the systematic review and meta-analysis. The mean/median/midpoint of the difference between first and last years of follow-up was 9 years, ranging from 2–25 years. Twenty two studies provided risk estimates adjusted for age and 12 for socioeconomic status (education, occupation and type of health insurance). When considering never smokers as the reference category, the combined RR estimates were 1.55 (95% CI 1.42 to 1.68; $I^2 = 50.3\%$; 29 estimates from 22 studies) for current smokers, 1.59 (95% CI 1.39 to 1.81; $I^2 = 42.5\%$; 23 estimates from 20 studies) for the highest category of consumption when more than two categories were available, and 1.32 (95% CI 1.20 to 1.44; $I^2 = 24.0\%$; 27 estimates from 21 studies) for ex-smokers. The summary RR estimates for current vs. never smokers was 1.67 (95% CI 1.45 to 1.93; $I^2 = 57.6\%$; 15 studies) when only men were evaluated, 1.29 (95% CI 1.12 to 1.49; $I^2 = 16.5\%$; 8 studies) considering the estimates for women, and 1.53 (95% CI 1.40 to 1.67; $I^2 = 0\%$; 6 studies) when data were presented for males and females combined.

Conclusion: Cigarette consumption (current smokers vs never smokers) significantly increases the risk of gastric cancer, both in males and in females, by nearly 70% and 30% respectively. Ex-smokers have a 30% increased risk of gastric neoplasia.

012 APPENDECTOMY, SMOKING AND INFLAMMATORY BOWEL DISEASE: A CASE CONTROL STUDY

V. McCarthy¹, E. Bairead², A. Fitzgerald¹, F. Shanahan², I. Perry¹. ¹Department of Epidemiology and Public Health, University College Cork, Ireland; ²Department of Medicine, University College Cork, Ireland

Aim: To examine the association between appendectomy and smoking and the subsequent risk of developing ulcerative colitis or Crohn's disease.

Methods: A case/control study was carried out in Cork University Hospital. The cases (n = 250) having a diagnosis of either Crohn's disease (CD) or

ulcerative colitis (UC) and <50 years were recruited consecutively from the weekly inflammatory bowel disease clinic. The controls (n = 249) were recruited consecutively from the general outpatients department and were age and gender matched with a five year range. Data were obtained on history of appendectomy, smoking status and a wide range of markers for early childhood hygiene. Blood samples for genetic analyses are also available. Cases and controls were matched by age at recruitment. We evaluated smoking status at time of diagnosis and appendectomy one year prior to diagnosis. For the control group the age of diagnosis for the matched case was used.

Results: The age at diagnosis was similar for CD and UC cases, median (lower, upper quartile) = 22 (18, 26) and 24 (17, 29) respectively. Among those who had an appendectomy the age at which this occurred was 18 (12, 25). Based on a conditional logistic regression, smoking was significantly associated with a reduced risk of UC; OR 0.44 (95% CI 0.22 to 0.89). However, appendectomy was not significantly associated with UC; OR 0.60 (95% CI 0.14 to 2.51). Neither factor was significantly associated with CD; OR 0.98 (95% CI 0.50 to 1.90) and 1.25 (0.41 to 3.83) respectively.

Conclusion: The results for UC with regard to smoking and appendectomy are consistent with earlier research but the lack of association between CD smoking and appendectomy differs from previous work. However, additional analyses adjusted for markers of early childhood hygiene and stratified by genetic markers will clarify the aetiological and clinical significance of these findings.

Diet and health

013 DIETARY INTAKE OF VITAMIN K AND RISK OF PROSTATE CANCER IN EPIC-HEIDELBERG

K. Nimptsch, S. Rohrmann, J. Linseisen. Division of Cancer Epidemiology, German Cancer Research Centre, Heidelberg, Germany

Background: Anticarcinogenic activities of the synthetic K-vitamin menadione (K_3), as well as of phyloquinone (K_1) and menaquinone (K_2), the K-vitamins naturally occurring in the human diet, have been observed in various cancer cell lines, including prostate cancer cells. The mechanisms by which phyloquinone and menaquinone may exert cancer-preventive effects include the induction of the proto-oncogenes c-myc and c-fos, which are associated with apoptosis. Epidemiological studies linking dietary intake of vitamin K with the development of cancer have been rarely conducted.

Objective: To examine the association between dietary vitamin K intake and the risk of incident prostate cancer.

Design: Prospective cohort study.

Setting: Heidelberg, Germany.

Participants: 11 319 male subjects, aged 40–64 years, enrolled between 1994 and 1998 for EPIC-Heidelberg. Habitual dietary intake was assessed by a validated food-frequency questionnaire. Dietary intake of phyloquinone and menaquinone was estimated using HPLC-based food content data.

Main Outcome Measure: The relative risk (RR) of total and advanced (Gleason sum score ≥ 7 , TNM staging score of T3/T4, N1–N3 or M1, PSA at diagnosis ≥ 20 ng/ml or prostate cancer as underlying cause of death) prostate cancer in relation to quartiles of phyloquinone and menaquinone intake was modelled using Cox proportional hazards regression; crude (stratified for age) results and results adjusted for potential confounders are presented.

Results: During the mean follow-up time of 8.6 years, 268 incident including 108 advanced prostate cancer cases occurred. Median intakes (interquartile range) of phyloquinone and menaquinone in the cohort were 93.6 (70.9–123.5) and 34.7 (25.7–45.7) $\mu\text{g/day}$, respectively. Dietary intake of menaquinone was inversely associated with prostate cancer risk. The crude RR (95% CI) for prostate cancer was 0.73 (0.51–1.04, $p_{\text{trend}} = 0.09$) comparing the highest versus lowest quartile of menaquinone intake; after multivariate adjustment the risk estimate was 0.64 (0.41–1.00, $p_{\text{trend}} = 0.06$). The association was stronger for advanced prostate cancer (RR = 0.36 (0.17–0.78), $p_{\text{trend}} = 0.01$). Phyloquinone intake was not associated with prostate cancer; adjusted RR (highest vs lowest quartile of phyloquinone intake) was 1.03 (0.71–1.48).

Conclusions: Our findings suggest a protective effect of menaquinone intake on the risk of prostate cancer while no significant association was observed for phyloquinone. This fits with experimental data showing much stronger anti-tumour activity for menaquinone as compared to phyloquinone. Since this is one of the first prospective investigations on the

association between dietary vitamin K intake and the risk of prostate cancer, further epidemiological studies are required to confirm the results.

014 WHAT INFLUENCES THE DIET OF TODDLERS LIVING IN AREAS OF HIGH DEPRIVATION?

I. Crombie¹, W. Wreiden², V. Swanson³, K. Power³, P. Slane¹, K. Brown¹, L. Irvine¹. ¹Department of Public Health, University of Dundee; ²Centre for Public Health Nutrition, University of Dundee; ³Department of Psychology, Stirling University, UK

Objective: To investigate the factors that influence the food choices made by mothers of young children living in areas of high deprivation.

Design: Interview survey conducted in the homes of participants. Questions on knowledge, beliefs, intentions and behaviours were based on social cognition models and findings from focus groups.

Setting: Areas of high deprivation in Dundee city and in Fife, Scotland

Participants: 300 mothers with a children aged two years,

Results: A very high response rate (81%) was achieved. Most families lived in council housing (81%), 43% of mothers reported that no other adult lived in the home and 91% were unemployed. Only 22% of children had ever been breast fed and 60% of mothers were current smokers. Children were allocated a composite dietary score based on whether or not their diet was balanced on the four main food groups (bread, other cereals and potatoes; fruit and vegetables; meat, fish and alternatives; milk and dairy foods) and limited high sugar and/or high fatty foods. Eighty five per cent had a poor diet. Univariate analysis showed that many types of factors were significantly associated with a poor diet including: lower levels of concern about providing a healthy diet; factors about planning and organising meals; and mothers' perceived control over diet. Few measures of food availability, cooking skills, knowledge of a healthy diet, or beliefs about the health benefits of a healthy diet were significant. Regression modelling identified five significant factors. An increased risk of a poor diet was associated with mothers reporting that they were unlikely to restrict sweets (OR 21.6, $p < 0.0001$), or that they found it difficult to provide 2–3 portions of fruit (OR 2.9, $p = 0.005$). Concern that the child did not eat enough increased the risk of a poor diet (OR 2.4, $p = 0.03$). Believing that a healthy diet would help the child to eat more reduced the risk of having a poor diet (OR 0.3, $p = 0.04$), as did providing breakfast every day (OR 0.2, $p = 0.02$).

Conclusions: Many of the children had a poor diet and specific areas of concern were highlighted. Interventions are required to promote more positive intentions to the preparation and serving of foods. The benefits of these behaviours to the mother (enjoyment) and the child (improved diet, weight control) should be emphasised. Mothers could be encouraged to plan specific meals at which the family eats together.

015 DIETARY PATTERNS AND GASTRIC CANCER IN A PORTUGUESE URBAN POPULATION

J. Bastos, C. Lopes, H. Barros, N. Lunet. Department of Hygiene and Epidemiology, Porto University Medical School, Portugal

Objective: To quantify the association between different dietary patterns and the gastric cancer risk in a Portuguese population.

Design: Case-control study.

Setting: Cases were selected in two major hospitals from Porto, Portugal, and controls were selected among city dwellers.

Participants: Incident gastric cancer cases were identified in the surgery departments of two major hospitals. Population controls were recruited by random digit dialling using households as the sampling frame, followed by simple random sampling to select one eligible person among permanent residents in each household. Trained interviewers inquired participants using a structured questionnaire including sociodemographic and life-style characteristics. A validated food frequency questionnaire (FFQ) was used to evaluate food intake in the previous year. Data from 388 histologically confirmed cases and 1053 controls were analysed.

Main Outcome Measures: Cluster analysis, with standardised data, was used to identify dietary patterns. The 82 FFQ items were previously combined into 24 groups. To determine the number of clusters, hierarchical cluster analysis was performed with squared Euclidean distances used in the proximities matrix and Ward's method used as clustering method. The Calinski and Harabasz pseudo-F stopping rule index and the Duda and Hart $Je(2)/Je(1)$ index were used jointly to select the number of clusters for the analysis. The association between dietary patterns and gastric cancer was quantified through age-, gender-, education- and total energy intake-adjusted odds ratios (OR) using unconditional logistic regression.

Results: Three dietary patterns were identified with the following characteristics: (I) highest consumptions of fruit and dairy products, and the lowest consumptions of grains and alcoholic beverages; (II) highest consumptions of vegetable soup, legumes and grains; (III) the highest in fast-foods/fried snacks, coffee, fish, red meat, white meat, codfish, eggs and alcoholic beverages. Vegetable consumption was similar across the three patterns. Individuals in pattern I were more likely to be female (66.0%). Median age was higher for subjects in pattern II (69 years) and lower for pattern III (58 years). Compared to the dietary pattern I, pattern II was associated with a higher risk of gastric cancer (OR 3.29, 95% CI 1.75 to 6.20). No statistically significant association was found between patterns I and III (OR 1.05, 95% CI 0.77 to 1.42).

Conclusions: A dietary pattern characterised by high consumption of soup (usually a salted food consumed in large amounts), legumes and grains is associated with an increased risk of gastric cancer.

Lifestyle: smoking cessation

016 A CLUSTER-RANDOMISED CONTROLLED TRIAL OF PROACTIVELY IDENTIFYING SMOKERS AND OFFERING SUPPORT FROM NHS STOP SMOKING SERVICES

R. L. Murray¹, T. Coleman², J. Britton¹, M. Antoniuk¹, A. Fergus¹, S. A. Lewis¹. ¹Divisions of Epidemiology & Public Health; ²Primary Care, University of Nottingham, UK

Introduction: NHS Stop Smoking Services (SSS) are cost effective in helping smokers to stop. Relatively few people use these services, however, and qualitative work with smokers from disadvantaged areas of Nottingham suggested that raising smokers' awareness of SSS might increase their use of such services. We hypothesised that identifying smokers in primary care and proactively offering them information about NHS SSS would encourage their uptake of SSS and subsequent smoking cessation.

Methods: We sent a questionnaire to all patients aged 18 or over who were registered with 24 general practices in Nottingham and either recorded as a smoker or having no smoking status recorded. Questionnaires were sent with covering letters from GPs and identified current smokers, offering help with quitting smoking. General practices were randomised to intervention or control groups; smokers in the intervention practices who requested advice were immediately contacted by telephone or letter and given information about local SSS availability with a personal invitation to attend. Smokers in the control group received usual care until after six-month follow-up when they too were contacted, as above. The study had 80% power to detect a difference of 1.5% in smoking cessation rates between groups at six-month follow-up using a second postal questionnaire, and analysed using a two-level hierarchical model.

Results: 3051 and 3805 current smokers responded to the questionnaire in intervention and control practices respectively, of whom 1289 (42.2%) and 1551 (40.8%) requested support. At six-month follow-up, 16.6% (intervention) and 8.9% (control group) smokers reported having seen an SSS advisor during the study period (adjusted OR (95% CI) for seeing advisor 2.09 (1.57 to 2.78)) but there was no difference between intervention and control practices in the mean proportions of smokers who reported smoking cessation and had this validated by saliva cotinine estimation (3.5% (intervention) vs 2.5% (control), adjusted OR (95% CI) for smoking cessation 1.64 (0.92 to 2.89)).

Conclusion: This simple method of promoting smoking cessation services to individual smokers via their general practices increased self reported attendance at NHS Stop Smoking Services, but there is no evidence that this resulted in higher levels of smoking cessation.

017 PRIMARY CARE SMOKING CESSATION INTERVENTION CONDUCTED IN A SAMPLE OF SPANISH SMOKERS: PREDICTORS OF SMOKING CESSATION

D. Puente¹, C. Cabezas^{1,2}, F. J. González¹, F. Camarrelles³, M. Torrecilla⁴, J. Domínguez⁵, for the ISTAPS Study Group Investigators. ¹IDIA Jordi Gol, Barcelona; ²Public Health Department of Catalonia Government, Barcelona; ³General Moscardó- Health Centre, Madrid; ⁴San Juan- Health Centre, Salamanca; ⁵11-Intervention Unit of Medical Care, Madrid, Spain

Background: There is a large body of research on the effectiveness of specific interventions addressed to people who want to stop smoking. However, there are no studies including large samples of individuals that

tested the complete range of interventions recommended nowadays for helping people to give up smoking, especially interventions including motivational interviewing of those not interested in cessation in the upcoming weeks.

Objective: To evaluate the effectiveness in primary care centres of a stepped smoking cessation intervention based on transtheoretical model of change.

Design: Randomised clinical trial. Unit of randomisation: basic care unit (family physician and nurse who care for the same group of patients). Intention to treat analysis.

Setting: Eighty two primary care centres.

Participants: 2830 current smokers (age 14–85 years) seeking assistance for any reason at primary care centres (1482 and 1348 subjects assigned to intervention group and control group, respectively).

Intervention: Six-month implementation of recommendations of a Clinical Practice Guideline. Control: usual care.

Measurement: Abstinence rate (point prevalence) one year after the inclusion of subjects in the study. Demographic variables, characteristics of tobacco use and motivation to quit variables were investigated as predictors of smoking cessation, collected through a structured questionnaire designed for this purpose.

Results: Abstinence rate one year after the inclusion of subjects was 22.6% (24.8% in the intervention group vs 20.2% in the control group). The multiple logistic regression model showed that the factors predicting smoking cessation were age (OR 1.01, 95% CI 1.00 to 1.02), belonging to intervention group (OR 1.32, 95% CI 1.03 to 1.70), motivation to quit (Richmond test) (OR 1.10, 95% CI 1.04 to 1.17) and readiness to quit smoking (OR 1.08, 95% CI 1.03 to 1.13). Contrarily, high nicotine dependence (Fagerström test) (OR 0.87, 95% CI 0.83 to 0.92) and having a partner who smokes (OR 0.75, 95% CI 0.58 to 0.97) lowered the probability of stopping.

Conclusions: The study shows that primary health care is a suitable context for an intervention against tobacco through the use of stepped interventions. Low nicotine dependence, high motivation, readiness to change, age and not having a partner who smokes are good predictors of success.

018 THE IMPACT OF THE SMOKING BAN IN IRELAND: MODELLING HOSPITAL ADMISSIONS FOR ACUTE MYOCARDIAL INFARCTIONS

A. Vellinga^{1,2}, F. Howell³, D. O'Donovan^{1,2}. ¹Department of Health Promotion, NUI Galway; ²HSE West, Galway; ³HSE Population Health Directorate, Dublin, Ireland

Objective: To determine whether the legislation on smoking in public places which came into effect on 29 March 2004 led to a reduction in hospital admissions.

Design: An ecological study by means of a time series analysis of the admissions as recorded by HIPE (Hospital InPatient Enquiry), the registration system used by 95% of the Irish Hospitals.

Setting: Republic of Ireland.

Participants: All patients admitted to a hospital from 1999–2004.

Main Outcome Measures: Numbers of weekly admissions for acute myocardial infarctions (AMI).

Results: ARIMA models were fitted in which the legislation was included in the model as an intervention variable. AMI fell with 13.4 admissions per week, after a delay of 8 weeks, in the first six months after the introduction of the smoking legislation.

Conclusions: Taking into account the limitations of ecological studies, our results suggests that the observed decline in hospital admissions for AMI in the six-month period following the smoking legislation might be due to the reduction in environmental tobacco smoke (ETS) in the working environment. Controlling passive smoking by means of legislation may have important short-term effects on health.

Methods I

019 SUB-STUDIES NESTED IN A LARGER COHORT: A COMPARISON OF THE NESTED CASE-CONTROL AND CASE-COHORT DESIGNS

R. H. Keogh, A. W. Roddam. Cancer Research UK Cancer Epidemiology Unit, Richard Doll Building, University of Oxford, UK

Objective: To compare two designs for sub-studies nested within a larger cohort study, when laboratory analyses are necessary to obtain covariate

measurements, with the aim of making most efficient use of the biological material.

Background and Motivation: It is common for biological material to be collected in large scale cohorts. Studies making use of this biological material are normally nested within the cohort, maximising the use of the material and minimising the costs of performing the sample analyses. Two common methods used by investigators to design such studies are the nested case-control design and the case-cohort design. Greater statistical efficiency can be achieved from a case-cohort study relative to a comparable nested case-control study, and the former may be advantageous as the subcohort can be used to monitor the study. However, if the laboratory measurement method is susceptible to effects due to samples being processed in batches then the nested case-control design is preferred to ensure unbiased relative risk estimates.

Methods: Simulations are used to model laboratory “batch” effects within comparable nested case-control and case-cohort sampling schemes, using both prospective and retrospective case-cohort studies. Batch effects considered include time drifts of the assay, and variations due to differences in laboratory analyses and conditions. Relative risks from simulated nested case-control and case-cohort studies are estimated using partial and pseudo-likelihoods respectively and compared.

Results: In a nested case-control study the samples from individuals in the same case-control set are analysed in the same batch, eliminating any batch effect. In a case-cohort study each sampled risk set comprises individuals whose samples were subject to different batch effects. Non-time-dependent batch effects which increase the variation in measurements result in conservatively biased relative risk estimates in a case-cohort study. This bias increases as the between-batch variation increases relative to the total variation among the measurements, although it is small for a range of realistic circumstances. Batch effects due to time-drifts result in systematic bias in relative risk estimates, which decreases as the size of the subcohort increases. These effects are illustrated in a study of the association between breast cancer and serum oestradiol.

Conclusions: Laboratory derived measurements which are subject to “batch” effects can result in biased relative risk estimates in a case-cohort study. However, for a range of typical scenarios the magnitude of the bias is not severe and the efficiency gain of the case-cohort design over the nested case-control design remains.

020 IMPROVING PSYCHOMETRIC PROPERTIES OF A SCALE MEASURING INPATIENT SATISFACTION WITH CARE BY REDUCING CEILING EFFECT

L. Moret^{1,2}, J.-M. Nguyen¹, N. Pillet¹, B. Falissard^{2,3}, I. Gasquet^{2,3}, P. Lombrail¹. ¹Public Health Department, University Hospital, Nantes, France; ²Inserm, U669, Paris, France; ³Direction de la Politique Médicale, AP-HP, Paris, France

Objective: To solve two problems of an already validated scale measuring inpatient opinion on care: (1) a high non-response rate for some items due to the “not applicable” response option and (2) a skewed score distribution with high ceiling effect.

Method: EQS-H scale comprised 26 items and two subscales of 13 items each, “quality of medical information” (MI) and “relationships with staff and daily routine” (RS). Three studies were conducted: (1) a mono-centre study (n = 552, response rate (RR) 83.4%, self-completion the day before discharge) to construct a shorter version of the scale without items with high non-response rate and maintaining those useful to ensure good internal validity and reliability; (2) a mono-centre study (n = 1246, RR 77.9%, self-completion the day before discharge) to confirm psychometric properties of the new version; (3) a multicentre national study (n = 886, RR 41.7%, self-completion at home 15 days after discharge) to test a new response pattern to reduce ceiling effect.

Results: Six items having a non-response rate >20% were deleted, increasing rates of exhaustive responses to all items from 15% to 48%. Factorial analysis supported the evidence for removing four more items to ensure good internal validity and reliability of the new version and explained 43% of the variance. Cronbach's α were 0.80 (MI) and 0.81 (RS). Study 2 confirmed the results obtained. The new response format produced a normalisation of the 2 scores with a large decrease in ceiling effect (25% to 4% for MI subscale and 61% to 8% for RS). Properties of the final version were excellent: the two subscales (8 items each) explained 66% of the variance in PCA, Cronbach's α were 0.92 (MI) and 0.93 (RS). The 16-item EQS-H overall score was associated with several adjustment variables in a general multivariate linear model (gender, age, health status, satisfaction with life). Structural Equation Modelling confirmed the existence of two latent factors (MI and RS) but the best characteristics were obtained with a hierarchical model including the two latent factors and a global satisfaction latent factor, bringing the 16 items together.

Conclusions: The new version of EQS-H had better psychometric properties than the previous one. Rates of missing values were lower, and score distribution was normalised. Dimensions explored focused on quality of MI delivered and on RS, are not limited to the French healthcare system, and further scale validation in other countries and cultures is required, since it would facilitate cross-cultural studies of healthcare services' quality. English, Spanish and Italian versions of the scale are already available.

021 HEALTH, URBAN TRANSFORMATION AND THE "GoWell" STUDY: EVALUATING COMPLEX SOCIAL CHANGE IN THE CONTEXT OF GLASGOW'S URBAN REGENERATION PROGRAMME

M. Egan, on behalf of the GoWell team. MRC Social and Public Health Sciences Unit, Glasgow, UK

Objective: Researchers and policy-makers have called for evaluative evidence of interventions affecting social determinants of health and health inequalities. Evaluations of such interventions are often expensive, difficult to design and implement, and hence remain something of a rarity. The "GoWell" study aims to evaluate the effects of macro- and micro-level urban transformation in Glasgow during a decade of massive investment in neighbourhood regeneration. This presentation will summarise early findings and discuss the challenges involved in conducting complex evaluations on this scale.

Design: GoWell is a 10-year prospective study with comparison areas. It involves both longitudinal and repeat-cross-sectional surveys of residents' health and well-being ($n=7000$), and a qualitative study of stake-holders ($n=100$) that explores socio-environmental pathways to health, theories of change and community empowerment. Additional components of the study also measure changes to physical environments, services and neighbourhood amenities.

Setting: Over the next decade, Glasgow will undergo a £multi-billion investment programme involving housing improvement, demolitions and "new-builds", as well as community sustainability initiatives across the city. GoWell compares 14 neighbourhoods undergoing different types of regeneration and evaluates routine data at both neighbourhood and city-wide level.

Results: Our baseline survey (summer 2006) has highlighted the poor health, low expectations and low senses of self- and collective-efficacy amongst a sizable minority of residents in neighbourhoods earmarked for regeneration. Initial summary findings include reports of high levels of social isolation (particularly in neighbourhoods dominated by multistoreys, where only 45% of residents reported daily contact with anyone); resistance to healthy lifestyle messages (40% of smokers intend never to quit); high health service use (across a range of measures); low self- and collective-efficacy (29% of participants think they can influence decisions affecting their neighbourhood), and qualitative evidence suggests that residents have little influence over the regeneration process. Compared to "white Scottish" residents, Glasgow's growing asylum-seeker population reports higher levels of neighbourhood satisfaction and better health across a range of measures.

Discussion: In a city characterised by high concentrations of ill-health and deprivation, many Glasgow residents remain disengaged from their community, from regeneration processes and from key public health messages. GoWell will provide policy-relevant evidence on whether different types of regeneration can have positive (or adverse) impacts on health and well-being in these communities, through either behavioural, psychosocial or physical pathways. As such, GoWell provides a case study in the methodological challenges associated with complex evaluations of "natural experiments" affecting social determinants of health.

Parallel session B

Population health II

022 ESTIMATING THE PREVALENCE OF FEMALE GENITAL MUTILATION IN ENGLAND AND WALES

E. Dorkenoo¹, L. Morison², A. Macfarlane³. ¹FORWARD; ²London School of Hygiene and Tropical Medicine; ³City University, UK

Background: There are no reliable data on the extent of female genital mutilation (FGM) in the UK. It is suspected that prevalence has been

increasing, mainly due to migration. To plan appropriate maternity care for affected women information about its prevalence is needed.

Objectives: To estimate for residents of England and Wales: prevalence of FGM among women aged 15 and over; the estimated numbers maternities which were to women who have undergone FGM; the numbers of girls aged under 15 with or at risk of FGM and the type of FGM.

Methods: The typology of FGM, I, II and III was based on that used in WHO FGM prevalence surveys in the 29 identified practising countries. Prevalence rates were derived from these surveys. The numbers of women aged 15–49 resident in England and Wales and born in FGM practising countries were derived from the 2001 census. Estimated age-specific FGM prevalence rates were used to estimate numbers with FGM. Attempts were made to update this using ONS Migration Statistics. Maternities in the presence of FGM and were estimated by applying prevalence rates in mothers' countries of origin to data from birth registration. Numbers of girls aged under 15 who had been born in FGM practising countries, were derived from the 2001 census and from female live births from 1993 to 2004 to mothers from FGM practising countries.

Results: It was estimated that 65 790 of the 174 528 women aged 15–49 resident in England and Wales and born in practising countries enumerated in the 2001 census had undergone FGM. These estimates could not be updated as migration statistics were inadequate. The estimated number of maternities to women who had undergone FGM increased from 6256 in 2001 to 9032 in 2004 rising from 1.06% of all maternities in 2001 to 1.43% in 2004. It was estimated that there are at least 24 000 girls under the age of 15 with or at high risk of Type III FGM and nearly 9000 at high risk of Type I or Type II.

Discussion: These are the first systematic estimates of the prevalence FGM in England and Wales, but they are subject to a number of biases. To gain a clearer picture, a survey is needed.

Conclusions: Despite their limitations, these estimates suggest that the numbers of women living in England and Wales with FGM are substantial and increasing.

023 AVOIDABLE MORTALITY IN ITALY

S. Conti¹, F. S. Mennini², G. Minelli¹, F. Palazzo³, F. A. Ricciardi⁴. ¹Unit of Statistics, Istituto Superiore di Sanità; ²CEIS Sanità, Facoltà di Economia, Università Tor Vergata; ³CNR, Istituto di Ricerca sulla Popolazione e Politiche Sociali; ⁴Lazio Sanità, Agenzia di Sanità Pubblica del Lazio, Rome, Italy

Background: The study of avoidable mortality is important for public health, given that it can provide indications for prevention interventions. A cause of death is defined as "avoidable" if there exist forms of prevention capable of reducing the number of deaths, particularly among non-elderly persons. Avoidable mortality is classified into three categories, according to the type of intervention: (1) mortality avoidable through primary prevention: reducing the incidence of the disease or event (eg, prevention of lung cancer through anti-smoking campaigns); (2) that avoidable through secondary prevention: early detection and treatment (eg, prevention of cancer of the uterine cervix through screening); and (3) that avoidable through improved treatment and medical care (eg, severe heart disease amenable to timely interventions).

Materials and Methods: We analysed the official mortality data collected by the Italian National Institute of Statistics (ISTAT) for 2002 (the most recent data available). We calculated the Years of Potential Life Lost (YPLL) for persons between the ages of 5 and 64 years who died before reaching the life expectancy: 77 years for men and 83 years for women. We calculated the standardised rates of YPLL by gender and for each of Italy's 21 Regions.

Results: Avoidable causes of death were responsible for 22.8% of the YPLL among men and 12.3% among women. Among both men and women, the causes of death avoidable through primary prevention had the greatest impact, especially among men (75% of the YPLL among men, compared to 50% among women). Among women, the causes avoidable through secondary prevention were responsible for 31.4% of YPLL, compared to only 2.3% among men, probably because most of these deaths were caused by breast or cervix cancer. The causes avoidable through improved treatment and medical care were responsible for a similar percentage of YPLL when comparing the two genders (22.5% for men and 19.2% for women). In northern Regions, the causes avoidable through primary prevention had the greatest impact, whereas in southern Regions the causes avoidable through improved treatment and medical care were most important; in central Regions, there was an intermediate situation.

Conclusions: Mortality avoidable through primary prevention continues to greatly contribute to YPLL in Italy. Detailed analyses at the national level can provide useful indications to decision-makers for promoting prevention strategies for reducing the impact of avoidable diseases.

024 INCOME DYNAMICS AND PREMATURE ADULT MORTALITY IN CANADA

J. Etches¹, C. Mustard^{1,2}. ¹Institute for Work and Health; ²Department of Public Health Sciences, University of Toronto, Toronto, Canada

Objectives: While there is a large body of research on the health consequences of involuntary job loss, there is relatively little research on the association of income drops, or income dynamics more generally, and health outcomes. Income declines following job loss or other abrupt changes to family economic circumstances may have direct impacts on the health of individuals. We conceive of the dynamics of family disposable income as both a series of life events and as a chronic exposure, and explore dose-response relationships and induction times for premature all-cause mortality. Confounding by family breakdown, family deaths, job loss, and retirement, and health selection bias are accounted for in the analysis. Effect modification by sex, family type, and income level are explored.

Design: The Longitudinal Administrative Databank (LAD) is a 20% random sample of Canadian personal income tax filers, linking income tax records at the individual level for 6.2 million individuals for the years 1982–2004, with Census families reconstructed. It is an open cohort and is representative of the Canadian population cross-sectionally and longitudinally. Measures of annual family disposable income were used to estimate income dynamics over time between the ages of 45 and 59, and were analysed as time-varying covariates in survival models, lagged to reflect assumptions regarding induction periods.

Setting: Adult population, aged between 45 and 59 at the time of income measurement.

Participants: Canadian personal income tax filers.

Main Outcome Measures: Premature (aged 51–77) all-cause mortality as reported on tax returns for the deceased.

Results: Early results indicate that effects of income and income dynamics on mortality risk are present in this Canadian sample, but more moderate than was observed previously in the USA. Patterns seen in the Panel Study of Income Dynamics in the USA, where it appeared that income dynamics primarily affected the survival of those with mid-range incomes, are not present in the Canadian data.

Conclusions: Income dynamics is a theoretically challenging exposure construct, and how it is conceived has a significant bearing on how one would analyse associations with health outcomes. Further research with cause-specific mortality and intermediate health outcomes is recommended. Future research would be of greatest policy value if comparison of patterns observed in Canada to other jurisdictions included measures of the coverage and generosity of income security programmes.

025 POPULATION ATTRIBUTABLE RISKS FOR POOR OUTCOME IN PRIMARY CARE LOW BACK PAIN

K. M. Dunn, K. Jordan, P. R. Croft. *Primary Care Musculoskeletal Research Centre, Keele University, UK*

Background: Back pain is common in the general population, with one-month prevalence around 30%, and is therefore a significant public health problem. Many people recover quickly, but approximately a quarter of sufferers (6–9% of the population) will consult a GP for their problem within a one-year period, and a high proportion have persistent problems. Providing information on the risk of persistence is therefore important in this group, but few studies have identified a representative sample or included a wide range of risk factors, and none have calculated population attributable risks (PARs).

Objective: To determine the risk factors for a poor outcome at one-year, and the proportion of back pain sufferers with a poor outcome that can be attributed to measurable risk factors.

Design and Setting: Prospective inception cohort study in five general practices in Staffordshire, UK.

Participants: Consecutive back pain consulters aged 30–59 years ($n=389$).

Results: Baseline risk factors covering demographics, episode duration, symptom severity, pain widespreadness, affect and cognitions, and self-reported health were assessed for their importance. In unadjusted analyses, 17 baseline factors were significantly associated with having highly disabling and severely limiting pain at follow-up. After adjustment for potential confounders, 7 baseline factors remained significant associations; the strongest risks were for unemployment (relative risk (RR) 4.15; 95% CI 2.03 to 8.51) and high pain intensity (RR 4.13; 95% CI 1.73 to 9.88). Adjusted PARs were calculated from the adjusted RRs, with 95% CIs calculated using bootstrapping techniques. The highest PARs were for high pain intensity (68%; 95% CI 42 to 84%) and unemployment (64%; 95% CI 47 to 78%), indicating that in over 60% of back pain consulters with a poor

outcome, outcome is statistically attributable to these baseline factors, regardless of the presence of the other risk factors. Poor self-rated health, high disability, upper body pain and pain bothersomeness all also had PARs over 40%.

Conclusions: We have demonstrated that a range of factors significantly increase the risk of a poor outcome in back pain consulters, and that these high risks in combination with high prevalence of the risk factors in this population leads to very high PARs, even after adjustment. In public health, calculation of PARs is one method of identifying potential targets for intervention, and given that consulters with back pain in primary care represent a significant proportion of all sufferers, this is therefore a sensible arena for public health secondary prevention of persistent back pain.

026 PREVALENCE OF PREMENSTRUAL SYNDROME AND THE INFLUENCE OF CONTRACEPTIVE USE AND LIFESTYLE FACTORS ON THIS CONDITION

H. Inskip¹, C. Sadler², J. Hammond¹, S. Borland¹, R. Bayly¹, N. Panay³, H. Smith⁴. ¹MRC Epidemiology Resource Centre & ²Department of Primary Medical Care, University of Southampton; ³West London Menopause & PMS Centre, Queen Charlotte's & Chelsea & Westminster Hospitals, London; ⁴Division of Primary Care & Public Health, Brighton & Sussex Medical School, University of Brighton, UK

Objective: To determine the prevalence of premenstrual syndrome in healthy young women, and assess the effects of contraceptive usage and lifestyle factors on this condition.

Design: Cross-sectional survey.

Setting: Within the Southampton Women's Survey (SWS), a cohort study of women recruited through general practices from the general population, who were interviewed when not pregnant and followed through subsequent pregnancy.

Population: 973 women aged 20–34 years (53% of the 1841 women invited to participate).

Methods: Women who provided a blood sample as part of the SWS recruitment interview were asked to complete a prospective six-week menstrual symptom diary. Two clinicians assessed the diaries independently according to a pre-specified protocol and identified women suffering from significant premenstrual symptoms. Disagreements were resolved in discussion with a third researcher. Prevalence of premenstrual syndrome was assessed and related to contraceptive use and lifestyle factors using binary regression to obtain prevalence risk ratios.

Main Outcome Measures: Premenstrual syndrome (PMS), diagnosed as (a) a cyclical pattern of symptoms occurring in the days leading up to menstruation that resolved completely or greatly improved by the end of menstruation, (b) an interval of ≥ 7 days before symptoms recurred, and (c) ≥ 5 symptoms scored as mild or moderate or ≥ 2 symptoms scored as severe, with each symptom following the pattern described above. In women with no discernable menstrual cycle or erratic bleeding, diaries were examined for any evidence of cyclical symptoms.

Results: Using these pre-specified criteria, 24% of the women were considered to have PMS (95% CI 21 to 27%). If all those who failed to complete the diary had been free of PMS then the prevalence would have been 12%. Women were less likely to be diagnosed with premenstrual syndrome if they currently used hormonal contraceptives (prevalence ratio 0.60, 95% CI 0.47 to 0.76), especially progestogen-only methods. Strikingly, premenstrual syndrome was not diagnosed in any of the 34 women using injectable progestogens (prevalence ratio 0.0, one-sided (upper) 97.5% confidence point 0.1). After adjustment for contraceptive use, premenstrual syndrome was more likely to be diagnosed in women reporting a high level of stress in their lives and in those with a lower level of educational attainment.

Conclusions: Premenstrual syndrome is common in young women, with nearly a quarter suffering a range of symptoms on a monthly basis. Injectable progestogens, or other progestogen-only contraceptives appear to alleviate this condition and may provide an effective therapy.

Maternal and child health II

027 WOMEN'S PERCEPTIONS OF MATERNITY CARE

M. Redshaw, R. Rowe, C. Hockley. *National Perinatal Epidemiology Unit, University of Oxford, UK*

Objective: To investigate women's perceptions of the quality of their care during pregnancy and childbirth.

Setting: England.

Participants: Women aged 16 years and over, excluding those whose infants had died before data collection.

Design: A random sample of 4800 women was identified by the Office for National Statistics, using live birth registrations for births in one week in March 2006. The sampling was stratified on the basis of births in different geographical areas (Government Office Regions). No subgroups were over-sampled. Checks on infant deaths were made before mailing and women whose baby had died were excluded.

Method: Questionnaires with structured attitudinal question formats were mailed three months after the birth. Women were able to respond in a variable way to statements about the care provided, indicating agreement or disagreement, whether the statement applied only to some staff, and in some instances about midwifery and medical staff separately.

Main Outcome Measures: Women's perceptions of midwifery and medical staff during pregnancy, labour and birth and the postnatal period.

Results: The useable response rate was 63%. 13% of respondents were from black and minority ethnic groups. Differences in perceptions occurred with pregnancy, labour and birth and postnatal care and with parity. Women's views were largely positive, though some were critical about interpersonal aspects of care. During pregnancy, more than one in 10 women felt they received care from one or more midwives or doctors who did not talk to them in a way they could understand (13% and 14% respectively) and similar proportions felt they were not treated with respect (14% and 11%). Perceptions about labour and birth were generally similar, though more women were positive about care at this time. Women were more critical about their postnatal hospital care, with 16% reporting that one or more members of staff did not communicate with them effectively and 22% that one or more members of staff did not treat them with respect. Women who had previously given birth, who had shorter labours and shorter postnatal stays were more positive in the views expressed.

Conclusions: The type of question format used allowed women describe the contrasts in care that many experienced, including their interactions with different staff groups. The findings confirm the view that experiencing effective communication and feeling respected appear to be markers for quality of care from a women's perspective.

028 RISK FACTORS FOR CONGENITAL ANOMALIES

S. Anthony, Y. Schonbeck, G. W. Jacobusse, K. M. van der Pal-de Bruin. *Section of Reproduction and Perinatology, TNO Quality of Life, Leiden, The Netherlands*

Objectives: To determine the relation between several potential risk factors and the risk of having a child with one or more congenital anomalies.

Design: Retrospective cohort study.

Setting: The Netherlands Perinatal Registry, 1997–2004.

Participants: 1 594 380 newborns registered in the Netherlands Perinatal Registry.

Main Outcome Measures: The overall risk of having a child with a congenital anomaly and the risk of anomalies in different organ systems, expressed in odds ratios. Population attributable risks were calculated to express the impact of the risk factors on a population based level.

Results: All studied potential risk factors, maternal age, parity, ethnicity, pre-existing maternal diabetes, maternal epilepsy, history of abortions, IVF/ICSI pregnancy, other assisted reproduction techniques, gender and plurality were significantly related to the risk of having a child with a congenital anomaly. The strongest relation was found for pre-existing maternal diabetes and maternal epilepsy (adjusted OR 2.0 95% CI 1.8 to 2.3 and adjusted OR 2.1 95% CI 1.7 to 2.6, respectively). For maternal diabetes the risk of anomalies was especially elevated in the cardiovascular organ system and for maternal epilepsy in the central nervous system. High maternal age, IVF/ICSI pregnancy, male gender and plurality were also strongly related to the risk of having a child with an anomaly. The population attributable risks calculated for all risk factors were especially high for male gender, primiparous women, high maternal age and non-Western ethnicity (PAR respectively 18.4, 5.0, 2.5 and 1.7). The PAR for maternal diabetes, for epilepsy and for IVF/ICSI is very small as the prevalence of these risk factors in the general population is very low. In total 30% of the registered anomalies could be ascribed to the studied risk factors.

Conclusions: Strategies for primary prevention of congenital anomalies should focus on (partly) different risk factors depending on the approach used. For a high-risk group approach existing maternal morbidity such as diabetes and epilepsy are important factors. For a public health approach, however, factors such as high maternal age, primiparity and ethnicity are more important to focus on, for example in preconception counselling.

029 MATERNAL AGE SPECIFIC RISK OF NON-CHROMOSOMAL ANOMALIES

M. Loane¹, H. Dolk¹, J. Morris², and a EUROCAT Working Group¹. *¹EUROCAT, University of Ulster; ²St Bartholomew's and the Royal London School of Medicine and Dentistry, UK*

Objectives: The increased risk of chromosomal anomalies associated with older mothers is well documented. We assess the risk of non-chromosomal anomalies in older mothers (35+ years) and younger mothers (<20 years) in Europe 1990–2004.

Design and Setting: Prevalence study in 25 regions of Europe covered by population-based EUROCAT registries, 1990–2004, covering a total of 4.8 million births. The EUROCAT database contains standardised comparable data on malformations obtained from a collaborative network of European registries set up to carry out epidemiological surveillance of congenital anomalies throughout Europe.

Participants: All registered cases of non-chromosomal anomaly that were liveborn, fetal deaths at 20 weeks gestation or more or terminations of pregnancy following prenatal diagnosis of a congenital malformation.

Main Outcome Measures: Prevalence of non-chromosomal anomalies (total cases divided by total births) by 5-year maternal age groups.

Results: In the years 1990–2004, 25 regional registries in 15 European countries identified a total of 111 899 cases of non-chromosomal anomalies with maternal age known, giving a prevalence rate of 23 per 1000 births. The proportion of young mothers (<20 years) increased from 3% in 1990–4 to 5% in 2000–4, while the proportion of older mothers (35+ years) increased from 14% in 1990–4 to 19% in 2000–4. The prevalence of all non-chromosomal anomalies was 27 per 1000 births in younger mothers (<20 years) and 23 per 1000 births in older mothers (35+ years). The relative risk of all non-chromosomal anomalies for younger mothers (<20 years) was 1.13 (95% CI 1.10 to 1.17) and 0.97 (95% CI 0.96 to 0.99) for older mothers (35+ years) compared to the baseline (25–29 years). In 2000–4 the prevalence of non-chromosomal anomalies in younger mothers was 28 per 1000 births and 23 per 1000 births in older mothers. Results differed for individual anomalies.

Conclusions: Generally, young maternal age is a stronger risk factor for a wider range of non-chromosomal congenital anomalies than older maternal age. The increasing average age of mothers at childbirth in Europe is not causing an increase in prevalence of non-chromosomal congenital anomalies, as overall risk does not rise with older maternal age. However, teenage mothers are at greater risk of congenital anomalies, and this needs further investigation.

030 PHYSICAL EXERCISE AND THE RISK OF PRETERM BIRTH: A STUDY WITHIN THE DANISH NATIONAL BIRTH COHORT

M. Juhl¹, P. Andersen², J. Olsen³, M. Madsen¹, T. Jorgensen¹, A. Nybo-Andersen^{1,4}. *¹National Institute of Public Health, Denmark; ²Department of Biostatistics, Institute of Public Health, University of Copenhagen, Denmark; ³Department of Epidemiology, UCLA School of Public Health, California, US; ⁴Department of Social Medicine, Institute of Public Health, University of Copenhagen, Denmark*

Objective: According to antenatal guidelines in many countries, women should be physically active during pregnancy, although empirical evidence to support this recommendation concerning fetal health is still sparse. The aim of the study was to examine the relation between physical exercise during pregnancy and the risk of preterm birth.

Material and Methods: Self-reported data on physical exercise were collected twice during pregnancy for 89 196 women recruited to the Danish National Birth Cohort between 1996 and 2002. Outcome data stem from the National Discharge Registry in Denmark. Hazard ratios (HR) for preterm birth were calculated by use of Cox regression analysis.

Results: Among singleton pregnancies one third of the participants did engage in physical exercise during pregnancy and 4.9% gave birth preterm. Physical exercise was associated with a reduced risk of preterm birth compared with no exercise (HR 0.82, 95% CI 0.76 to 0.88) but no dose-response relation was seen. The association was not affected by the type of exercise. The results did not indicate any time-dependent effects of exercise on extreme, very, and moderate preterm birth.

Conclusions: This study showed a reduced risk of preterm birth among women who engaged in exercise during pregnancy compared with women who reported no exercise. These results indicate a slightly protective effect of exercise or that pregnancies ending in preterm deliveries follow an early onset of symptoms that may interfere with the capacity to be physically active.

031 THE SEROPREVALENCE OF RUBELLA IN PREGNANT WOMEN IN NORTH THAMES

P. Hardelid¹, D. Williams¹, W. D. Cubitt², C. Peckham¹, P. Tookey¹, M. Cortina-Borja¹, C. Dezateux¹. ¹MRC Centre of Epidemiology for Child Health, UCL Institute of Child Health, London; ²Department of Virology, Great Ormond Street Hospital for Children NHS Trust, London, UK

Background: Maternal rubella infection early in pregnancy can cause severe and multiple congenital anomalies in the infant. Since the introduction of vaccination, the number of children born with congenital rubella has declined in the UK, and only 12 UK-born children were reported to the national surveillance programme between 1999 and 2006. Most of these were infants born to mothers who were recent immigrants and infected in their country of origin, or soon after arrival in the UK. London, with a large immigrant population and consistently low measles, mumps and rubella (MMR) vaccination uptake, is at particular risk of rubella outbreaks.

Objectives: To estimate the proportion of pregnant women who are rubella IgG antibody seronegative by maternal country of birth, maternal age and Primary Care Trust of residence at delivery.

Design: Cross-sectional seroprevalence study of approximately 18 000 residual newborn dried blood spots randomly sampled from newborn screening samples collected in 2004.

Setting: North Thames (North London, Bedfordshire, Hertfordshire and Essex), England

Methods: Rubella IgG enzyme-linked immunosorbent assay to measure maternally acquired antibody as a proxy for maternal antibody concentration. Finite mixture models were constructed and used to estimate the proportion of seronegative pregnant women. Rubella seroprevalence was examined using logistic regression in STATA.

Results: 12 814 samples have been tested thus far. 3.1% (95% CI 2.8% to 3.4%) were seronegative to rubella. Women born in Sub-Saharan Africa and South Asia were more likely than UK-born women to be seronegative, controlling for maternal age: adjusted odds ratio (AOR) (95% CI) 4.9 (3.3 to 7.4) and 4.9 (3.4 to 7.2) respectively. Relative to those aged 30–34 years, women aged <20 were more likely to be seronegative: AOR 2.5 (1.5 to 4.1).

Conclusion: These preliminary findings suggest that young mothers and those born abroad are at increased risk of rubella infection. Immunisation strategies targeted at newly arrived women migrants might reduce the prevalence of rubella susceptibility in women of child bearing age. An increase in the uptake of vaccine among children in London is also required to prevent transmission of rubella infection to pregnant women.

Older people II

032 DO COMPLEX INTERVENTIONS HELP OLDER PEOPLE TO LIVE AT HOME? A SYSTEMATIC REVIEW

A. Beswick¹, K. Rees¹, S. Ebrahim², P. Dieppe¹. ¹MRC Health Services Research Collaboration, Department of Social Medicine, University of Bristol; ²Department of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine, UK

Background: In older age, decline in physical function may lead to loss of independence, the need for hospital and nursing home care, and premature death. The importance of preventive strategies based around identification and treatment of diverse risk factors is recognised by older people, health professionals and policy makers. Strategies take the form of complex interventions: combinations of interdisciplinary teamwork targeting health and social problems.

Objectives: To evaluate community-based complex interventions to preserve physical function and independence in older people.

Methods: We used Cochrane systematic review methods to identify randomised controlled trials fulfilling the inclusion criteria: mean age 65+ years; living at home or preparing for hospital discharge to home; community-based multifactorial intervention; and follow-up at least 6 months. Articles were identified from computerised databases and citation searches. Outcomes studied were: not living at home, death, nursing home and hospital admissions, falls and physical function. Summary relative risks and standardised mean differences were calculated using fixed effects meta-analysis and potential sources of heterogeneity investigated.

Results: Eighty nine trials including nearly 100 000 people fulfilled inclusion criteria. While most trials were conducted in the USA and UK, many other countries were represented. The overall relative risk of not living at home was 0.95 (95% CI 0.93 to 0.97) reflecting a mean of 2.2% more people living at home per year in the intervention group (number needed to treat 45). This was explained by reduced nursing home

admissions, relative risk 0.87 (95% CI 0.83 to 0.90) rather than death, relative risk 1.00 (95% CI 0.97 to 1.02). Hospital admissions and falls were lower in the intervention group, relative risk 0.93 (95% CI 0.90 to 0.97) and 0.90 (95% CI 0.86 to 0.94) respectively. Physical function at follow up was better in the intervention group, standardised mean difference -0.09 (95% CI -0.14 to -0.05). With the exception of reduced nursing home admissions, there was no evidence for greater effectiveness in less healthy groups. There was no suggestion that higher intensity interventions were more effective.

Conclusions: The need to evaluate complex models of care in older people is recognised internationally. Review of trials suggests that complex interventions can help older people to carry on living at home, largely through preventing the need for nursing home admission, and reduce hospital admissions and falls. As benefits were seen with a broad range of intervention intensities in diverse older populations, determining the cost-effectiveness of specific interventions is a high priority to inform implementation of care.

033 PREDICTORS OF THE ONSET AND PERSISTENCE OF PARTICIPATION RESTRICTION IN COMMUNITY-DWELLING OLDER ADULTS

R. Wilkie, K. Jordan, P. Croft. Primary Care Musculoskeletal Research Centre, Keele University, UK

Background: In older populations, increasing rates of chronic diseases and impairments may lead to activity limitation but may not necessarily restrict participation in aspects of life such as looking after dependants, work or socialising. Our study aimed to examine which individual and environmental factors were linked with the onset and persistence of perceived participation restriction in community-dwelling older adults.

Methods: Prospective population-based observational cohort of adults aged 50 years and over using self-completed questionnaires. Analysis was performed on participants (n=3709) who completed all items of the Keele Assessment of Participation at both baseline and three-year follow-up. Multi-level logistic regression was used to assess the baseline predictors of (a) onset and (b) persistence of any participation restriction (restriction in one aspect of life or more) at three years. Factors examined were at the individual level (age, gender, specific health conditions and impairments common in older adults, socio-economic and personal factors) and the area-level Index of Multiple Deprivation covering domains of income, employment, education, health and disability, housing and services, crime and the living environment.

Results: A high level of activity limitation (OR 2.7; 95% CI 1.6 to 2.4) was the main independent predictor of onset of participation restriction at three years. Modest associations were also apparent for comorbidity, obesity and adequacy of income. The main predictors of persistence of participation restriction were depression (3.3; 1.9 to 5.9) and age 80 and over (2.9; 1.5 to 5.7). Activity limitation, cognitive impairment, occupational class and adequacy of income were also significantly related to persistence. Of the seven area-level domains, only living in an area with high levels of crime deprivation (1.3; 0.9 to 1.9) was associated with the onset of participation restriction. High education deprivation (1.4; 0.8 to 2.5) and high environment deprivation (1.2; 0.8 to 1.9) were associated with the persistence of participation restriction although these associations were not statistically significant.

Conclusions: The onset and persistence of participation restriction were associated with a range of potential health and social targets in older adults. The socially disadvantaged and the oldest old were more susceptible to the onset and persistence of perceived participation restriction. Clinical approaches aimed at managing activity limitation and health conditions and impairments (such as depression and obesity) may prevent and reduce participation restriction in older adults. Area level environmental factors did not appear to be linked with the onset or persistence of participation restriction but power to demonstrate these was limited.

034 SOCIAL ENGAGEMENT AND THE RISK OF CARDIOVASCULAR DISEASE MORTALITY: RESULTS OF A PROSPECTIVE POPULATION-BASED STUDY OF OLDER MEN

S. Ramsay¹, S. Ebrahim², P. Whincup³, O. Papacosta¹, R. Morris¹, L. Lennon¹, S. G. Wannamethee¹. ¹Department of Primary Care & Population Sciences, University College London, London; ²Department of Epidemiology & Population Health, London School of Hygiene & Tropical Medicine; ³Department of Community Health Sciences, St George's, University of London, London, UK

Objective: Although social relationships appear to be related to health status, their association with cardiovascular disease (CVD) is less clear. Although some studies have suggested that weak social relations increase

CVD risk, few have taken into account the potential confounding effects of behavioural factors (smoking, physical activity, body weight and alcohol consumption) and the influence of co-morbidity and disability. We examined the prospective relation of social engagement with CVD mortality taking account of behavioural factors, socioeconomic conditions and the presence of comorbidity and disability.

Design: Prospective study of a socioeconomically and geographically representative cohort.

Setting: 24 British towns.

Participants: 5925 men, aged 52–74 years, followed-up from 1992 to 2006.

Methods: Social engagement was measured as a score from 0–9 based on questions reflecting the structure of relationships including frequency and extent of engagement. The score was categorised into four groups – 0–3, 4–5, 6–7 and 8–9. Hazard ratios for CVD mortality according to these categories were computed and the effect adjusted for age, comorbidity, and behavioural and socioeconomic factors.

Results: Subjects with higher social engagement scores had lower levels of smoking, heavy drinking, obesity and physical inactivity (all p for trend <0.005). The hazard for CVD mortality decreased with increasing social engagement score – hazard ratio (HR) for those with the highest social engagement scores of 8–9 was 0.42 (95% CI 0.32 to 0.53) compared to those with the lowest scores of 0–3 (p for trend <0.0001). Further adjustment for behavioural factors (smoking, alcohol, physical activity and body weight), disability, comorbidity and socioeconomic factors reduced the strength of this association though a significant trend remained (p for trend = 0.0004) – HR 0.70 (95% CI 0.53 to 0.93) for highest vs lowest social engagement scores. This association between increasing social engagement score appeared to be present both in men with and without CVD at baseline. Although the association appeared somewhat stronger in patients with pre-existing CVD (HR 0.59 for highest vs lowest social engagement scores) than in those without (HR 0.79), there was no evidence of an interaction between social engagement and CVD ($p=0.98$).

Conclusion: In our study of older men, social engagement appeared to have a modest protective effect on CVD mortality independent of behavioural factors, socioeconomic conditions, disease and disability.

035 THE EFFECTS OF SINGLE AND DUAL SENSORY LOSS ON DEPRESSION, SUBJECTIVE ILL-HEALTH AND FUNCTIONAL DISABILITY IN ELDERLY JAPANESE

T. Michikawa, Y. Nishiwaki, S. Harada, Y. Kikuchi, S. Iwasawa, M. Nakano, T. Takebayashi. *Department of Preventive Medicine and Public Health, Keio University, Tokyo, Japan*

Objective: To assess the effect of hearing loss, vision loss and their combination (dual sensory loss) on depression, subjective ill-health and functional disability in a community-dwelling elderly and to determine whether the effect varies by gender.

Design: A cross-sectional study.

Setting: Community-based sample in Kurabuchi, Gunma Prefecture, Japan

Participants: 838 (350 males, 488 females) elderly aged 65 years old and older participated in the baseline survey of the cohort study on the functional assessment and ageing (58% of the eligible population in this area).

Methods and Main Outcome Measure: Best-corrected visual acuity and pure-tone audiometric test (30, 50 dB at 1 kHz and 40 dB at 4 kHz) were used to assess the sensory function. Sensory loss was defined according to the US criteria (<0.5 in the better eye) for vision and low frequency hearing acuity (at least failed 30 dB at 1 kHz bilaterally) for hearing. Information on depression, subjective ill-health and the functional disability (Instrumental ADL) was collected through a face-to-face interview using structured questionnaire. We used the five-item Geriatric Depression Scale to identify depression, and Tokyo Metropolitan Institute of Gerontology index of competence to evaluate the IADL. Demographic and socioeconomic information (age, sex and education, and current/past histories of life-threatening diseases) were also collected.

Results: The prevalence of single vision loss, hearing loss and dual sensory loss were 13.1, 14.0 and 6.3% in males, 23.0, 13.9 and 12.3% in females, respectively. Multivariate logistic regression analysis revealed that hearing loss in males (OR 2.22 (1.07 to 4.61)) and vision loss in females (OR 1.91 (1.14 to 3.21)) was related to depression. The subjects with dual sensory loss had higher odds ratio than subjects with single loss both in males and females. Dual sensory loss was also associated with subjective ill-health and disturbed IADL.

Conclusions: The prevalence of sensory loss was high in the community-dwelling elderly and increased with age increased. The sensory loss, dual sensory loss in particular, had a significant effect on depression, subjective ill-health and the IADL decline. The effect of sensory loss on depression

differs between in males and in females. Although screening, prevention and treatment of sensory loss would be important for preventing the decline in quality of life, different strategies may be needed for males and females.

036 DECREASED MUSCLE MASS AND INCREASED CENTRAL ADIPOSITY ARE INDEPENDENTLY RELATED TO MORTALITY IN OLDER MEN

S. Wannamethee, G. Shaper, L. Lennon, P. Whincup. *Department of Primary Care and Population Science, Royal Free and University College Medical School, London, UK*

Background: Although visceral fat deposition increases with age, muscle mass is reduced. These changes have opposite effects on body weight; BMI is therefore an increasingly poor marker of adiposity with increasing age. Studying the influence of age-related changes in body composition on mortality therefore requires the use of more specific body composition measures.

Aims: We have examined the relationship between a wide range of indices of body composition including BMI and more specific markers of adiposity (waist circumference (WC), waist-to-hip ratio (WHR), fat mass) and markers of muscle mass (mid arm muscle circumference, fat free mass) and all cause mortality in men aged 60–79 years.

Methods: Prospective study of 4107 men aged 60–79 years with no diagnosis of heart failure, and followed up for an average of 6 years during which there were 713 deaths.

Results: Underweight men (BMI <18.5) had a mortality rate three times higher than any other BMI group. After exclusion of these men, increased adiposity (BMI, WC and WHR) showed little relation with mortality after adjustment for lifestyle characteristics. Muscle mass (indicated by mid-arm muscle circumference (MAMC)) was significantly and inversely associated with mortality (adjusted relative risk for the 4 quartiles were 1.00, 0.79, 0.71 and 0.71 ($p=0.0003$ for trend)). Men with low MAMC (lowest quartile) had the highest mortality irrespective of adiposity. After adjustment for MAMC, obesity markers, particularly high WC (>102 cm) and WHR (top quartile) were associated with increased mortality. The relationship between BMI and mortality appeared to be dependent on muscle mass, obesity being positively associated with increased mortality only in those with above median MAMC. Measuring both MAMC and WC most effectively predicted mortality. Men with low WC (<102 cm) and above median muscle mass showed the lowest mortality risk. Men with WC >102 cm and above median muscle mass showed significantly increased mortality (adjusted RR 1.39, 95% CI 1.08 to 1.77) and this increased to 1.66 95% CI (1.08 to 2.56) in those with WC >102 and below median MAMC.

Conclusion: The findings suggest that both decreased muscle mass (denoted by low mid-arm muscle circumference) and increased visceral fat (denoted by high waist circumference) are independently associated with increased mortality in older men. Although BMI should be used in the first instance to identify underweight men, our findings suggest that the use of both waist circumference and MAMC provide simple measures of body composition to assess mortality risk in older men.

Breast cancer

037 25-HYDROXYVITAMIN D AND RISK OF POSTMENOPAUSAL BREAST CANCER

S. Abbas¹, J. Linseisen¹, T. Slinger¹, S. Kropp¹, D. Flesch-Janys², J. Chang-Claude¹. ¹*Division of Cancer Epidemiology, German Cancer Research Centre, Heidelberg, Germany;* ²*Institute for Medical Biometrics and Epidemiology, University Clinic Hamburg-Eppendorf, Hamburg, Germany*

Introduction: A variety of studies suggest that vitamin D may reduce the risk of breast cancer. Most of these studies assessed the effects of dietary intake only, although sun exposure is an important source of vitamin D. Therefore, measurement of vitamin D metabolites provides a better indication of the overall vitamin D status. Serum concentration of 25-hydroxyvitamin D (25(OH)D) was suggested as medium-term biomarker of vitamin D supply.

Objective: To assess the association of 25(OH)D serum concentrations with the risk of breast cancer in postmenopausal women.

Design: We used a large population-based case-control study in Germany, which recruited incident breast cancer patients aged 50–74 between 2002 and 2005 and population-based controls matched according to year of birth. Information on sociodemographic and anthropometric data, life style habits, hormone use and other breast cancer risk factors were collected by

a personal interview. For this analysis, we included 1398 postmenopausal cases and 1394 postmenopausal controls from the Rhine-Neckar-Karlsruhe study region, matched in addition on time of blood collection. 25(OH)D was measured in serum with an enzyme immunoassay (OCTEIA 25-hydroxy vitamin D, IDS) and analysed as a continuous and categorical (5 categories) variable. Conditional logistic regression was used to calculate odds ratios for breast cancer adjusted for potential confounders.

Results: Median serum concentration of 25(OH)D was 44.9 and 51.4 nmol/l for cases and controls, respectively. 25(OH)D level was significantly inversely associated with the risk of postmenopausal breast cancer. Compared with the lowest category (<30 nM), the odds ratios (OR (95% CI)) for higher serum concentrations (30 to <45, 45 to <60, 60 to <75, and ≥ 75 nM) were 0.57 (0.45–0.73), 0.50 (0.39–0.65), 0.43 (0.32–0.57) and 0.32 (0.24–0.43), respectively ($p_{\text{trend}} < 0.0001$). When analysed as a continuous variable, 25(OH)D showed a significantly reduced risk of 0.88 (0.85–0.91) per 10 nM increment.

Conclusion: Our findings strongly suggest a protective effect for postmenopausal breast cancer risk through a better vitamin D supply as characterized by measurement of serum 25(OH)D.

038 BREAST CANCER RISK FACTORS AND VOLUMETRIC BREAST DENSITY: A NOVEL MARKER OF BREAST CANCER RISK

M. Jeffreys¹, R. Warren², R. Highnam³, GDavey. Smith⁴. ¹Centre for Public Health Research, Massey University, Wellington, New Zealand; ²Department of Radiology, Addenbrooke's Hospital, Cambridge, UK; ³Highnam Associates, Wellington, New Zealand; ⁴Department of Social Medicine, University of Bristol, UK

Objective: To explore the relationships between recognised breast cancer risk factors and two novel measures of breast density volume.

Design: Cross sectional study nested within a prospective cohort.

Participants: 590 women, who attended Glasgow University (1948–68), replied to a questionnaire (2001) and attended breast screening in Scotland (1989–2002).

Main Outcome Measures: Volumetric breast density was estimated from medio-lateral oblique mammograms taken at the first screening visit for each woman. We used a fully automated computer programme (Standard Mammogram Form, SMF, Version 2.2) applied to digitised film-screen mammograms. This measured the proportion of the breast volume composed of dense (non-fatty) tissue (SMF%) and the absolute volume of this tissue (SMF volume in cm³).

Results: The median age at first breast screening was 54.1 years (range 40.0 to 71.5). The median SMF volume was 70.25 cm³ (interquartile range: 51.0 to 103.0). Mean SMF% was 26.3%, standard deviation 8.0% (range 12.7% to 58.8%). Age-adjusted logistic regression models showed a mixed pattern of associations between volumetric breast density and breast cancer risk factors. There was a positive relationship between age at last menstrual period and SMF%, odds ratio per year later: 1.05 (95% CI 1.01 to 1.08, $p = 0.004$). Number of pregnancies was inversely related to SMF Volume, odds ratio per extra pregnancy: 0.78 (0.70 to 0.86, $p < 0.001$). BMI measured at university (median age 19) and in 2001 (median age 62) was positively related to SMF volume, odds ratio per extra kg/m² 1.21 (1.15 to 1.28) and 1.17 (1.09 to 1.26) respectively, and inversely related to SMF%, odds ratio per extra kg/m² 0.83 (0.79 to 0.88) and 0.82 (0.76 to 0.88) respectively, $p < 0.001$.

Conclusions: SMF% and absolute SMF volume are related to several, but not all, breast cancer risk factors. In particular, the positive relationship between BMI and SMF volume suggests that the volume of dense breast tissue is likely to be a useful marker in breast cancer epidemiology.

039 THE ASSOCIATION OF RISK OF DIFFERENT HISTOLOGICAL SUBTYPES OF BREAST CANCER AND DIFFERENT FORMULATIONS OF MENOPAUSAL HORMONE THERAPY IN POSTMENOPAUSAL WOMEN

D. Flesch-Janys¹, J. Berger¹, W. Braendle², S. Kropp³, E. Mutschelknauss¹, N. Obi¹, T. Slinger³, J. Chang-Claude³. ¹Department of Medical Biometrics and Epidemiology; ²Center of Gynaecology, Obstetrics and Paediatrics, University Medical Centre Hamburg-Eppendorf; ³Division of Cancer Epidemiology, German Cancer Research Centre, Heidelberg, Germany

Objectives: To determine the risk of breast cancer by histological subtypes associated with the use of different formulations of menopausal hormone therapy (HT) in postmenopausal women in a population of high prevalence and long duration of use.

Methods: The MARIE study (Mammary Carcinoma Risk Evaluation) is a population based, two centre case-control studies in the Hamburg and Rhine-Neckar-Region in Germany. The study included $n = 3464$ postmenopausal invasive and in situ breast cancer cases aged 50–74 years at diagnosis and $n = 6657$ controls, frequency matched (1:2) by year of birth. Data on hormone use and various breast cancer risk factors were ascertained by in-person interviews. Polytomous logistic regression was used to estimate ORs and 95% CIs, adjusted for potential confounders.

Results: Ever use of HT was associated with an increased risk for all tumour types combined (OR 1.39; 95% CI 1.26 to 1.54). Elevated risks were most pronounced for current users of HT (1.75; 1.57 to 1.96). Risk estimates varied substantially by histological type. The highest estimates were observed for current users for lobular (2.94; 2.35 to 2.67) and tubular tumours (3.67; 2.04 to 6.58), while ductal tumours showed an OR of 1.39 (1.22 to 1.58). Ever use of oestrogen-only therapy was not associated with an increased risk in ductal tumours, but elevated for lobular (2.06; 1.59 to 2.68), tubular (2.33; 1.15 to 4.71), and in situ carcinomas (2.04; 1.32 to 2.16). In contrast, ever use of combined oestrogen-progestin increased the risk of ductal tumours as well (1.29; 1.13 to 1.47). For lobular (2.46; 1.96 to 3.10) and tubular tumours (3.58; 1.99 to 6.46) the risk estimates related to ever use of combined therapy were substantially higher than those for oestrogen-only. In general risks increased by duration of use and declined rapidly after cessation, but risks were still elevated for cyclical combined therapy several years later (1.67; 1.34 to 2.09 after 5 to <10 years).

Conclusions: Menopause related hormone therapy is associated with an increased risk of breast cancer, most pronounced for lobular and tubular types. In general risk is highest for current users and decreases with time after cessation, though for combined therapy it may persist for several years.

040 PREGNANCY DURATION AND MATERNAL BREAST CANCER RISK

J. Wohlfahrt, M. Melbye. Department of Epidemiology Research, Section of Epidemiology, Statens Serum Institut, Copenhagen, Denmark

Background: A birth at an early age reduces a mother's long-term breast cancer risk, but it is uncertain how long her pregnancy should last to induce the reduction. The national registration of gestational age in Denmark allows for an evaluation of how the reduction varies with duration of pregnancy.

Material and Method: The association between pregnancy duration and breast cancer risk was evaluated by incidence rate ratios in a register-based cohort of all Danish women born since 1935 (1.7 million women) by log-linear Poisson regression. Information on births, pregnancy duration in weeks and breast cancer were obtained from national registries.

Results: During 47.1 million years of follow-up 31 297 breast cancer cases were diagnosed, whereof 6999 had at least one pregnancy with registered gestational age. Breast cancer risk following any pregnancy resulting in a childbirth was 7% (95% CI 4%–10%) lower than a pregnancy lasting 4 weeks less. For example, compared to women with one birth less, women aged 25–29 years at childbirth at week 40 had an estimated 14% reduced risk more than 20 years after the birth, whereas there was no reduction if the pregnancy had lasted less than 32 weeks.

Conclusion: Long-term maternal breast cancer risk following a birth is lower the longer the duration of the preceding pregnancy. The well-known reduction following a full-term birth at an early age might be due to factors acting in the last weeks of the pregnancy.

041 COX-2 SELECTIVE INHIBITORS, OTHER NON-STEROIDAL ANTI-INFLAMMATORY DRUGS, AND THE RISK OF BREAST CANCER

D. P. Cronin-Fenton¹, L. Pedersen¹, S. Friis², T. L. Lash^{1,3}, J. A. Baron⁴, H. T. Sørensen^{1,3}. ¹Department of Clinical Epidemiology, Aarhus University Hospital, Denmark; ²Institute of Cancer Epidemiology, The Danish Cancer Society, Copenhagen, Denmark; ³Department of Epidemiology, School of Public Health, Boston University, USA; ⁴Department of Medicine, Dartmouth Medical School, Lebanon, USA

Background: Evidence suggests that long-term use of non-steroidal anti-inflammatory drugs (NSAIDs) reduces the risk of colorectal cancer. Some have suggested that such a chemopreventive effect may also be applicable to breast cancer. However, estimates of the strength of the association between use of NSAIDs and risk of breast cancer are inconsistent.

Objectives: We conducted a large, population-based case-control study to examine if use of NSAIDs or selective (s) Cox-2 inhibitors is associated with breast cancer risk.

Methods: We conducted this study in the counties of North Jutland and Aarhus, Denmark, with a total population of 1.15 million women from January 1991 through December 2005. We used county hospital discharge registries to identify breast cancer cases, and pharmacy registries for prescription history. Controls, matched to cases on birth year and county of residence, were selected from the Danish Civil Registration system, and sampled by incidence density sampling. We excluded exposure data in the year before index date to allow for a preclinical latency period. Exposure history was included from the time the pharmacy databases were established—1989 in North Jutland and 1996 in Aarhus. We used conditional logistic regression to compute crude and adjusted odds ratios and 95% confidence intervals as a measure of relative risk of breast cancer according to sCox-2 inhibitors and other NSAID use. We examined the association of NSAIDs and sCox-2 inhibitors with breast cancer risk overall, and according to frequency (persistent (≥ 1 vs < 1 prescription every 6 months), duration (< 7 years/ ≥ 7 years), and intensity (mg/day) of use.

Results: We included 7237 cases and 71 208 population-based controls. Median age of the study population was 62.7 years; over 57% were aged < 65 years at index date. More cases than controls had ever used HRT (32.2% vs 28.8%). Compared to never/rare users, low and high intensity use of sCox-2 inhibitors were positively associated with breast cancer risk (odds ratio (OR) 1.20, 95% CI 0.94 to 1.52 and OR 1.35, 95% CI 1.03 to 1.78, respectively). There was no significant association of other NSAIDs with breast cancer; OR_{low intensity} 1.04, 95% CI 0.97 to 1.13, OR_{medium intensity} 1.08, 95% CI 1.00 to 1.17, OR_{high intensity} 1.02, 95% CI 0.88 to 1.17. We found no consistent trends in risk across categories of frequency or duration of drug use.

Conclusions: Our findings suggest that Cox-2 inhibitors and other NSAIDs do not reduce breast cancer risk.

Genetics and health

042 GENES AND SMOKING INTERACT ON THE RISK OF AGE-RELATED MACULOPATHY: THE MÜNSTER AGEING AND RETINA STUDY

A. Farwick, M. Dietzel, M. Stoll, D. Pauleikhoff, H. W. Hense. *Institute of Epidemiology & Social Medicine, University Muenster, Germany*

Background: Age-related macular degeneration (AMD) is the most common cause of irreversible visual impairment and legal blindness among older people in the Western world. Although the genetic determinants of age-related maculopathy (ARM) and AMD have been extensively studied in recent epidemiological and clinical investigations, the complex interplay between genetic and environmental factors in determining the onset and progression of the disease remains insufficiently understood.

Objective: We investigated whether single nucleotide polymorphisms (SNPs) within two previously identified AMD risk genes on different chromosomes (Complement factor H (dbSNP ID: rs1061170) and LOC387715 (dbSNP ID: rs10490924) were related to prevalent ARM (n = 449) and AMD (n = 288) in the baseline examination of the Münster Aging and Retina Study cohort (MARS, total n = 920). Particular interest was dedicated to effect modification between SNPs and/or by smoking. We also specifically searched for differences relating to the two phenotypic manifestations of geographic atrophy (GA) and choroidal neovascularisation (CNV).

Results: We observed that the CFH (risk allele frequency in controls 34%) and the LOC (25%) genetic variants were common and independently associated with an increased risk of ARM (OR 5.6 and 2.0, respectively, $p < 0.001$, homozygous vs non-carrier) and AMD (OR 6.9 and 8.5, respectively, $p < 0.001$). Both SNPs were also more strongly associated with CNV (homozygotes OR 6.6 and 11.0) than GA (OR 4.9 and 4.1, respectively). Compared to individuals carrying none of the two risk alleles, those homozygous for both risk variants showed a massively higher risk of AMD (OR 69.9; synergy index SI: 8.7). Of 34 individuals homozygous for both risk alleles, only one had no maculopathy. Furthermore, smoking amplified the effect of each of the genetic risk variant, especially for CNV (OR 15.4 and 20.8, respectively, for homozygotes).

Conclusion: There is indication of a very strong genetic determination of ARM and AMD, we observed strong biological interaction between two common genetic risk variants on different chromosomal loci, and it appears that smoking substantially accentuates the genetic risk of AMD, especially for CNV. The public health impact of these findings needs consideration.

043 GENETIC AND ENVIRONMENTAL FACTORS IN RELATIVE WEIGHT FROM BIRTH TO AGE 18: THE SWEDISH YOUNG MALE TWINS STUDY

F. Rasmussen^{1,4}, K. Silventoinen², K. H. Pietiläinen³, P. Tynelius⁴, T. I. A. Sørensen⁵, J. Kaprio⁶. ¹Department of Public Health Sciences, Karolinska Institute, Sweden; ²Department of Public Health, University of Helsinki, Finland; ³Obesity Research Unit, Helsinki University Hospital, Finland; ⁴Division of Epidemiology, Stockholm Centre of Public Health, Sweden; ⁵Institute of Preventive Medicine, Copenhagen University Hospital, Centre for Health and Society, Denmark; ⁶Department of Mental Health and Alcohol Research, National Public Health Institute, Finland

Objectives: To investigate the contributions of genetic and environmental factors to the development of relative weight during the growth period.

Subjects and Methods: The data included 231 monozygotic and 144 dizygotic complete male twin pairs born in Sweden 1973–9 and measured annually from birth to 18 years of age. The data were used using classic twin methods based on structural linear equations.

Results: Body mass index (BMI, kg/m²) at age 18 correlated with BMI at age one ($r = 0.32$, 95% CI 0.21 to 0.42) and this correlation increased steadily up to age 17 ($r = 0.91$, 95% 0.89 to 0.93). Major part (81–95%) of these trait correlations were attributable to correlated additive genetic factors, but also unique environmental correlations were present during the whole growth period. The small correlation between ponderal index (kg/m³) at birth and BMI at age 18 ($r = 0.09$, 95% CI 0.02 to 0.15) could be attributed in its entirety to correlated unique environmental factors.

Conclusions: Our results suggest persistent genetic regulation of BMI from age one to 18. However, also environmental factors, not shared by siblings, affected the correlations of BMI. A small specific environmental correlation was found between ponderal index at birth and BMI at age 18, which may reflect the effect of neonatal environmental factors on adult BMI. A challenge of future research is to identify chromosome regions and specific genes regulating the development of BMI as well as environmental factors affecting BMI through the growth period independently or interacting with genetic factors.

044 EFFECTS OF CONSANGUINITY ON STILLBIRTHS AND INFANT DEATH IN NORWAY: A STUDY ON 2.2 MILLION BIRTHS

A. M. Gribovski, P. Surén, C. Stoltenberg. *Division of Epidemiology, Norwegian Institute of Public Health, Oslo, Norway*

Objectives: To estimate the effects of consanguinity on the risk of stillbirth and infant death in Norway.

Design: A registry study based on the Medical Birth Registry of Norway (MBRN) linked to Statistics Norway for data on ethnicity and education. Data on consanguinity, stillbirths and infant deaths were obtained from the MBRN. Logistic regression was used to study effects of consanguinity on the outcomes adjusted for maternal age, education, parity, and birth year. Relationship between partners was defined as: first cousins or closer, second cousins, and related to unknown degree. Infants born to unrelated couples served as a reference group. Analyses were performed separately for ethnic Norwegians, ethnic Pakistanis and in the full sample.

Participants: All infants born in Norway and registered in MBRN from 1967 through the first half of 2005 (n = 2 232 690).

Main Outcome Measures: Adjusted odds ratios (OR) and population attributable fractions (PAF) for stillbirths and infant deaths were calculated.

Results: In the full sample, stillbirths were more common in first-cousin marriages (OR 1.63, 95% CI 1.39 to 1.91) and marriages with unknown degree of relationship (OR 1.22, 95% CI 1.02 to 1.46). Infants born in first-cousin marriages (OR 2.31, 95% CI 2.11 to 2.79), second-cousin marriages (OR 1.42, 95% CI 1.19 to 1.69) and marriages with unknown degree of relationship (OR 1.35, 95% CI 1.12 to 1.62) had higher risk to die during the first year of life compared to children born to unrelated parents. ORs in ethnic Norwegians and ethnic Pakistanis for both outcomes were similar. PAFs for all marriages between relatives were 0.47% for stillbirths in the whole population, 0.20% for ethnic Norwegians and 23% for ethnic Pakistanis. The corresponding PAFs for infant mortality were 1.2%, 0.56% and 42%.

Conclusions: Consanguinity is associated with increased risk of stillbirth and infant death independent of maternal socio-demographic factors. While consanguinity accounts for 0.2% of stillbirths and 0.6% of infant deaths in ethnic Norwegians, in ethnic Pakistanis, almost every fourth stillbirth and every second infant death can be attributed to consanguinity. Causes of infant deaths by parental consanguinity will also be discussed.

045 ROLE OF PARENTAL LINEAGES IN MONOZYGOTIC AND DIZYGOTIC TWINNING IN ITALY

S. Brescianini¹, L. Nisticò¹, E. Medda¹, V. Grimaldi², R. Lanni³, C. D'Ippolito¹, V. Toccaceli¹, P. Mastroiacovo⁴. ¹National Centre for Epidemiology, Surveillance and Health Promotion, Istituto Superiore di Sanità, Rome, Italy; ²ASL Roma B, Rome, Italy; ³ASL Roma E, Rome, Italy; ⁴International Centre for Birth Defects, Rome, Italy

Objective: It is widely accepted that twinning, especially of dizygotic pairs, is a familial trait. Different transmission patterns for dizygotic (DZ) twinning have been proposed, and the role of both parental lineages for monozygotic (MZ) and DZ twin births is controversial.

Design: Since most studies simply compare twinning prevalence among relatives of MZ and DZ twins, we adopted a case-control approach to estimate the relative risk of being MZ or DZ twin given that a parent or a grandparent is a twin.

Participants and Setting: Participants in this study were all members of the Mercurio Project that enrolled consecutive singleton and twin births in 40 Italian hospitals during 1993–5. Twins were recontacted 10 years later by the Italian Twin Registry to better ascertain their zygosity. Data on twin parents and grandparents were collected three months after birth for 552 spontaneously conceived twin pairs (229 MZ, 323 DZ), and 1162 singletons.

Main Outcome Measure: Odds ratio (OR) of being a twin given that at least one parent or grandparent is a twin.

Results: Twin prevalence is not significantly different between twins' and singletons' parents. Instead, the odds ratio of being a twin, given that at least one grandparent is a twin is 1.6 (95% CI 1.1 to 2.3). This OR rises to 1.9 (95% CI 1.2 to 3.0) if at least one maternal grandparent is a twin, but is not significant for paternal side. When looking at the ORs by zygosity, having one maternal or paternal twin grandparent confers a higher risk of DZ twinning (OR 1.8, 95% CI 1.0 to 3.1 and OR 1.7, 95% CI 1.0 to 3.1). For MZ twins only maternal side confers a significant higher risk (OR 2.1, 95% CI 1.2 to 3.8) and in particular all the signal come from maternal grandmother (OR 2.7, 95% CI 1.3 to 5.6).

Conclusion: In our sample MZ twinning seems to be transmitted by maternal grandmother, while both lineages contribute to DZ twinning.

046 VITAMIN D STATUS AND SELF-PERCEIVED HEALTH: CONVENTIONAL AND MENDELIAN RANDOMISATION APPROACHES

E. Hyppönen, G. Davey Smith, C. Power. MRC Centre for the Epidemiology of Child Health, Institute of Child Health, University College, London, UK

Objective: Given the proposed wide-ranging influence of vitamin D on health and disease risk, we hypothesised that self-perceived health would vary by current vitamin D status (measured by 25(OH)D), and by functional genetic variants influencing vitamin D metabolism.

Design: Cohort study.

Setting: Biomedical survey carried out 2003–4 in England, Scotland and Wales.

Participants: White European participants in the 1958 cohort (aged 45 years), 3633 females and 3633 males (3219/3178 with genetic information).

Main Outcome Measures: Information on self-perceived health (poor/fair/good/excellent) and background indicators was obtained by a structured questionnaire. 25(OH)D was measured by IDS ELISA (standardised to DEQAS mean) and CYP27B1 genotype (affecting vitamin D activation) determined by TaqMan.

Results: 18.1% of men and 17.8% of women described their health as fair or poor. Season of measurement was strongly associated with 25(OH)D (R^2 25%, $p < 0.0001$), but not with self-perceived health ($p = 0.31$). Risk of experiencing fair or poor health was reduced from the lowest to the highest concentrations of 25(OH)D: compared to the reference group of < 25 nmol/l OR for fair or poor health (95% CI) were 0.70 (0.55 to 0.89) for 25–49.9 nmol/l, 0.49 (0.38 to 0.64) for 50–74.9 nmol/l, 0.41 (0.30 to 0.56) for 75–99.9 nmol/l, 0.38 (0.24 to 0.60) for 100–125 nmol/l, and 0.23 (0.10 to 0.56) for > 125 nmol/l, adjusted for sex, month, geographical location, physical activity, and social indicators (social class, marital status, financial problems). Average serum 25(OH)D concentration varied by CYP27B1 genotype and average concentrations were 5.2% higher in participants with CC genotype compared to AA genotype ($p = 0.01$). There was also an association between CYP27B1 genotype and self-perceived health: individuals with CC genotype were 25% (95% CI –40 to –6) less likely to report fair or poor health compared to AA ($p = 0.002$). Adjustment for social indicators or known determinants

of vitamin D status had little influence on CYP27B1 –self-perceived health association.

Conclusions: The strong association between serum 25(OH)D and self-perceived health was supported by an association with CYP27B1 genotype, which provides further evidence for a causal relation. These results provide a practical example on the use of genetic variants as proxy markers for environmental exposure on studies of vitamin D and the use of the Mendelian randomisation approach.

Lifestyle: smoking and health

047 VALUE-ADDED EDUCATION AND SMOKING UPTAKE IN SCHOOLS: A COHORT STUDY

W. Markham, P. Aveyard, C. Bridle, S. Bisset. School of Health and Social Studies, University of Warwick, Coventry, UK

Objective: To show that schools achieving higher examination pass and lower truancy rates than expected given their pupil populations (value-added schools) are associated with a lower incidence of smoking among pupils (13–14 years).

Methods: Value-added scores for schools were derived from the standardised residuals of two regression equations that separately predicted the proportion of pupils passing high school diplomas and the proportion of half-days lost to truancy from the socio-economic and ethnic profile of pupils. The residuals were inversely correlated, so that schools with higher than expected examination pass rates had lower than expected truancy rates and a principal component score indexed value-added education. The risk of regular smoking at one and two year follow-up was examined in relation to the value-added score in a cohort of 8352 UK pupils in 52 schools. Random effects logistic regression was used to adjust for baseline smoking status and other adolescent smoking risk factors.

Results: Many schools providing value-added education served disadvantaged communities and consequently had low examination pass rates and high truancy but these rates were better than expected given their pupil populations. Adjusted for smoking uptake risk factors, the odds ratio (95% CI) for regular smoking for a one standard deviation increase in the value-added measure was 0.85 (0.73 to 0.99) at one year and 0.80 (0.71 to 0.91) at two year follow-up. Baseline smoking status did not moderate this.

Conclusions: Schools providing value-added education are associated with lower incidence of smoking. Understanding the precise mechanisms could be of great public health significance.

048 SMOKING BEHAVIOUR AND EXPENDITURE IN CHINA: RESULTS FROM A NATIONALLY REPRESENTATIVE SURVEY

J. A. Critchley¹, J. Qian², M. Cai², Y. Xin², J. Gao², S. Tang³. ¹Institute of Health and Society, Newcastle University, Newcastle upon Tyne, UK; ²Centre for Health Statistics and Information, Ministry of Health, Beijing, PR China; ³WHO China Office, Beijing, PR China

Background: China has signed and ratified the WHO Framework Convention on Tobacco Control, demonstrating its commitment in principle to strengthening tobacco control. However, smoking remains common in men, and there are concerns it may be increasing in women. China's development plan focuses on economic rather than health indicators, and tobacco taxation is nationally important, contributing over 6% of total government revenue. Although cigarettes are relatively cheap in China, they may still pose an important economic burden on poorer rural households.

Methods: We analysed data from a Chinese household survey, the National Health Services Survey (NHSS) to identify trends in smoking prevalence, proportion of heavy smokers, age at starting smoking, quit attempts and attitudes towards quitting, by age, sex, income, education and geography. The NHSS used multi-stage stratified random sampling procedures and methods to achieve maximum representation of the Chinese population. It took place in all provinces in 1993, 1998 and 2003. The sample size was approximately 200 000 individuals per survey, from 50 000 households (600 000 in total). A range of household information including income and expenditure, health behaviours (such as smoking), and health service usage was collected; response rates were around 98%. Smoking was defined according to standard criteria. We used fractional logit modelling to predict the effect of smoking on household expenditure patterns, and log-linear modelling to estimate the effects of smoking on medical and other expenditures.

Results: Smoking prevalence has declined slightly in both men and women from 1993 to 2003 (from 60% to 49% in men, and 5% to 3.2% in women); this has occurred in all age groups, throughout urban and rural areas. However the proportion of heavy smokers among current smokers has more than doubled in only five years (from 25% in 1998 to over 52% in 2003), and the age at starting to smoke has fallen slightly (by about three years). Few current smokers report recent attempts to quit and most (62%) report no intention of quitting; the most common reason given for quitting is ill-health (41%), but few smokers report receiving any doctor advice to quit. In poorer rural areas, the direct costs of cigarettes resulted in reductions in expenditure on education among smoking households, compared with non-smoking households.

Discussion: Although there have been some recent successes in reducing overall smoking prevalence, further efforts are urgently needed, particularly in rural areas. Smoking may have considerable opportunity costs, affecting future generations in China.

049 RISK PERCEPTION OF SMOKING IN THE GENERAL POPULATION: CHANGES FROM 1999 TO 2006

B. A. Greiner, B. J. Mullally, S. Meaney, B. Power, I. J. Perry. *Department of Epidemiology and Public Health, University College Cork, Ireland*

Background: Smoking is the leading cause of death in many developed countries. It is estimated that in Ireland more than 6000 people die of smoking-related diseases each year, this is 10 times more than the number killed each year in road traffic accidents. Research conducted in 1999 showed that the general Irish population were aware of the dangers of smoking at large but clearly underestimated the importance of smoking relative to other external causes of death. It is likely that with the extensive public discussions on the harmful effects of smoking the population became more aware of smoking as the major risk factor for premature death over the past few years.

Objectives: To investigate changes in perceived risk of premature death due to smoking from 1999 to 2006 in the general population and general practitioners.

Methods: This study involved two cross-sectional telephone surveys of representative samples of 1000 Irish adults in 1999 and 2006, respectively, and follow-up telephone surveys with a random sample of general practitioners. The original "expert" sample of general practitioners (n=171, 85% response rate) were interviewed in 1999; a repeat survey was completed in 2006 (n=131, 77% response rate). Participants were asked to identify the main cause of death before age 70 in Ireland from a list of seven causes: smoking, road traffic accidents, accidents at work, AIDS, homicide, illicit drugs and alcohol misuse and estimate the absolute number of premature death among 1000 20-year-old lifelong smokers.

Results: In 2006 43.2% of the general population sample correctly identified smoking as the most important cause of premature death followed by road traffic accidents (39%). Women, and the youngest and the oldest age groups were significantly more likely to underestimate the relevance of smoking to death. Correct answers did not vary greatly by smoking status. There was no marked change to the responses in the 1999 survey with 43.6% correct answers. The majority of GPs correctly identified smoking as the leading cause of premature death in Ireland in both phases; a non-significant drop of 5% (90% to 85%; $p=0.435$) was seen from 1999 to 2006.

Relevance for Public Health: Optimism bias must be addressed in tobacco control campaigns.

050 THE ROLE OF PEER INFLUENCE AND PEER SELECTION IN ADOLESCENT SMOKING

H. Rothwell¹, J. Holliday¹, S. Murphy¹, R. Campbell², L. Moore¹. ¹Cardiff Institute of Society, Health and Ethics, Cardiff; ²Department of Social Medicine, University of Bristol, UK

Background: Smoking in adolescence is strongly associated with friends' smoking behaviour. However, longitudinal analyses have found that this relationship is not straightforward. It is unclear whether the school year group, friendship group, best friend or boy/girlfriend have the greatest influence, and there is inconsistent evidence of the relative importance of peer influence (direct effect of others on behaviour) and peer selection (friendships dependent on behaviour).

Objectives: To ascertain: if the smoking behaviour of best friends and/or the wider friendship group is associated with future smoking behaviour (peer influence); if change in smoking behaviour is associated with changes in smoking behaviour of best friends and/or the wider friendship group (peer selection).

Methods: ASSIST involved almost 11 000 12–13-year-old students in 59 schools. Four waves of data (including own smoking behaviour, smoking

behaviour of best friend, girlfriend/boyfriend, wider friendship group, family and co-residents, and socioeconomic status) were collected (baseline=T1, post-intervention=T2–T4). Logistic regression was used to estimate the effect of peer influence and selection on the likelihood of weekly smoking at T2. Univariable and multivariable models separated variables representing peer influence and selection before their combined effects were estimated. All models controlled for T1 smoking behaviour. A final model controlled for respondents' sex, household smoking, and SES. **Results:** Peer-influence variables were significant ($p<0.001$) in univariable models but best friends' smoking and year-group smoking prevalence were not significant when all peer-influence variables were included. After controlling for peer selection, peer-influence variables were not significant. Peer-selection variables were significant ($p<0.001$) in univariable and multivariable models. Change to having smoking friends significantly increased the risk of smoking. There was no comparable protective effect of change to having non-smoking friends. Students reporting no change in the behaviour of best friends who smoked, or in a wider friendship group which included smokers, had the highest risk of smoking at T2.

Conclusion: Peer selection of the wider friendship group, rather than of best friends or boy/girlfriends, was more strongly associated with smoking uptake than peer influence. This suggests that interventions which focus on resisting peer pressure to adopt risk behaviours such as smoking may be based on a naïve understanding of the relationship between adolescent socialisation, peer effects and behaviour.

051 SMOKING, CANCER AND MORTALITY IN THE MILLION WOMEN STUDY

K. Pirie¹, A. Roddam¹, G. Reeves¹, V. Beral¹, R. Peto², on behalf of the Million Women Study Collaborators. ¹Cancer Research UK Epidemiology Unit, University of Oxford; ²Clinical Trial Service Unit, University of Oxford, UK

Background: Although the health effects of smoking in men are well established, there have been few large studies examining the health effects of smoking in women.

Objectives: To investigate the association between smoking and the risk of a number of health outcomes, including cancer incidence and mortality from other causes.

Design: Prospective cohort study.

Participants and Setting: A cohort of 1.3 million women aged 56 years on average, recruited from breast screening clinics in 1996–2001 in England and Scotland. Women were followed prospectively for incident cancer and death through NHS cancer registration and death records.

Main Outcome Measures: Relative risks of incident cancer and all cause mortality for current versus never smokers, adjusting for age, body-mass index (BMI), region and deprivation index.

Results: At recruitment, 51% of the women were lifelong non-smokers and 21% were current smokers. On average, current smokers reported smoking from the age of 19 years and smoked 15 cigarettes per day. During an average follow-up of 6.2 years for cancer incidence and 7.9 years for mortality from any cause, 54 162 incident cancers were diagnosed and 41 174 deaths occurred. The relative risks of developing cancer for current versus never-smokers varied substantially by cancer site. The relative risk of mortality from any cause for current versus never smokers is 2.84 (95% CI 2.77 to 2.91) in this cohort of women, which is higher than that reported for men in other studies. In particular, current smokers in this cohort are at a substantially increased risk of mortality from lung cancer, chronic obstructive pulmonary disease and coronary heart disease compared to women who have never smoked.

Conclusions: In this large cohort of women, current smokers are at a significantly increased risk of developing cancer and also of mortality from cancer and other causes. The relative risk for all cause mortality suggests that two out of three deaths in female smokers are due to smoking in this study.

Methods II

052 WHO ARE WE MISSING? AREA DEPRIVATION PREDICTS NON-PARTICIPATION IN PARENTS, CHILDREN AND TEACHERS

A. Goodman. *Department of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine, London, UK*

Objective: To examine the influence of the postcode-derived variable of area deprivation on research participation.

Design: Two population-based, nationally representative, cross-sectional surveys.

Setting: England.

Participants: 21 089 parents of children aged 5–16 were approached to participate in the British Child and Adolescent Mental Health Surveys of 1999 and 2004. With parental consent, a child's teacher ($n = 15\,816$) and the child themselves if aged 11–16 ($n = 7346$) were also approached to participate. Postcode was used to assign an Indices of Multiple Deprivation (IMD) score.

Main Outcome Measure: Participation in the survey (as a proportion of all those approached to take part).

Results: 75% parents who were approached participated and, for those parents who participated, 77% of teachers and 90% of children aged 11–16 took part. Parents, teachers and children were all substantially less likely to participate in more deprived areas, a trend which could be seen across the whole range. The response rate in the most deprived vs the least deprived IMD quartile was 70% vs 79% in parents, 71% vs 81% in teachers and 85% vs 92% in children. Multiple logistic regression models entering the IMD subdomains simultaneously suggested that different domains might be more important in predicting non-response in different informants.

Conclusion: Parental response rates were substantially lower in more deprived neighbourhoods. Furthermore, even among those parents who did participate, deprivation was a powerful predictor of non-participation for both their children and their children's teachers. Designs of this sort, which approach some informants only after obtaining consent from others, may therefore result in a multiplication of deprivation-related response biases, operating at two distinct points in the recruitment process. This is of particular concern for studies involving children, which often adopt just such a strategy, but is also relevant to some adult designs. More generally, these findings suggest that in England greater deprivation predicts lower response rates in multiple types of respondent. This may lead to the underestimation of the prevalence of deprivation-related health outcomes. These findings also provide a hint that different forms of deprivation may be more relevant for different informants.

053 THE IMPACT OF SPARSE DATA AT THE HOUSEHOLD LEVEL IN MULTILEVEL MODELLING

M. Kelly, F. Dunstan, D. L. Fone. *Centre for Health Sciences Research, Cardiff University, UK*

Background: Multilevel models are invaluable in area-level research for investigating the impact of context on health outcomes. The choice of which contexts to include in an analysis is not straightforward. Frequently datasets are collected which include sparse levels of data and published studies of household-level effects on mental health often contain many single response households. This results in the household level being sparse. The effect of this sparsity on the validity of results from a multilevel model has not been investigated to date. Similarly the ramifications of excluding such levels are unknown. Despite this uncertainty, recently published papers investigating common mental disorders have suggested that households constitute an important contextual level to include in the model.

Objective: To determine the impacts of including and excluding a sparse household level in a multilevel analysis.

Design: Simple three-level datasets were simulated with known variance structure in order to imitate individuals nested within households nested within areas. The relative importance of the household level, the sample size and the level of sparseness were all varied in order to assess the impact of each of these factors on multilevel modelling. Household responses were modelled by a Poisson distribution. An outcome measure was simulated based on the variance structure, as well as an individual-level predictor of this outcome. The outcome was fitted as a normal response, as well as being dichotomised for logistic analysis.

Methods: Multilevel modelling using the R programming language.

Results: Variance component estimates for three-level null models were unbiased for most levels of sparseness, however, under extreme sparseness conditions (average number of respondents per household <1.5) the variability of the household and individual level variance components increased. Excluding the household level resulted in the majority of that level's variation being attributed to the individual level. Area level variance components were overestimated only when the sample size was small ($n = 1000$) and the excluded level's variance contribution was large (~50%). Fixed effect coefficient estimation was unaffected as was the standard error on those coefficients.

Conclusion: The impact of including a sparse household level in multilevel analysis is complicated and depends on the level of sparseness present, the total sample size and the relative magnitude of the variance contribution from the sparse level. Sparseness can reduce variance component

estimation precision and so caution should be exercised in interpreting these models.

054 BEYOND KAPPA: THE USE OF MULTIFACETED RASCH ANALYSIS AND MULTILEVEL MODELLING TO INVESTIGATE OBSERVER EFFECTS

A. Blance^{1,2}, J. Carvalho³, M. S. Gilthorpe¹. ¹*Biostatistics Unit, University of Leeds, UK;* ²*Leeds Dental Institute, University of Leeds, UK;* ³*School of Dentistry, Catholic University of Louvain, Belgium*

Introduction: It is common in health research to undertake calibration exercises. When the scale concerned is categorical, this usually involves the use of Cohen's Kappa. Although well-documented, problems concerning Kappa are still not widely appreciated. The confidence intervals associated with Kappa are usually very wide. This lack of robustness can lead to calibration exercises drawing spurious conclusions. Kappa values close to one are rarely achieved and research that subsequently ignores the observer effect may lead to erroneous conclusions being drawn. This paper considers two alternative approaches (1) multifaceted RASCH modelling and (2) multilevel modelling.

Methods: The carious status of each surface, around each tooth, was recorded for 26 subjects by 26 observers, using a 10-point ordinal scale. RUMM2020 software was used to fit a multifaceted RASCH model. A 2-level model with observer at level-1 and surface at level-2 was fitted using MLwiN software, such that random variation at level-1 is a measure of the observer effects.

Results: Pairwise Kappa agreement ranged from 0.41 to 0.80, indicating that agreement was modest and variable. Agreement was not sufficient to ignore observer effects. Multifaceted Rasch analysis revealed several interesting features. In ranking the items in level of difficulty, not all disagreements lay at the difficult end of the spectrum. Observers diverged across the centre of the scale, where the majority of the observations happened to lie. Multilevel modelling was successful in explicitly incorporating the observer effects in the model. Observer effects were substantial.

Conclusions: The dataset analysed is typical of calibration exercises and research involving more than one observer. This work demonstrates the necessity of adopting alternative approaches to Kappa as: (1) observer effects may not always be ignored, as this can potentially lead to erroneous conclusions being drawn; and (2) costly calibration exercises may not always be necessary.

055 IDENTIFYING COMPLEX CAUSAL PATHWAYS WITH ARTIFICIAL NEURAL NETWORKS: A SIMULATION STUDY

K. Bammann, F. Günther, N. Wawro. *Bremen Institute for Prevention Research and Social Medicine, University of Bremen, Bremen, Germany*

Background: The investigation of genetic factors is gaining importance in epidemiology. Most relevant from a public health perspective are complex diseases that are characterised by complex pathways involving gene–gene– and gene–environment–interactions. The identification of such pathways in case-control studies requires sophisticated statistical methods that are still in their infancy. Due to their ability in describing complex non-linear association structures, artificial neural networks might represent a suitable means for modelling complex causal pathways. To investigate the potential of artificial neural networks, we currently conduct several simulation studies.

Methods and Results: The results from two simulation studies will be presented. The first one investigated whether the artificial neural network was able to detect the mode of inheritance. For coding single genotypes, different coding schemes were used. The results were compared with those of logistic regression models. It showed that in contrast to the logistic regression model, the artificial neural network was able to capture the underlying mode of inheritance irrespective of the applied coding scheme for the genotype. The second simulation study investigated the ability of artificial neural networks for capturing gene–gene–interaction. For generating the data, several biological models were used. Again, the results were compared with those of logistic regression models with and without interaction terms. The artificial neural network succeeded in modelling the different scenarios. This strength was also emphasised by the poor performance of the logistic regression model in some of the investigated situations.

Conclusion: The results of the simulation studies showed the high potential of artificial neural networks for modelling the complex interplay of genetic factors in aetiology. This promising approach will be further pursued using simulation data and real world data.

056 HOW REAL IS INTENTION-TO-TREAT ANALYSIS IN PHARMACOEPIDEMOLOGICAL SAFETY STUDIES? WE CAN DO BETTER

V. A. Kiri, C. Maringe. *PACE, PAREXEL International*

Introduction: Although cohort studies which are based on intention-to-treat (ITT) approach offer a simple design with data which are simpler to analyse and results easier to interpret, such studies also intrinsically assume that any time-varying treatment effect that exists can be adequately estimated by a fixed-effect component. However, such an assumption may not reflect real-life drug use. Reflection of real-life clinical practice is a major strength of epidemiological safety studies. The failure to properly reflect reality may result in effect underestimation leading to false and irreproducible conclusions due to exposure misclassification. In effect, the use of nested case-control design is a concession that ITT in cohort design may not be adequate. But the nested design also has its own sources of bias, including confounding by indication. We illustrate the viability of the case-crossover and case-in-time designs as alternatives by replicating a previously reported study that was based on the two designs.

Methods: A retrospective cohort of asthma patients aged 5–54 at first diagnosis in the UK General Practice Research Database was used to assess the safety of short-acting β_2 -agonists (SABA) on the risk of fatal or near fatal asthma attack in 1987–2006. The case-crossover design involved only patients who experienced the event and additionally, the case-in-time design also involved matched control patients in a nested case-control design who were event-free but were similar to their matched cases on age, gender and duration of asthma based on sampling from the corresponding risks sets. In both designs, we defined two periods of one year duration on each patient. The current period was the year before the event and a reference period as the year before the current. Thus patients had at least two years of assessment on SABA use between asthma diagnosis and the event. In the case-time control version, each qualified control subject of the nested case-control design was used twice, once for the current and also for the reference periods.

Results: We compared those who used more than 12 scripts in a one-year period with those who used less, we obtained hazard ratios of 2.73 (95% CI 2.07 to 3.59), 1.67 (0.95 to 2.92) and 0.79 (0.50 to 1.22) in the nested case-control, case-crossover and case-in-time designs respectively.

Conclusion: Both the case-crossover and case-in-time designs gave results similar to those previously reported and those from the nested case control also confirmed the bias of confounding by disease severity.

Parallel session C

Lifecourse I

057 POOR MIDLIFE PHYSICAL FUNCTION AMONG UNMARRIED AND CHILDLESS MEN: EVIDENCE FROM THE 1946 BRITISH BIRTH COHORT

J. Guralnik¹, S. Butterworth², K. Patel¹, G. Mishra², D. Kuh². ¹Laboratory of Epidemiology, Demography and Biometry, National Institute on Aging, Bethesda, Maryland, USA; ²MRC National Survey of Health and Development, University College and Royal Free Medical School, 1–19 Torrington Place, London, UK

Background: Marital and parental role characteristics are important factors in both men and women's health. Most studies to date have either focused on disease specific outcomes or summary measures of self-reported health rather than using functional tests of performance.

Objective: To investigate the extent to which marital and parental role characteristics are associated with midlife physical function.

Design: Prospective birth cohort study.

Setting: England, Scotland and Wales.

Participants: 1353 men and 1411 women followed up since their birth in 1946.

Main Outcome Measure: Handgrip strength, timed chair rising, and standing balance tests at age 53 years were used to calculate an aggregate physical performance score (men 1.42 (SD 0.42, range 0–2.81); women 1.30 (SD 0.37, range 0–2.59)).

Results: The mean physical performance score was 1.42 (SD 0.42) for men and 1.30 (SD 0.37) for women. By age 53 years, 11% of men and 8% of women had married but remained childless; 6% of men and 4% of women had never married. Never married (1.15; 95% CI 1.06 to 1.24) and childless

married men (1.36; 95% CI 1.30 to 1.42) had significantly poorer physical performance score than married men with children (1.46; 95% CI 1.43 to 1.48). These relationships remained after adjustment for adult social class, own educational attainment and body mass index at 53 years (β –0.18, 95% CI –0.27 to –0.09 for never married and β –0.09, 95% CI –0.16 to –0.03 for childless married, compared with married men with children). Of those men who had never married 28% were classified as having long-term health problems compared to 5% in both childless married men and married men with children. There were no marked differences among women.

Conclusions: In this representative middle-aged population, unmarried and childless men faced greater risk of poor midlife physical function, even after adjustment for confounders. These findings suggest that for men, marriage and parenthood protect against functional decline in midlife. Alternatively, physical performance may be a marker of poorer health in earlier life, which affects the chance of marriage and parenthood.

058 SMOKING HISTORY AND COGNITIVE FUNCTION IN LATE MID-LIFE

S. Sabia¹, M. Marmot², C. Dufouil³, A. Singh-Manoux^{1,2}. ¹INSERM, U687-IFR69, France, ²Department of Epidemiology and Public Health, University College London, UK, ³INSERM 708, France

Objectives: To examine the association between smoking history and cognitive function in middle-aged men and women, and explore the underestimation of this association due to loss to follow-up among smokers, through death and non-participation.

Design: Prospective cohort study (Whitehall II study) of 10 308 participants aged 35–55 years at baseline (phase 1; 1985–8). Smoking history was assessed at Phases 1, 2 (1988–90), 3 (1991–3) and 5 (1997–9). Smoking status was categorised as: “current smoker at Phase 5”, “recent ex-smoker” (stopped smoking between Phases 1 and 5), “long-term ex-smoker” (those who stopped before Phase 1) and “never smoker”. Cognitive functioning (memory test, AH 4-I, Mill-Hill, phonemic and semantic fluency) was tested at phases 5 and 7 (2002–4).

Setting: London-based office staff in 20 civil service departments.

Participants: At Phase 5, data were available for 5346 respondents (72% men, 28% women) free of stroke. Study of cognitive change between Phases 5 and 7 was possible for 4630 participants.

Main Outcome Measures: Being in the worst quintile of cognitive function or cognitive decline.

Results: Smokers at Phase 1 had a higher risk of death (HR 2.00; 95% CI 1.58 to 2.52 in men, and HR 2.46; 95% CI 1.80 to 3.37 in women) and non-participation (OR 1.32; 95% CI 1.16 to 1.51 in men, OR 1.69; 95% CI 1.41 to 2.02 in women). In age-adjusted analyses, male smokers had a higher risk of poor cognition on all measures. In fully adjusted models, this risk remained for memory (OR 1.41; 95% CI 1.08 to 1.84). Male “current” (OR 1.46; 95% CI 1.13 to 1.89) and “recent ex-smokers” (OR 1.62; 95% CI 1.23 to 2.13) also had a higher risk of decline in the AH4-I score. In both genders, “long-term ex-smokers” were less likely to have deficits in vocabulary and verbal fluency (\approx 30% of reduction of risk). Post hoc analysis showed that giving up smoking in early midlife is accompanied by amelioration of other health behaviours.

Conclusion: Smoking is associated with greater risk of memory deficit and reasoning decline among men. The association between smoking and cognition is underestimated even in middle age due to greater risk of death and non-participation among smokers. Stopping smoking is associated with improvement in others health behaviours, leading to little residual adverse effect on cognition.

059 IS THERE AN ASSOCIATION BETWEEN HYSTERECTOMY AND SUBSEQUENT PSYCHOLOGICAL HEALTH? FINDINGS FROM A BRITISH BIRTH COHORT STUDY

R. Cooper, G. Mishra, R. Hardy, D. Kuh. *MRC National Survey of Health and Development, Department of Epidemiology and Public Health, University College London, UK*

Background: The widely held belief for most of the twentieth century that hysterectomy impacts detrimentally on subsequent psychological health is not supported by recent studies that have taken prior psychological status into account. However, these studies have limitations and the association between hysterectomy and subsequent, long-term psychological health is still not well characterised.

Objectives: To test the association between hysterectomy and subsequent psychological health; to examine whether this association varies by characteristics of hysterectomy; to investigate whether the association is

independent of pre-hysterectomy psychological health and other potential confounders.

Design: Prospective cohort study.

Setting: England, Scotland and Wales.

Participants: Women from the MRC National Survey of Health and Development, followed up since birth in March 1946 until age 53 years with data on hysterectomy status (N = 1790)

Main Outcome Measure: General Health Questionnaire (GHQ)-28 scores at age 53 years.

Results: There was no significant association between hysterectomy status and GHQ-28 score at age 53 years when grouping all hysterectomies together (difference in mean log_e(GHQ-28 score) 0.09 (95% CI -0.04 to 0.21). However, this masked significant variation in effect by characteristics of hysterectomy. Most notably, compared with women who had not undergone hysterectomy or oophorectomy, women who had undergone hysterectomy for cancer had GHQ-28 scores at age 53 years which were 49% higher (95% CI 4% to 95%), and women who had undergone a hysterectomy before age 40 years had GHQ-28 scores 35% higher (95% CI 14% to 57%). These associations were not fully explained by prior psychological state or vulnerability, lifetime socioeconomic position, weight at age 26 years, smoking status or hormone replacement therapy use.

Conclusions: The poor psychological health of women who had undergone hysterectomy for cancer suggests that these women may require greater levels of support than they currently receive. While it is not possible from these analyses alone to identify whether there is an age or period effect operating which explains the association between young age at hysterectomy and poor subsequent psychological health, that a significant association has been found reignites the debate about whether there is an association between hysterectomy and psychological health and suggests that women who undergo the procedure at young ages could be at risk of poor psychological health in the long term.

060 LONG-TERM EFFECTS OF ADVERSE CHILDHOOD EXPERIENCES: INFLUENCES ON BODY SIZE AND GLUCOSE HOMEOSTASIS

C. Thomas, E. Hyppönen, C. Power. *Centre for Paediatric Epidemiology and Biostatistics, UCL Institute of Child Health, London, UK*

Objectives: Recent evidence suggests that abusive or neglectful childhood experiences are associated with adult health outcomes including obesity, cardiovascular disease and diabetes. The aim of this paper is to investigate the influences of childhood adversities (abuse, neglect, parental mental health or drug/alcohol problems, parental separation/divorce, parental involvement or support) on life-course body size and glucose homeostasis in adulthood.

Design: Birth cohort study.

Setting: England, Scotland and Wales.

Participants: 9377 members of the 1958 British birth cohort attending a biomedical survey at 45 years.

Main Outcome Measures: Standard deviation scores (SDS) for body mass index (BMI) at 7, 11, 16, 23, 33 and 45 years. Percentage change (100*log transformed) in glycated haemoglobin (HbA1c) at 45 years.

Results: Three patterns of growth were identified for participants who experienced childhood adversities compared to those who did not: (1) lower SDS for BMI throughout childhood and adulthood was associated with having a neglected physical appearance at 7 or 11 years or having a parent with a mental health problem; (2) lower BMI in childhood and a greater BMI in adulthood was a common pattern for those reporting different types of abuse, particularly physical abuse; (3) a greater BMI in adulthood only was found for a lack of parental support in childhood, as assessed for example, by few outings and little parental interest in the child's education or low aspirations for the child. Despite the finding of a greater BMI at 45 years for several adversities, relationships with HbA1c were weak. Most associations were explained by socioeconomic indicators except for a strict upbringing (0.57%, 95% CI 0.12 to 1.01), little maternal (1.43, 0.72-2.15) or paternal interest in education for women (0.83, 0.20 to 1.45) and for poor socio-emotional adjustment in childhood (0.83, 0.19 to 1.46). Additional adjustment for adiposity, smoking and alcohol consumption further attenuated associations, and a borderline association remained only for maternal interest in education.

Conclusions: Different patterns of growth were associated with different forms of childhood adversity, resulting in greater adult adiposity for some but not all experiences. Adversity in childhood was weakly associated with increased HbA1c in mid-adulthood, reflecting associations with socioeconomic circumstances, later adiposity and health behaviours. Given the relatively young age of the cohort, and associations with childhood adversity for obesity, smoking and alcohol consumption, stronger effects on glucose metabolism may not be apparent until later in life.

Child health

061 ETHNIC VARIATIONS IN GESTATIONAL AGE AND WEIGHT AT BIRTH IN ENGLAND AND WALES

K. Moser¹, L. Hilder². ¹Office for National Statistics, London; ²Department of Midwifery, City University, London, UK

Background: Ethnic differences in gestational age at birth and birthweight have been reported in relatively small local studies in the UK and elsewhere. Neither gestational age of live births, nor ethnic group, are collected at birth registration in England and Wales which gives rise to important gaps in the routine data on births. A new data source has been identified which is able to fill these gaps for births in England and Wales.

Objective: To investigate the variation in gestational age and birthweight across ethnic groups in England and Wales.

Design: Analysis of linked birth registration and NHS Numbers for Babies Service (NN4B) records.

Setting: England and Wales.

Population: All singleton live births in 2005 (~627 000), classified to "ethnic category (baby)" (using 2001 Census groupings) as requested on the NN4B record.

Main Outcome Measures: Gestational age distribution, mean gestational age, preterm rate (% <37 weeks), very preterm rate (% <28 weeks), birthweight distribution, mean birthweight, low birthweight rate (% <2500 g).

Results: An ethnic group is recorded for 89.0% of live singletons and gestational age at birth for 99.2%. Two thirds of live singletons are recorded as White British. The preterm birth rate is higher in the Black Caribbean group (9.7%) than in White, Asian, or the Black African, groups (range between 5.5% and 7.0%); it is lower in the Bangladeshi than the Indian or Pakistani groups. Very preterm birth rates vary by a factor of three across ethnic groups. The low birthweight rate is 5.6% in the White British group compared to around 10% in the Pakistani, Bangladeshi, Indian and Black Caribbean groups. Results will also be presented on the other measures. The contribution to the findings of different age patterns of childbearing across ethnic groups will be explored.

Conclusions: The differences shown between ethnic groups in gestational age and birthweight are large and justify more detailed investigation. These findings, not previously available for England and Wales as a whole, have important implications for policy and clinical practice. Further work is needed validating the ethnic group information. The NN4B is a powerful new data source whose importance in extending information on births in England and Wales will increase further with linkage to birth and death registration data.

062 GESTATIONAL AGE-SPECIFIC RISKS OF SURVIVAL AND MAJOR DEVELOPMENTAL IMPAIRMENTS

G. Surman¹, C. Hockley¹, J. J. Kurinczuk¹, L. Davidson². ¹National Perinatal Epidemiology Unit, University of Oxford, UK; ²Joseph L Mailman School of Public Health, Columbia University, New York, USA

Background: The reduction in infant mortality rates in recent decades has led to greater emphasis on the fate of survivors, particularly those born extremely preterm. In addition to information about the chances of survival, it is now increasingly important for both parents and clinicians to have information about the probability of newborns surviving with impairments which may pose significant life challenges. However, mortality rates by gestational age (GA) are not available from ONS and data about major impairments are scarce.

Objective: To investigate the relationship between gestational age at delivery, survival to age one year and subsequent risk of cerebral palsy, visual impairment and hearing loss.

Design: Linkage of data from the 4Child database with data from the Confidential Enquiry into Stillbirths and Deaths in Infancy (CESDI) for births 1993-5.

Setting: Four counties in south east England.

Main Outcome Measures: Survival at age one year, survival with or without cerebral palsy or sensory impairment.

Results: Births at <24 weeks GA had a mortality rate of 96% by age one year. Mortality rates fell sharply with increasing GA, with rates of 55% at 24-27 weeks and 18% at 28-31 weeks. Generally, as birthweight increased within each GA group, mortality rates fell. In the 36-39 week group mortality rate increased for those with birthweights in excess of 4000 g, however numbers were small and this was not statistically significant. Twelve infant survivors born at <24 weeks had none of the three major impairments. At 24-27 weeks, 28-31 weeks, 32-35 weeks, 36-39 weeks and 40-45 weeks, infant survivors had cerebral palsy rates

(with or without sensory impairment) of 8.33%, 2.95%, 0.85%, 0.19% and 0.17%, respectively. Rates of sensory impairment among infant survivors for the same GA groups were 3.7%, 1.62%, 0.43%, 0.10% and 0.12%, respectively. The proportion of infants with impairments fell markedly from 32 wks onwards. The proportion of infant survivors born at ≥ 36 weeks with cerebral palsy was 0.2% and 0.1% had a sensory impairment.

Conclusion: The data from this special record linkage study enable us to predict the gestational age-specific risk of major developmental impairments in addition to survival. This information will be useful to clinicians counselling women with an anticipated preterm delivery and to neonatologists counselling the parents of infants in their care.

063 INFANT FEEDING AND GROWTH DURING THE FIRST YEAR OF LIFE: THE SOUTHAMPTON WOMEN'S SURVEY

J. Baird¹, J. Poole¹, S. Robinson¹, L. Marriott¹, K. Godfrey¹, C. Cooper¹, H. Inskip¹, C. Law². ¹MRC Epidemiology Resource Centre, University of Southampton; ²Institute of Child Health, University College London, UK

Background: Current guidelines recommend that infants are exclusively breastfed for the first 6 months, with particular solid foods being gradually introduced from 6 months.

Objective: To compare growth of infants whose feeding most closely followed current guidelines with growth of infants with other feeding practices.

Methods: The Southampton Women's Survey is a prospective cohort study of women aged 20–34 years and their babies. At 6 and 12 months infants' weight, length and skinfold thickness were measured, their milk feeding recorded, and diets assessed using food frequency questionnaires. Dietary patterns at 6 and 12 months were described using principal components analysis. The main outcomes were conditional growth in weight, length and skinfold thickness from 0–6 and 6–12 months.

Results: Infants who breastfed from 0–6 months gained weight, length and adiposity from 0–6 months more slowly and were smaller in size at 6 months than infants who were formula-fed, independent of age at introduction of solids and maternal factors: compared with infants who breastfed from 0–6 months, infants who were formula-fed gained 0.21 standard deviation scores (SDS) in weight (95% CI 0.00 to 0.42). Infants who were introduced to solids at 5 months or later had lower weight and length at 6 months than other infants, independent of 0–6 month milk feeding and maternal factors. Age at introduction of solids was not related to growth. Infants whose dietary pattern at 6 months was most similar to current feeding guidelines, with high frequencies of fresh fruit and vegetables, home-prepared foods and breast milk, gained weight and skinfold thickness more rapidly from 6–12 months than other infants, independent of milk feeding, age at introduction of solids and maternal factors: compared with infants in the lowest quarter, infants in the highest 'infant guidelines' score quarter gained 0.24 SDS (95% CI 0.06 to 0.43) in weight and 0.26 SDS (95% CI 0.07 to 0.45) in skinfold thickness. Conversely, infants whose diets had the highest frequencies of breads and processed foods gained weight less rapidly from 6–12 months than other infants.

Conclusions: Variations in infant feeding are related to patterns of infant growth. Infants whose feeding conformed most closely to current guidelines had slower growth from 0–6 months, were smaller at 6 months of age, and had more rapid weight and skinfold thickness gain from 6–12 months, than other infants. The extent to which these patterns of growth influence the current or later health of infants needs to be assessed.

064 ALLERGY AND RISK OF CHILDHOOD LEUKAEMIA: RESULTS FROM THE UNITED KINGDOM CHILDHOOD CANCER STUDY

A. M. Hughes¹, T. Lightfoot¹, J. Simpson¹, P. Ansell¹, P. A. McKinney², S. Kinsey³, C. D. Mitchell⁴, T. O. B. Eden⁵, M. Greaves⁶, E. Roman¹, on behalf of the United Kingdom Childhood Cancer Study Investigators. ¹Epidemiology & Genetics Unit, Department of Health Sciences, University of York; ²Paediatric Epidemiology Group, University of Leeds; ³Department of Paediatric and Adolescent Oncology and Haematology, St James University Hospital, Leeds; ⁴Department of Haematology/Oncology, John Radcliffe Hospital, Oxford; ⁵Academic Unit of Paediatric Oncology, Christie Hospital NHS Trust, Manchester; ⁶Institute of Cancer Research, Chester Beatty Laboratories, London, UK

Objective: To determine the effect of preceding history of allergy on risk of childhood leukaemia using contemporaneously-collected primary care data.

Design: National population-based case-control study.

Setting: UK, 1991–6.

Participants: 839 children diagnosed with leukaemia aged 14 or younger; 1337 controls randomly selected from primary care population registers

and individually-matched to participating cases by age, sex and region with two controls per case.

Main Outcome Measures: Associations of childhood leukaemias with clinically-diagnosed eczema, asthma and hay fever, estimated with unconditional logistic regression. Accuracy of 1843 parental reports of allergy history using a measure of sensitivity, overall agreement between interviews and records using the kappa (κ) statistic and a comparison of relative risk estimates derived from the two sources.

Results: More than a third of subjects had at least one allergy diagnosed prior to leukaemia diagnosis (cases) or pseudodiagnosis (controls). For both total acute lymphoblastic leukaemia (ALL) and common-ALL/precursor B-cell ALL (c-ALL), a history of eczema was associated with a 30% significant reduction in risk: the odds ratios (OR) and 95% confidence intervals (CI) were 0.70 (0.51 to 0.97) and 0.68 (0.48 to 0.98), respectively. Similar associations were observed for hay fever (OR 0.47; 95% CI 0.26 to 0.85 and OR 0.62; 95% CI 0.33 to 1.16 for ALL and c-ALL, respectively). No such patterns were seen either for asthma and ALL, or for any allergy and acute myeloid leukaemia. Asthma was reported with high accuracy, but eczema history was frequently under-reported by mothers. Agreement between interview and contemporaneous clinical diagnoses was only moderate for both cases and controls and risk estimates for allergy histories were less pronounced if based on medical record data.

Conclusions: Our finding of a reciprocal relationship between allergy and ALL in children is compatible with the hypothesis that a dysregulated immune response is a critical determinant of childhood ALL. A comparative analysis of primary care records with parent's recall of allergy confirmed the unreliability of parental report at interview.

Diabetes

065 RECENT TRENDS IN THE INCIDENCE RATE OF TYPE 1 DIABETES IN CHILDHOOD IN GERMANY

J. Rosenbauer¹, K. Straßburger¹, R. W. Holl², G. Giani¹, in cooperation with the German Pediatric Surveillance Unit (ESPED) and the DPV-Science Initiative. ¹Institute for Biometrics and Epidemiology, German Diabetes Centre, Leibniz Institute at Düsseldorf University; ²Department of Epidemiology, University of Ulm, Germany

Background and Aims: A large population at risk and a sufficiently long observation period are important preconditions for valid estimation of Type 1 diabetes incidence in childhood and its temporal trends. Aim of the present study was to estimate incidence and time trends of Type 1 diabetes in children 0–14 years of age in the large risk population of the German federal state North Rhine-Westphalia (NRW) during 1996–2003.

Materials and Methods: During the study period the average risk population was 2.9 million children comprising about one quarter of all children in the age group 0–14 years in Germany. The North Rhine-Westphalian diabetes register ascertains newly diagnosed cases of type 1 diabetes by means of three data sources: the prospective hospital-based active surveillance system ESPED, annual inquiries among practices, and the computer-based documentation system DPV founded for quality control and scientific research in paediatric diabetes care. Completeness of ascertainment was estimated by the capture-recapture-method using log-linear modelling. Point and interval estimates (95% CI) of incidence rates (per 100 000 person-years) were based on Poisson distribution. Age- and sex-standardised rates were estimated by the direct method using equal weights. Poisson regression analysis was applied to assess time trends.

Results: During 1996–2003 a total of 4261 newly diagnosed diabetic children aged 0–14 years (2227 boys, 2034 girls) were registered. Ascertainment was estimated to be 96.8% (95% CI 96.4% to 97.2%) complete. The overall age- and sex-standardised incidence rate was 18.1 (17.6 to 18.7). The age-standardised incidence among boys (18.5, 17.7 to 19.3) was slightly higher than among girls (17.8, 17.0 to 18.5, $p=0.188$). Age-specific estimates for age groups 0–4, 5–9, and 10–14 years were 12.5 (11.7 to 12.4), 19.8 (18.8 to 20.8), and 22.0 (21.0 to 23.1), respectively ($p<0.001$). The average annual incidence increase was estimated as 3.9% (2.5% to 5.3%). While there was no significant difference in incidence trend among boys and girls (annual increase: 4.3% vs 3.4%, $p=0.526$) the incidence trend varied significantly between age-groups ($p=0.012$), with the steepest increase in youngest children. Annual increases for the age groups 0–4, 5–9, and 10–14 years were 7.7%, 3.8%, and 2.1%, respectively.

Conclusions: These data confirm that incidence of type 1 diabetes in childhood is steadily increasing in Germany. Based on the observed incidence rate, there are annually about 2500 children newly diagnosed

with type 1 diabetes in Germany which underlines the public health importance of childhood diabetes care. Further research is needed to identify causes of the continuous rise of diabetes incidence.

066 DIABETES AND THE RISK OF CANCER IN THE MILLION WOMEN STUDY

R. Stevens, A. Roddam, D. Bull, G. Reeves, J. Green, V. Beral, on behalf of the Million Women Study Collaborators. *Cancer Research UK Epidemiology Unit, University of Oxford, UK*

Background: Diabetes has been associated with cancer at various sites, but prospective studies have been limited in size or have lacked a non-diabetic comparison group.

Objectives: We used data from the largest ever prospective study of cancer in women to examine the risk of cancer in the presence of diabetes.

Participants: 1.3 million women aged on average 56 years were recruited between 1996 and 2001 through the NHS breast screening programme, and followed prospectively over median 6.6 years for incident cancer through the Office for National Statistics.

Outcome Measures: Relative risk (RR) of incident cancer in women with versus without self-reported diabetes, allowing for age, smoking status, body-mass index (BMI), region and deprivation index.

Preliminary Results: Diabetes was reported by 33 000 women (2.7%) at recruitment. Out of 56 000 (non-melanoma) incident cancers, 1855 (3.3%) were in women with diabetes. The RR for incident cancer in women with vs without diabetes was 1.2 (95% CI 1.1 to 1.2). Women with diabetes were at a significantly greater risk of pancreatic (RR 1.6, 95% CI 1.1 to 2.1), renal (RR 2.0, 95% CI 1.4 to 2.6), endometrial (RR 1.4, 95% CI 1.2 to 1.7), and oesophageal (RR 1.7, 95% CI 1.2 to 2.5) cancers than women without diabetes.

Conclusions: This large prospective study confirms that women with diabetes are at increased risk of several cancers, even after allowing for BMI.

067 GEOGRAPHICAL AND SOCIOECONOMIC DETERMINANTS OF TYPE 1 DIABETES INCIDENCE IN SWEDEN

K-F. Lynch^{1,2}, B. Chaix³, P. Lindqvist⁴, P. Otterblad-Olausson⁵, A. Lernmark², J. Merlo¹. ¹*Social Epidemiology & Health Economics*, ²*Diabetes and Celiac Unit*, and ⁴*Obstetrics, Department of Clinical Sciences, Lund University, Malmö, Sweden*; ³*Inserm 2U707, Paris, France*; ⁵*Centre for Epidemiology at the Swedish Board of Health and Welfare, Sweden*

Objective: It is today widely assumed that socioeconomic factors at the area level as well as at the individual level influence the risk of type 1 diabetes (T1D). However, compared with other disorders such as, for example, cardiovascular diseases, there are only a small number of studies investigating the association between socioeconomic factors and the risk of T1D. In this paper we present preliminary results from a larger project aimed at developing the social, environmental and genetic epidemiology of T1D.

Participants: Using the Swedish Medical Birth Registry together with the National Mortality and Hospital Discharge Registries, all newborns between 1987 and 1993 (n=811 599) were prospectively followed for development of T1D until the age of 11. Geographic information was determined by geocoding residence of mothers at time of birth. Individual socioeconomic information was obtained by linking socioeconomic data from 1990 Swedish Census as well as from 1987 to 1993 the National Income and Asset Register.

Methods: We apply a three level logistic regression model with individual nested within municipalities (n=290) nested within counties (n=25). Geographical variation between these areas in the incidence of T1D was expressed as median odds ratios (MOR). Socioeconomic factors and other individual characteristics were later added to the model as fixed effects to determine how socioeconomic factors were associated with incidence of T1D and how much of the variance between areas was due to differences in individual composition of the areas.

Results: In a model simultaneously taking into account between-municipality and between-county variations, a slight variation in incidence of childhood T1D was observed between municipalities (MOR 1.16, 95% CI 1.09 to 1.24) but almost no variation was found between counties (MOR 1.06, 95% CI 1.01 to 1.12). Being on social allowance (OR 0.83, 95% CI 0.71 to 0.96) and higher household income (one quintile increase) (OR 1.05 95% CI 1.02 to 1.08) as well as year of birth, gestational age adjusted birth weight, maternal diabetes status, and country of birth were associated with incidence of T1D. However, these compositional factors did not explain the variation between municipalities.

Conclusion: High socioeconomic position of the household seems to increase the risk of the child developing diabetes before age 11. However, the individual factors studied did not explain the small variation between areas. Further investigation will examine contextual variables at the municipality level and examine spatial distribution of children developing T1D.

068 EVALUATION OF A COMPLEX INTERVENTION: A CLUSTER RANDOMISED CONTROLLED TRIAL OF ENHANCED DIABETES CARE—THE UNITED KINGDOM ASIAN DIABETES STUDY

N. T. Raymond¹, S. Bellary^{2,3}, J. P. O'Hare¹, S. Mughal^{2,3}, A. Szczepura¹, S. Kumar¹, A. H. Barnett^{2,3}, on behalf of UKADS Study Group. ¹*Warwick Medical School, University of Warwick, Coventry*; ²*Heart of England NHS Foundation Trust, Birmingham*; ³*University of Birmingham, UK*

Introduction: Intensive management in type 2 diabetes can improve clinical outcomes, but delivering healthcare to achieve targets remains a challenge for healthcare professionals. Within a complex interventions framework and following a pilot study, we investigated the effectiveness of a culturally sensitive enhanced care package designed to improve cardiovascular risk factors in patients of South Asian ethnicity with type 2 diabetes.

Methods: In Coventry and Birmingham, UK, 21 practices were randomised to either intervention (protected practice nurse time, link worker sessions and diabetes specialist nurse support) or standard, care groups. Treatment protocols, including detailed prescribing algorithms for control of diabetes, blood pressure and lipids were provided for both groups. Outcome measures were blood pressure, total cholesterol, HbA1c and proportions of patients achieving internationally recommended and Quality and Outcomes Framework (QOF) targets after one year. Analyses used multiple linear and mixed regression methods to estimate intervention effects allowing for confounding factors and cluster randomisation.

Results: 1494 consenting patients of South Asian ethnicity with type 2 diabetes were included in analyses. Baseline differences between intervention and control groups were significant for systolic and diastolic BP, gender and diabetes duration. After one year, significant decreases in systolic blood pressure (4 mmHg), diastolic blood pressure (2 mmHg), total cholesterol (0.3 mmol/l) and proportions of patients achieving blood pressure and total cholesterol targets were achieved for the whole study group. With adjustment for confounding factors, the intervention group achieved statistically significantly lower systolic (−2.1 mmHg (−3.7 to −0.4), p=0.013) and diastolic (−1.4 mmHg (−2.4 to −0.4), p=0.004) blood pressures. After adjustment for clustering, only diastolic blood pressure remained significant. There were no significant differences between groups for total cholesterol or HbA1c. In the sub-group of patients with blood pressure >145/85 mmHg at baseline, the intervention group achieved significantly greater reductions in systolic (−4.7, −8.2 to −1.1, p=0.012) and diastolic (−2.3, −4.6 to −0.1, p=0.041) blood pressures after adjustment for confounding factors and clustering.

Discussion: Although improvements in blood pressure and cholesterol were achieved, limited effects of the intervention were observed. There were no significant improvements in glycaemic control, despite the QOF initiative plus our intervention. In high risk groups, there was some evidence of added benefits from our culturally sensitive initiative. Innovative measures to motivate patients and evidence-based clinical targets may be needed to maximise healthcare outcomes in patients of South Asian ethnicity.

Cancer

069 PERSONAL HISTORY OF ENDOMETRIOSIS AND RISK OF CUTANEOUS MELANOMA IN A LARGE PROSPECTIVE COHORT OF FRENCH WOMEN

M. Kvaskoff, S. Mesrine, A. Fournier, M. C. Boutron-Ruault, F. Clavel-Chapelon. *Inserm, ERI 20, EA 4045, and Institut Gustave Roussy, Villejuif, F-94805 France*

Background: Some studies have suggested an association between cutaneous melanoma and endometriosis, but the available evidence is weak and the effect of other benign gynaecological diseases on the risk of melanoma is unknown.

Objective: To investigate the potential effect of a personal history of endometriosis and some other benign gynaecological diseases on the risk of cutaneous malignant melanoma in women.

Design: The French E3N prospective cohort study.

Setting: France.

Participants: 91 965 women insured by a French national health scheme mostly covering teachers, living in France and aged 40–65 years at inclusion in 1990, followed up until July 2002.

Main Outcome Measures: Occurrence of cutaneous malignant melanoma.

Results: During 12 years of follow-up, 363 cutaneous melanoma cases were ascertained. After adjustment for phototype factors, body mass index, and hormonal factors, women with a personal history of endometriosis were significantly more at risk of melanoma than women who never had endometriosis (RR 1.62, 95% CI 1.15 to 2.29). There was also a significant positive association between melanoma and a personal history of fibroma, as compared to women with no such history (RR 1.33, 95% CI 1.06 to 1.67). A history of ovarian cyst, uterine polyp, breast adenoma/fibro-adenoma, or breast fibrocystic disease was not significantly associated with risk.

Conclusion: These data provide the strongest evidence to date of a positive association between a history of endometriosis and the risk of melanoma. In addition to suggesting a hormonal hypothesis, these results may reflect that endometriosis and melanoma share common genetic features. Because endometriosis appears as a risk indicator for cutaneous melanoma, gynaecologists may alert patients with endometriosis of their higher susceptibility to the disease and guide them towards melanoma prevention. The association between a history of fibroma and melanoma has not been previously described and needs to be confirmed in future studies.

070 DENTAL X RAYS AND THE RISK OF THYROID CANCER

A. Memon¹, D. Williams², S. Godward³. ¹Division of Primary Care and Public Health, Brighton and Sussex Medical School; ²Thyroid Carcinogenesis Research Group, Strangeways Research Laboratories, University of Cambridge; ³Department of Public Health and Primary Care, University of Cambridge, UK

Background: An increasing incidence of thyroid cancer has been reported in many countries over the last few decades. Much of this increase may be due to improved ascertainment, but there may be other contributing factors. The thyroid gland is highly susceptible to radiation carcinogenesis. Dental radiography, which is a common source of radiation exposure in the general population, is often overlooked as a source of radiation to the gland and may be associated with the risk of thyroid nodules and thyroid cancer. An increased risk of thyroid cancer has been reported in dentists, dental assistants, and diagnostic x ray workers. Exposure to dental x rays has also been associated with an increased risk of meningiomas, tumours of salivary and parathyroid glands, and low birth weight in infants. There is current controversy over the possible thyroid carcinogenic effects of low doses of radiation such as those due to dental radiography.

Objective: To evaluate the potential relationship between exposure to dental x rays and risk of thyroid cancer.

Design: Population based case-control study.

Setting: National Cancer Registry, Kuwait Cancer Control Centre, Kuwait (population 2.8 million).

Participants: 313 patients with thyroid cancer; 313 control subjects individually matched to each thyroid cancer patient for age, gender, nationality, and district of residence. Information on dental x rays and other relevant exposures was collected through a personal interview with the cases and controls, and the data were recorded in a structured questionnaire. Multivariate logistic regression models were used for case-control comparisons.

Main outcome measures: Risk of thyroid cancer associated with exposure to dental x rays.

Results: There was an approximately twofold significantly increased risk of thyroid cancer in individuals who were exposed to dental x rays (OR 2.1; 95% CI 1.4 to 3.1) ($p=0.001$). There was also a significant dose-response relationship which showed an increasing trend in risk with increasing number of dental x rays ($p_{\text{trend}} < 0.0001$). This relationship remained after controlling for sociodemographic factors (gender, nationality, level of education), number of live births, or age at diagnosis.

Conclusions: These data support the hypothesis that exposure to dental x rays is associated with an increased risk of thyroid cancer with a significant dose-response relationship.

071 RISK OF PRIMARY ADULT-ONSET GLIOMAS AND MENINGIOMAS: ANTHROPOMETRIC AND LIFESTYLE FACTORS

V. Benson, J. Green, K. Pirie, V. Beral, on behalf of the Million Women Study Collaborators. CRUK Epidemiology Unit, University of Oxford, UK

Background: Each year in the UK, approximately 4300 people are diagnosed with a brain or other central nervous system (CNS) tumour.

Brain tumour patients typically have a poor prognosis, and little is known about risk factors of these tumours.

Objectives: To investigate the role of anthropometric and lifestyle factors and the risk of primary adult-onset brain and CNS tumours, specifically gliomas and meningiomas.

Design: Prospective cohort study.

Participants and Setting: 1.3 million women aged 56 years on average, recruited from breast screening clinics from 1996–2001 in England and Scotland and followed for incident tumours through NHS cancer registration.

Main Outcome Measure: Relative risk (RR) of incident glioma and meningioma (classified as malignant or benign) relating to various factors, adjusting for age, deprivation index, and region of residence.

Preliminary Results: After an average of 6.2 years follow-up, a total of 1563 women were diagnosed with a tumour of the brain or CNS; 647 tumours were classified as glioma and 390 as meningioma. Preliminary findings show that for glioma, increasing height was positively associated with increasing tumour risk: women 172 cm and taller were significantly more likely to develop a glioma when compared to women 162–165 cm tall (RR 1.31, 95% CI 1.01 to 1.69). Whereas for the risk of meningiomas, increasing body mass index was positively associated with tumour risk: compared to a woman with a body mass index of 22.5–25 kg/m², obese women (body mass index ≥ 30 kg/m²) had an RR of 1.52 (95% CI 1.10 to 2.09). Smoking and alcohol consumption were not associated with the risk of developing either tumour type. Findings from other lifestyle factors will also be presented.

Conclusion: Taller women are at a slight increased risk of developing glioma, whereas obese women are at an increased risk of developing meningioma.

072 TREATMENT OF PROSTATE CANCER IN THE REAL WORLD: POPULATION-BASED PRACTICES, FACTORS ASSOCIATED WITH TREATMENT RECEIPT AND IMPACT ON SURVIVAL

F. J. Drummond¹, A-E. Carsin¹, L. Sharp¹, S. Deady¹, D. P. Cronin-Fenton², H. Comber¹. ¹National Cancer Registry, Ireland, Elm Court, Boreenmanna Rd, Cork, Ireland; ²Department of Clinical Epidemiology, Aarhus University Hospital, Aarhus, Denmark

Objective: Controversy exists over whether radical treatment of prostate cancer improves overall survival. We undertook a population-based study of treatment trends for prostate cancer in Ireland from 1994 to 2003; investigating factors predicting receipt of treatment

Methods: Subjects included 14 895 men diagnosed with invasive prostate cancer (ICD10, C61) between 1994 and 2003, registered with the National Cancer Registry, Ireland (NCR). Patients were followed from diagnosis to death or 31 December 2003. Data on prostate specific antigen (PSA) tests were requested from all hospital laboratories and linked with cancer registrations. PSA velocity (PSAV) was calculated, by logistic regression, as the annual rate of change of PSA prior to the prostate cancer diagnosis. Factors associated with treatment receipt within one year of diagnosis were investigated using logistic regression. Cox proportional hazards were used to assess effects of treatment and other factors on mortality.

Results: Median age at diagnosis was 72 years. Overall 44% of men had surgery, 41% had hormone therapy, 18% had radiotherapy and 19% had no active therapy. The proportion having surgery increased significantly (+10.3, 95% CI -11.8 to +38.0). Between 1994 and 1996 and decreased thereafter, while the use of radiotherapy increased significantly from 1996 (+19.8, 95% CI 15.8 to 24.0). The proportions receiving hormone therapy and those with no active treatment were unchanged over time. Increasing age was inversely associated with receipt of surgery and radiotherapy and positively associated with receipt of hormone therapy and with no active therapy. Regional differences in treatment were observed. Higher total PSA prior to diagnosis was associated with increased likelihood of radiotherapy and hormone therapy and reduced likelihood of surgery. Increasing tumour grade was positively associated with use of surgery and hormone therapy. PSAV > 2.0 ng/ml/year, increasing age, unmarried status, more advanced stage and nodal involvement, but not PSA level prior to diagnosis, were positively associated with risk of death following prostatectomy. Survival improved during the study period with 67%, 75% and 83% of men surviving for two years during 94–97, 98–00 and 01–03, respectively. Overall, patients who did not receive cancer-directed treatment had significantly lower rate of survival than those who received the treatment (hazard ratio 1.29; 1.19 to 1.38).

Conclusions: We observed temporal changes in prostate cancer treatment. Clinical (tumour stage and PSA level) and patient-related (age, region),

factors were associated with treatment receipt. Our observations suggest that receipt of treatment for prostate cancer may improve survival.

Obesity and health

073 EFFECT OF OVERWEIGHT AND OBESITY ON HOSPITAL ADMISSIONS FOR GALLBLADDER DISEASE

B. Liu, A. Balkwill, S. Sweetland, V. Beral, on behalf of the Million Women Study Collaborators. CRUK Epidemiology Unit, University of Oxford, UK

Objectives: To examine the effect of body mass index (BMI) on the risk of hospital admission and the length of hospital stay for gallbladder disease in middle-aged women in the UK.

Design: Prospective population-based cohort study.

Setting and Participants: 1.3 million women aged 56 years old on average, recruited from breast screening clinics from 1996–2001 in England and Scotland and followed-up through NHS hospital admission record databases for a total of 8.0 million person-years.

Main Outcome Measures: Hospital admissions for cholelithiasis, cholecystitis or cholecystectomy and average length of hospital stay.

Results: A total of 25 612 women had at least one hospital admission for cholelithiasis, cholecystitis or a cholecystectomy during follow-up. The relative risk of hospital admission increased with increasing BMI ($p < 0.0001$ for linear trend). Compared to women with a BMI of $< 22.5 \text{ kg/m}^2$, obese women had an adjusted relative risk of hospital admission for gallbladder disease of 3.40 (95% CI 3.24 to 3.56). We estimate that among middle-aged women in the UK, overweight and obesity contributes to 43% of hospital admissions for gallbladder disease. The effect of BMI on the number of hospital admissions and the length of hospital stay for gallbladder disease will also be examined, taking into account other factors including smoking, socioeconomic status and pre-existing illnesses.

Conclusions: Increased BMI makes a major contribution to hospital admissions for gallbladder disease.

074 HOW MUCH HEAVIER ARE WE? SECULAR CHILDHOOD OBESITY TRENDS IN THE REPUBLIC OF IRELAND

H. Whelton¹, J. Harrington², E. Crowley¹, V. Kelleher¹, M. Cronin³, I. J. Perry². ¹WHO Collaborating Centre for Oral Health Services Research University College Cork; ²Department of Epidemiology and Public Health, University College Cork; ³Department of Statistics, University College Cork, Ireland

Background: During the 1990s the Republic of Ireland experienced high annual rates of economic growth, which reversed decades of economic under-performance and transformed the country from one of the poorest to one of the most affluent countries in Europe. Economic development is a critical determinant of health and the effects of economic growth on childhood growth and development have been documented in many countries world wide.

Objective: We have examined trends in height, weight and body mass index in representative samples of Irish children examined in 1946–8 and 2002.

Subjects: Heights and weights of children between the ages of 4–14 years in the Republic of Ireland were recorded in 1948 ($n = 14\ 835$) and 2002 ($n = 17\ 518$) as part of the Irish Nutrition Survey (1948) and the North South Survey of Children's Oral Health (2002).

Results: Comparison of data from 1948 and 2002 show that children were taller and heavier in 2002 and that the increase in weight was disproportionate to the increase in height. On average, 14-year-old boys and girls were 23.1 cm and 15.6 cm taller respectively in 2002. More dramatic increases are seen in the weights of these children. The average weight of 14-year-old boys in 2002 is 65% greater than that of 1948, (37.0 kg and 60.9 kg respectively), while that of girls also increased substantially from 39.5 kg in 1948 to 58.7 kg in 2002. Mean BMI for 14-year-old boys and girls show similar increases from 17 kg/m^2 and 18 kg/m^2 respectively in 1948 to 21 kg/m^2 and 22 kg/m^2 in 2002.

Conclusion: The findings are of interest, given the relatively unique historical pattern of economic development in Ireland in the 20th century (in a European context), prolonged stagnation followed by a rapid catch-up phase of high economic growth. The data provide stark and compelling evidence on the evolution of the obesity epidemic in Irish children in tandem with the "Celtic Tiger".

075 SNACKING BETWEEN MEALS IN RELATION TO WEIGHT GAIN AND OBESITY IN A PROSPECTIVE MEDITERRANEAN COHORT: THE SUN STUDY

M. Bes-Rastrollo^{1,2}, E. Toledo¹, M. Pardo-Fernandez¹, A. Alonso^{1,3}, A. Sánchez-Villegas^{1,4}, M. A. Martínez-González¹. ¹Department of Preventive Medicine and Public Health, University of Navarra, Pamplona, Spain; ²Department of Nutrition, HSPH, Boston, USA; ³Department of Epidemiology, HSPH, Boston, USA; ⁴Department of Clinical Sciences, University of Las Palmas, Las Palmas de Gran Canaria, Spain

Background: Although snacking between meals has been traditionally considered a possible risk factor for obesity, longitudinal data on the long-term relationship between snacking and weight gain are limited.

Objective: To evaluate prospectively the relationship between snacking between meals and weight gain, and the incidence of overweight/obesity.

Setting: Free-living Mediterranean cohort (the SUN study).

Participants: 8752 university graduates from a Spanish dynamic cohort (mean age of 38 years, 60% women) followed up for an average of 28 months through mailed questionnaires.

Main Outcome Measures: The main exposure was snacking between meals. We defined two outcomes: weight gain (gaining $\geq 5 \text{ kg}$ during follow-up) and incidence of overweight/obesity (achieving $\text{BMI} \geq 25 \text{ kg/m}^2$ during follow-up). Self-reported weight and BMI were previously validated in a subsample of the cohort.

Results: 10.7% of the population reported weight gain $\geq 5 \text{ kg}$ during follow-up. After adjusting for age, sex, smoking, leisure-time physical activity, and total fibre intake, snacking between meals was associated with a significantly higher risk of weight gain. The odds ratio (OR) was 1.18 (95% CI 1.02 to 1.36). After excluding prevalent cases of overweight/obesity at baseline, we found 500 incident cases of overweight/obesity among 6314 participants. Snacking between meals was also significantly associated with incident overweight/obesity (adjusted OR 1.26, 95% CI 1.03 to 1.54).

Conclusions: These results provide evidence to support a role for snacking between meals as one of the risk factors explaining the current obesity epidemic in Mediterranean countries.

076 MEASURING PHYSICAL ACTIVITY IN EPIDEMIOLOGICAL STUDIES AMONG CHILDREN: POTENTIAL PROBLEMS OF ACCELEROMETER MEASUREMENTS

J. A. Toschke^{1,2}, R. von Kries¹, E. Rosenfeld¹, A. M. Toschke^{1,3}. ¹Ludwig-Maximilians University of Munich, Institute of Social Pediatrics & Adolescent Medicine, Division of Epidemiology, Germany; ²Imperial College London, Division of Surgery, Oncology, Reproductive Biology & Anaesthesia, Department of Surgery and Surgical Technology, London, UK; ³King's College London, Division of Health and Social Care Research, Department of Public Health Sciences, London, UK

Objective: Overweight and obesity are the most common nutritional disorders in industrialised countries, and their prevalence continues to rise. Physical activity (PA) is one major determinant of body composition. Accelerometers have been reported to provide valid objective measures among adults. However, studies among children rarely report positive findings. To assess the day-to-day variability of accelerometers in preschoolers.

Design: Cross-sectional study.

Setting: Compulsory school entry health examination, Munich, Southern Germany.

Participants: 205 children aged 5.00 to 6.99 years.

Main Outcome Measures: Counts of uni-axial accelerometers (Actigraph AM 7164–2.2) from instruments placed on elastic belts as provided by the manufacturer were measured under free-living conditions. The measurements were carried out on five consecutive days including one weekend from the time of getting up in the morning until bedtime. Any time the instruments were taken off during the day—for example, for swimming or bathing—was noted in daily logs by the parents. Additionally, parents were asked to estimate the time the child cycled each day in order to adjust for invalid counts during cycling.

Results: The sample consisted of 51% boys and 49% girls. The majority was 6 years old (82%). Thirteen children were excluded because of refusal to carry the accelerometer ($n = 9$) or loss of the instrument ($n = 4$) leaving accelerometer data of $n = 192$ children. Boys showed on average 135 counts more per minute compared to girls with mean values of 899 for boys and 764 for girls ($p < 0.01$). Intra-individual correlation of accelerometry data between single days of examination was low with Pearson correlation coefficients between $r = 0.31$ and $r = 0.51$ adjusted for weekday or weekend day, respectively. Furthermore, child's body mass index and accelerometer measures were not related to each other (Pearson's

correlation coefficient $r = -0.06$). In a subsequent study individuals wore two accelerometers at the same time. Analyses showed higher measures ($+50\%$ counts/minute; $p < 0.01$) for instruments placed in front of the umbilicus compared to instruments placed at the right hip.

Conclusion: Comparison of activity counts on different days revealed a low reliability of accelerometer measures among preschoolers under free-living conditions. Uni-axial accelerometers placed on elastic belts might measure physical activity with low precision among preschoolers under free-living conditions possibly due to variable placement of instruments. Such measurement errors have to be considered in studies on physical activity measured by accelerometry and obesity among preschoolers.

Lifestyle: alcohol consumption and health

077 HAZARDOUS ALCOHOL DRINKING AND PREMATURE MORTALITY IN RUSSIA: THE IZHEVSK FAMILY CASE-CONTROL STUDY OF MEN AGED 25–54 YEARS, 2003–2005

S. Tomkins¹, D. A. Leon¹, L. Saburova², E. Andreev³, N. Kiryanov⁴, M. McKee¹, V. M. Shkolnikov³. ¹London School of Hygiene & Tropical Medicine, UK; ²Social Technologies Institute, Izhevsk, Russia; ³Max Planck Institute for Demographic Research, Rostock, Germany; ⁴Izhevsk Medical Academy, Russia

Background: Life expectancy among Russian men is extremely low. In 2004 it was 59 years, and largely driven by very high mortality at working ages. The reasons for this and for the huge fluctuations in mortality seen since the mid-1980s are poorly understood. The Izhevsk Family case-control study has investigated the contribution of alcohol, and hazardous drinking in particular, to male mortality in a typical Russian city in the Urals.

Methods: Interviews were obtained with proxy informants for 62% (1750/2835) of all deaths among male residents of the city aged 25–54 years over 24 months from October 2003. Interviews with proxy informants of live controls were obtained for 57% (1750/3078) of control households approached. Information was obtained on frequency of consumption and usual amount of beer, wine and spirits consumed, frequency of consumption of non-beverage alcohol (manufactured ethanol-based liquids not intended to be drunk, known as surrogates) and markers of problem drinking including frequent hangovers and extended periods of excessive drunkenness. Education, employment and marital status were also collected.

Results: Over half (51%) of the cases were classed as problem drinkers or drank surrogates, compared to 13% of controls. The mortality odds ratio (OR) for these hazardous drinkers, relative to men who either abstained or were non-problematic beverage drinkers was 6.0 (95% CI 5.0 to 7.3) adjusted for smoking and education. The odds ratio for drinking non-surrogates in the past year (yes/no) was 9.2 (7.2 to 11.7) adjusted for age. Adjustment for volume of ethanol consumed from beverages, education and smoking attenuated the OR to 7.0 (5.5 to 9.0). The magnitude of the association of surrogate drinking with mortality varied considerably by cause of death. The observed pattern is very similar to the variation by cause in the proportional mortality increases observed in Russia among men aged 25–54 between 1991 and 1994. We estimate that 43% of deaths among men aged 25–54 years in Izhevsk are attributable to patterns of hazardous drinking and especially to surrogate consumption.

Conclusions: Hazardous alcohol consumption is strongly related to mortality among working age men in a typical Russian city and may account for almost half of all deaths in this group. Our study is the first to identify surrogate consumption as a particularly important component of hazardous drinking in Russia. Moreover, our analyses provide indirect support for the contention that this type of drinking behaviour may be related to the sharp fluctuations seen in Russian mortality in the early 1990s.

078 THE EFFECT OF THE REDUCTION IN THE PRICE OF ALCOHOL ON SOCIOECONOMIC DIFFERENCES IN ALCOHOL-RELATED MORTALITY: A NATURAL EXPERIMENT BASED ON REGISTER DATA

K. Hertzum¹, P. Mäkelä², P. Martikainen^{1,3}. ¹Population Research Unit, Department of Sociology, University of Helsinki; ²National Research and Development Centre for Welfare and Health, Helsinki; ³Helsinki Collegium for Advanced Studies, Helsinki, Finland

Background: In 2004 there was a drastic reduction in the price of alcohol in Finland due to a reduction in alcohol taxes and travellers' duty free

allowances from the EU were abolished. The authors examined to what extent this affected alcohol-related mortality in different age and socioeconomic status groups.

Methods: For this register-based follow-up study of all over 15-year-old Finnish men and women, independent variables of the participants were extracted from employment statistics of Statistics Finland for the end of 2000 and 2003, and mortality follow-up was for the years 2001–3 and 2004–5 respectively. Alcohol-related causes were defined on the basis of both the underlying and contributory causes of death. Poisson regression models including different socioeconomic variables and calendar period interaction were fitted.

Results: Alcohol-related mortality increased among men by 16% and among women by 31% after the reduction in the price of alcohol. 82% of the deaths and increase were due to chronic causes. The increase was the largest among men aged 55–59 years and women aged 50–54 years. Among those aged 30–59 years, alcohol-related mortality increased most in the socioeconomic groups where the premature mortality rates were already the highest: men and women who were unemployed or pensioners. It is noteworthy that those employed have not suffered from the increased alcohol-related mortality thus far. Largest increases and differences in increase were observed for chronic rather than acute alcohol related causes. Differences in change in alcohol-related mortality by income were partially accounted for by differences in main activity.

Conclusions: The mortality impact of the reduction in the price of alcohol was, in the first two years after the changes, confined to subpopulations which already had the highest mortality rates.

079 THE IMPACT OF BINGE DRINKING ON SICKNESS ABSENCE

O. Rahkonen, A. Salonsalmi, M. Laaksonen, E. Lahelma. Department of Public Health, University of Helsinki, Finland

Objective: Sickness absence is influenced by several different factors. We aimed to examine the impact of binge drinking on sickness absence and to analyse whether this impact could be explained by socioeconomic position, physical and mental strain at work and health status.

Design: Baseline questionnaire survey (2000–2) linked with the employer's registers on sickness absence with three years' follow-up.

Setting: Staff of the City of Helsinki, Finland.

Participants: 5328 female and 1442 male employees of the City of Helsinki, aged 40–60 years.

Main Outcome Measures: Short (self-certified, 1–3 days) and long (medically confirmed, 4+ days) spells of sickness absence.

Results: Binge drinking was strongly associated with both short sickness absence spells among women (RR 1.70, 95% CI 1.36 to 2.13) and men (1.62 (1.19 to 2.19) and with long sickness absence spells among women (1.55 (1.16 to 2.08)). Adjusting for occupational social class and working conditions had no effects on the association. Adjusting for several diseases (such as angina, diabetes and hypertension) only slightly attenuated the associations. Adjusting for mental health more strongly attenuated the associations. However, the associations remained statistically significant.

Conclusions: Binge drinking increased the risk of having sickness absence independently of socioeconomic position and working conditions. Mental health was able to partly explain the excess sickness absence spells among binge drinkers.

080 MORTALITY AND ALCOHOL IN RUSSIA: CASE-CONTROL STUDY OF 50 000 ADULT DEATHS IN THREE SIBERIAN CITIES

D. Zaridze¹, P. Brennan², N. Igitov³, I. Konobeevskaya⁴, A. Boroda¹, J. Boreham⁵, P. Boffetta², R. Peto⁵. ¹Institute of Carcinogenesis, Moscow, Russia; ²International Agency for Research on Cancer, Lyon, France; ³Altai State Medical Institute, Barnaul, Russia; ⁴Research Institute of Cardiology, Tomsk, Russia; ⁵Clinical Trials Service Unit, Oxford, UK

Background: Mortality among middle aged adults in Russia is among the highest in the world. Alcohol is suspected of having an important role in this although data are limited.

Objective: To measure the mortality associated with heavy alcohol consumption in Russian adults.

Design: All deaths that occurred between 1991 and 2001 in three cities in Western Siberia (Barnaul, Bysk and Tomsk) were identified from local mortality registers. Interviewers made home visits in order to obtain proxy information on alcohol, tobacco and other lifestyle variables from families of the deceased. Complete proxy information was obtained from 48 572 deceased adults (31 512 men and 17 060 women). A control group

comprising 5719 deaths was made up from a group of diseases known not to be related to alcohol or tobacco.

Main Outcome Measures: Relative risk for mortality from all causes and from specific causes.

Results: Among controls, approximately half of the men and 90% of the women were reported to be non-drinkers or light drinkers (average of one drink a day). Fairly heavy alcohol consumption (average of a bottle of vodka every few days) was reported for one in three men and one in 20 women among controls, and very heavy alcohol consumption (an average of one bottle of vodka a day) was reported for approximately one in six men and one in 30 women. Specific causes of death that were increased for very heavy alcohol consumption among men included respiratory tuberculosis (RR=3.5), cancers of the head and neck (RR=2.2), and liver cirrhosis (RR=5.9). Acute myocardial infarction was not increased although other acute ischaemic heart disease was increased (RR=2.3). External causes of death were strongly associated with very heavy alcohol consumption (RR=5.2) including transport accidents (RR=2.3), suicide (RR=6.2) and assault (RR=5.9). Although very heavy alcohol consumption was rare among women, RRs of mortality tended to be greater, being 4.2 for respiratory tuberculosis, 5.8 for other acute IHD and 11.6 for external causes. All the above RRs were significant at $p<0.0001$.

Conclusions: If these deaths are largely or wholly causal then, among male very heavy drinkers, this level of alcohol consumption was responsible for approximately 42% of deaths due to medical causes and 81% of deaths due to external causes. Among female very heavy drinkers, approximately 58% of deaths due to medical causes and 91% of deaths due to external causes were due to very heavy alcohol consumption.

Methods III

081 A COMPARISON OF METHODS FOR ASSESSING THE RISK OF CAUSING A ROAD CRASH WHEN DRIVING UNDER THE INFLUENCE OF CANNABIS OR ALCOHOL

E. Lenguerrand, J. L. Martin, B. Laumon, and the SAM group. *Transport, Occupational and Environmental Epidemiology Research and Surveillance Unit, Joint Unit of the French National Institute for Transport and Safety-INRETS, the Lyon 1 University and the National Institute for Monitoring Medical Development-INSV, France*

Background: The prevention of road crash deaths and injuries requires the knowledge of crash risks associated with hazardous behaviours such as driving under the influence of cannabis or alcohol. When designing a case-control study for assessing such risks, setting up a relevant control group is hard to achieve due to difficulties in determining a representative sample of the road population and the driver's reluctance to report their level of consumption without compulsory test. Both responsibility analysis and quasi-induced exposure method can be used to get round this difficulty. No research has compared these approaches which are both relevant for investigating the role of cannabis and alcohol.

Objective: To evaluate the disparities between results assessed in the quasi-induced exposure method and those assessed with the responsibility analysis.

Participants: 10 748 drivers with known blood cannabis and alcohol concentrations, who were involved in fatal crashes in France between October 2001 and September 2003.

Design: Population based case-control studies set up using the quasi-induced exposure method and the responsibility analysis.

Main Outcomes Measures: The cases were those considered at fault in their crash and the controls those determined not at fault. Alcohol and cannabis consumption were measured with blood and urine tests immediately after the crash.

Results: An increase in the risk of causing a crash was found when driving under the influence of cannabis or alcohol. The risk assessed for cannabis was similar in all case-control studies. Due to disparities in sample size and in the type of crash studied, the alcohol dose-effect response was found to be larger with the quasi-induced exposure method than with the responsibility analysis, especially for drivers involved in single vehicle crashes. The assessment of the alcohol and cannabis interaction could only be estimated in the responsibility analysis and it showed that the risk associated with joint consumption was only the multiplication of the risks of causing a crash related to the consumption of either.

Conclusions: The quasi-induced exposure method makes it possible to focus on road safety issues that are particular to drivers prone to single- or two-vehicle crashes. The responsibility analysis is relevant for issues requiring an assessment of risk for the whole driver population. Therefore,

the latter approach provides a unique attributable risk that is valuable in improving public health issues related to cannabis and alcohol on the road.

082 DOES POPULATION MIXING MEASURE INFECTIOUS EXPOSURE AT THE COMMUNITY LEVEL?

J. C. Taylor¹, G. R. Law², P. J. Boyle³, Z. Feng³, M. S. Gilthorpe², P. A. McKinney¹, R. C. Parslow¹, R. G. Feltbower¹. ¹*Paediatric Epidemiology Group and ²Biostatistics Unit, Centre for Epidemiology and Biostatistics, University of Leeds;* ³*School of Geography and Geosciences, University of St Andrews, Fife, UK*

Background: There is growing evidence that some chronic diseases, including asthma, leukaemia, brain tumours and autoimmune diseases may be associated with exposure to infections. Infections may act through a direct mechanism with specific infections precipitating disease, or through a process such as the "hygiene hypothesis", in which a lack of exposure to infections in early childhood fails to correctly prime the immune system thereby increasing future risk of secondary disease. Measuring the range and dose of infection an individual is exposed to at a specific time period is difficult, even more so, when common infections are of interest. A series of studies have used population mixing, a term used to describe a process by which contact between people is promoted by their spatial movement, as a proxy for the level of infectious disease circulating in a community.

Objectives: A real measures of population mixing and community characteristics were compared with routine hospital data on infections to develop a valid and reproducible infectious disease proxy for future epidemiological studies.

Design: Ecological study using 2001 census derived migration and commuting based measures of population mixing and Hospital Episode Statistics (HES) data aggregated across small geographical areas.

Setting: Two Government Office Regions (West Midlands and the East, England) and Scotland.

Main Outcome Measures: Census derived measures of population mixing.

Results: A commuting-based distance measure showed a strong significant negative association with hospital admissions that was consistent across infection group, age groups and regions; areas with a higher median distance travelled by commuters leaving the area having a lower rate of hospital admissions for infections. Deprivation and population density demonstrated positive association with hospital admissions in a number of infection groups. Population potential (relative accessibility) explained the most variation in infectious admissions in Scotland, showing a non-linear relationship.

Conclusions: Providing hospital admissions are a good marker of common infections—the results suggest distance commuted may be the most reliable measure of population mixing for demonstrating an association with infections circulating in a community. Deprivation and population density are also good proxies for the level of infectious disease. Areas that exhibit high levels of population mixing do not necessarily possess raised rates of hospital admissions for infectious disease.

083 KRISTIAN FEYER ANDVORD'S STUDIES ON THE EPIDEMIOLOGY OF TUBERCULOSIS AND THE ORIGIN OF GENERATION COHORT ANALYSIS IN NORWAY

O. Naess¹, A. Schiotz². ¹*Institute of General Practice and Community Medicine, Oslo, Norway;* ²*Section for Social Medicine and Medical History, Institute of Public Health and Primary Health Care, University of Bergen, Norway*

Background: Generation cohort analysis has played an important role in epidemiology as a means to describe the experience of disease rates in people born in successive calendar years. This approach provides important clues about the natural history of specific diseases at the individual level as well as the evolution of disease at population level. Kristian Feyer Andvord suggested that primary infection mainly takes place in childhood and that falling mortality rates at the time of observation was a reflection of exposure early in life. Wade Hamilton Frost later in 1939 published a similar idea citing Andvord, and introduced the concept of "cohort". This seminal paper by Frost is widely known in epidemiology as it marks the birth of a concept vital to the discipline's self identification. Less attention has been paid to Andvord. We wanted to follow the origin of this method in the work of Andvord and the causal inferences he made in the period he acted within.

Methods: We went through all his 24 scientific articles and essays published in the period 1889–1935. To get reach of additional literature on Andvord and generation cohort analysis, we did a literature search using the following key words: "cohort", "cohort analysis", "generation", "Andvord", "Frost" and "tuberculosis".

Results: In contrast to many other countries, tuberculosis mortality in Norway did not start to decline until 1900. In 1930 Andvord was able to describe tuberculosis mortality for successive birth cohorts. He spent 40 years of his adult working life, from 1895 to 1935, on the quest to identify the age dependent susceptibility of the disease by means of comparing first geographic pattern and later birth cohorts. This period coincided with major changes in the scientific conceptions of tuberculosis and diseases in general and with political and ideological notions of prevention. This was also reflected in the causal inferences made by Andvord as he moved from miasmatic to genetic explanations for the decline of mortality. He was reluctant to put any emphasis on improved social living conditions.

Conclusions: Although Andvord developed a powerful tool in epidemiology when he described tuberculosis mortality in a period of great changes, he was influenced by political and ideological models of disease.

084 WHY MY DISEASE IS IMPORTANT: METRICS OF DISEASE OCCURRENCE USED IN THE INTRODUCTORY SECTIONS OF PAPERS IN THREE LEADING GENERAL MEDICAL JOURNALS IN 1993 AND 2003

H. N. Gouda, J. Powles. *Institute of Public Health, Forvie Site, University of Cambridge, UK*

Objectives: It is the consequences of events rather than the events themselves that reflect their social importance. "Event-based" measures of disease occurrence, which are typically optimal for scientific investigation, do not explicitly take into account the consequences of the events. They therefore do not appear to be optimal for expressing claims about the importance of a disease of interest. Time-based measures of "disease burden" (such as the Disability Adjusted Life Year (DALY) which was first introduced in the 1990s) were developed with the aim of better capturing the social significance of health losses from disease onsets. Here, we have analysed metrics used in claims about disease importance and investigated differences in trends between the years 1993 and 2003.

Design: Textual examination of papers retrieved from Medline.

Data Sources and Methods: 1125 papers published in the *New England Journal of Medicine*, the *Lancet* and the *Journal of the American Medical Association* during the first halves of 1993 and 2003 were selected on the basis of keywords found in a pilot study to be associated with claims about disease importance. 132 of these articles in 1993 and 248 in 2003 included claims about disease importance in their introductory sections and characteristics of these claims were abstracted.

Results: Of the quotes identified in the papers and articles examined the majority used counts, prevalence or incidence measurements to express the importance of the disease of interest. Some also used risk estimates and economic terms, such as cost of treatment, to describe the impact of the disease. There was no difference in the frequency of reporting these measures between those published in 1993 and 2003. Very few articles referred to metrics that weighted events by the expected consequent loss of healthy time—such as years of life lost, QALYs and/or DALYs.

Conclusions: Time-based metrics appear to have made little headway. Claims about the relative importance of diseases continue to be overwhelmingly expressed in terms of counts (of deaths and disease onsets) and comparisons of counts, rates and risks. Such "event-based" metrics do not usually convey to readers sufficient information on which to make a judgment about the relative social importance of a given disease.

Parallel session D

Lifecourse II

085 LOW APGAR SCORES AT BIRTH AND LONG-TERM COGNITIVE OUTCOMES

D. E. Odd¹, F. Rasmussen², D. Gunnell³, G. Lewis⁴, A. Whitelaw¹. ¹*Clinical Science at North Bristol, University of Bristol, UK;* ²*Department of Public Health Sciences, Karolinska Institute, Stockholm, Sweden;* ³*Department of Social Medicine, University of Bristol, UK;* ⁴*Department of Community Medicine, University of Bristol, UK*

Background: Infants in a poor condition at birth (as measured by a low Apgar score) who then develop encephalopathy are at increased risk of cerebral palsy and learning difficulties, with the duration of the low Apgar score correlating with the risk of these conditions. However, around 5% of

infants have transiently low Apgar scores without developing encephalopathy, and the long-term outcome of these infants is unknown.

Objective: To investigate the association of brief (0–5 min) and prolonged (>5 min) low Apgar scores (<7) in non-encephalopathic infants with educational achievement at age 15–16 and intelligence quotients (IQ) in adulthood.

Design: Nationwide and population-based record-linkage cohort study of 176 524 males. Data from the Medical Birth Register were linked to Population and Housing Censuses, conscription medical records (IQ), and School Registers (summary school grade). Infants were classified depending on the time for their Apgar score to reach 7 or above. Infants born before 37 weeks and those with encephalopathy were excluded.

Setting/Patients: All males born in Sweden between 1973 and 1976.

Main Outcome Measure: IQ score at 18 years of age.

Results: Infants with brief (OR 1.14 (1.03–1.27)) or prolonged (OR 1.35 (1.07–1.69)) low Apgar scores were more likely to have a low IQ score. The longer it took an infant to achieve a normal Apgar score the greater was their risk of having a low IQ score at age 18 years ($p=0.003$). There was no association between brief (OR 0.96 (0.87 to 1.06)) or prolonged (OR 1.01 (0.81 to 1.26)) low Apgar scores and a low summary school grade at age 15–16, or evidence for a trend in the risk of a low school grade ($p=0.61$).

Conclusions: Infants in poor condition at birth with no encephalopathy have increased risk of poor functioning in cognitive tests in later life. While lower IQ scores were found even in infants with only briefly low Apgar scores there was no impact on a broader measure of educational achievement (school grade).

086 FISH INTAKES IN PREGNANCY AND CHILD NEURODEVELOPMENT AT AGE 4 YEARS: RESULTS FROM A LONGITUDINAL SPANISH COHORT

M. A. Mendez¹, N. Ribas-Fitó¹, M. Torrent², J. Júlvez¹, J. Sunyer¹. ¹*Centre de Recerca en Epidemiologia Ambiental, Institut Municipal Investigació Medica, Catalonia, Spain;* ²*Àrea de Salut de Menorca, IB-SALUT, Menorà, Spain*

Objectives: To assess associations between maternal fish consumption in pregnancy and cognitive development at age 4 years in a population with high intakes.

Design: Prospective cohort study.

Setting: Menorca, Spain.

Participants: 459 full-term children born in 1997–8 to mothers recruited from prenatal clinics in the second trimester of pregnancy (95% response rate). 86% were administered developmental tests by trained psychologists at 4 years.

Main Outcome Measures: Associations between maternal fish consumption and scores on the Spanish version of the McCarthy Scales of Children's abilities using multivariate linear regression.

Results: 96.7% of mothers reported fish consumption in pregnancy, 49.4% up to once/week, 32.9% >1 to 2 times/week, 12.7% 2–3 times/week, and 5.1% >3 times/week. In multivariate models, fish consumption was not associated with development in children breastfed ≥ 6 months. However, in children breastfed <6 months, intakes of 2–3 times/week were associated with significantly higher standardised general cognitive (10.4 (SD 3.2)), perceptual-performance (10.1 (SD 3.1)), memory (9.7 (SD 3.3)) and verbal (8.8 (SD 3.3)) scores. Children whose mothers had intakes >3 times/week (256–453 g) had similar test scores as those of mothers with low intakes. Child fish intakes at age 4 years were not associated with test performance.

Conclusions: Consistent with previous studies, moderately high fish intakes in pregnancy were positively related to child cognitive development in subjects breastfed <6 months. There was no association between maternal fish intakes and cognitive development among children breastfed ≥ 6 months, who had higher mean scores. Breast milk is a key postnatal source of n-3 fatty acids essential for brain membranes, for which fish is the main dietary source. Although numbers were small, results suggest that high fish intakes, exceeding recommended limits to reduce neurotoxin exposure, may not enhance development in some settings.

087 THE RELATIONSHIP BETWEEN PERIODONTAL DISEASE AND PRETERM LOW BIRTHWEIGHT

M. Vettore¹, M. de Carmo Leal¹, A. Leao², A. Sheiham³. ¹*Department of Epidemiology, National School of Public Health, Oswaldo Cruz Foundation, Rio de Janeiro, Brazil;* ²*Division of Graduate Periodontics, Federal University of Rio de Janeiro, Brazil;* ³*Department of Epidemiology and Public Health, University College London, UK*

Background: There is no consensus about the possible influence of periodontal disease on preterm low birthweight.

Objective: To investigate relationship of clinical parameters of periodontal disease with preterm low birthweight.

Methods: A case-control study with 542 post-partum women aged over 30 years of age was conducted. Four groups of cases were compared with non-preterm and non-low birthweight controls (n=393): low birthweight (n=96), preterm (n=110), preterm and low birthweight (n=63) and preterm and/or low birthweight (n=143). Periodontal clinical parameters of dental plaque, bleeding on probing, periodontal pocket depth and clinical attachment level were recorded by through full mouth examination. Covariates included socio-demographic and anthropometric characteristics, housing conditions, maternal harmful habits, physical activities, violence during pregnancy, psychosocial factors, satisfaction with pregnancy, obstetric history, prenatal care and diseases during pregnancy.

Results: Periodontal disease levels were significantly higher in controls than cases. The extent of periodontal disease did not increase risk for preterm low birthweight using 13 different measures of periodontal disease. Frequency of periodontal sites with periodontal pocket depth \geq than 4 mm in women having low birthweight, preterm, and preterm and/or low birthweight was lower than controls.

Conclusion: In a large sample of women aged 30 years or over, periodontal disease was not more severe in those with preterm low birthweight babies.

088 MATERNAL SIZE IN PREGNANCY AND BODY COMPOSITION IN CHILDREN

C. R. Gale¹, M. K. Javid¹, S. M. Robinson¹, C. M. Law², K. M. Godfrey¹, C. Cooper¹. ¹MRC Epidemiology Resource Centre, University of Southampton; ²Centre for Paediatric Epidemiology and Biostatistics, Institute of Child Health, University College London, UK

Background: Evidence suggests that babies' fat mass at birth is greater if their mothers were themselves fatter during pregnancy, but it is unclear whether this association persists into childhood.

Objective: To examine the relation between maternal size in pregnancy, early growth and body composition in children.

Design: Prospective cohort study.

Setting: Southampton, UK.

Participants: 216 9-year-old children whose mothers had participated in a study of nutrition during pregnancy.

Main Outcome Measures: Fat mass and lean mass measured by dual-energy x ray absorptiometry, and adjusted for height ("fat mass index" and "lean mass index").

Results: Fat mass index at age 9 years was greater in children whose mothers had a larger mid-upper arm circumference in late pregnancy or a higher pre-pregnant body mass index. For one standard deviation (SD) increase in maternal mid-upper arm circumference in late pregnancy, fat mass index rose by 0.26 (95% CI 0.06 to 0.46) SD in boys and by 0.44 (95% CI 0.31 to 0.57) SD in girls. For one SD increase in maternal pre-pregnant BMI, fat mass index rose by 0.22 (95% CI 0.02 to 0.43) SD in boys and by 0.42 (95% CI 0.29 to 0.56) SD in girls. Other independent predictors of greater fat mass were smoking in pregnancy (in boys) and shorter duration of breastfeeding (in girls). Lean mass index was greater in children who had weighed more at birth.

Conclusions: Mothers who had a higher body mass index before pregnancy and a larger mid-upper arm circumference during pregnancy tend to have children with greater adiposity at age 9 years.

089 BIRTHWEIGHT AND RISK OF CHILDHOOD LEUKAEMIA: RESULTS FROM THE UNITED KINGDOM CHILDHOOD CANCER STUDY

A. G. Smith, T. Lightfoot, J. Simpson, E. Roman. *Epidemiology & Genetics Unit, Department of Health Sciences, University of York, UK*

Objective: To determine whether there is an association between birthweight and risk of developing childhood leukaemia using birth certificate data obtained from the Office for National Statistics.

Design: National population-based case-control study.

Setting: UK.

Participants: 1514 children (0–14 years old) newly diagnosed with leukaemia (1991–6), of which 1280 had acute lymphoblastic leukaemia (ALL) and 211 had acute myeloid leukaemia (AML). Two controls per case, individually-matched to cases on date-of-birth, sex and region of residence (n = 2997), were randomly selected from primary care population registers

Main Outcome Measures: Associations for total leukaemia, and separately for ALL and AML, with five categories of birthweight (<2500, 2500–2999, 3000–3499, 3500–3999 and >4000 g) were estimated using unconditional logistic regression adjusting for age, sex and region of residence.

Results: Preliminary analyses showed that compared to the baseline category (3000–3499 g), there was no association between low birthweight and childhood leukaemia (<2500 g, OR 0.87; 95% CI 0.65 to 1.52), but there was an increased risk for babies weighing 4000 g or more at birth (OR 1.30; 95% CI 1.05 to 1.60). Stratification by sex revealed no association for boys (OR 1.12 95% CI 0.86 to 1.46), but an increased risk for girls (OR 1.80; 95% CI 1.26 to 2.56). Similar results were observed for ALL alone, but no birthweight differences between AML cases and controls were observed.

Conclusions: We are confident that these findings reflect a real association between birthweight and childhood leukaemia. The data are not subject to recall bias, as they were recorded at birth registration. These findings support the hypothesis that high birthweight is a risk factor for childhood leukaemia, and provide further evidence that the development of childhood leukaemia maybe initiated in utero. Few studies have investigated the difference in risk between boys and girls, and we plan to examine this association further.

Inequalities

090 DEPRIVATION IS ASSOCIATED WITH HIGHER PREVALENCE OF CARDIOVASCULAR DISEASE AMONG PEOPLE WITH DIABETES INDEPENDENTLY OF CURRENT RISK FACTOR LEVELS

S. Wild¹, J. McKnight², A. McConnachie³, R. Lindsay⁴, on behalf of the Glasgow and Lothian Diabetes Register Data Group. ¹Public Health Sciences Department, University of Edinburgh; ²Western General Hospital, Edinburgh; ³Robertson Centre for Biostatistics, University of Glasgow; ⁴BHF Cardiovascular Research Centre University of Glasgow, UK

Objective: To investigate whether prevalence of cardiovascular complications of diabetes are associated with deprivation.

Design: Cross-sectional study using an area-based measure to define quintiles of deprivation

Setting and Subjects: 52 280 people with diabetes on a population-based register in southern Scotland of whom 15707 were in the most deprived and 9971 were in the most affluent quintiles of the Scottish population

Main Outcome Measures: Hospital records of diagnoses of ischaemic heart disease, stroke or peripheral vascular disease

Results: Age/sex adjusted prevalence of diabetes was 3.5% and 2.3% in the most and least deprived quintiles respectively. People with diabetes in the most compared to the least deprived quintile were younger (61.8 vs 62.6 years, p=0.0001), more likely to be female (50% vs 42%, p<0.0001), more likely to have type 2 than type 1 diabetes (89% vs 83%, p<0.0001), more likely to be current smokers (32 vs 13%, p<0.0001) had shorter mean duration of diabetes (6.8 years vs 8.6 years, p<0.0001), higher mean body mass index (BMI 31.0 vs 29.2 kg/m², p<0.0001), lower mean systolic blood pressure (134 vs 137 mmHg, p<0.0001), lower mean cholesterol (4.37 vs 4.45 mmol/l) and higher HbA1c (7.8 vs 7.6%, p<0.0001). The proportion of people that had any mention on hospital discharge records within the last five years was higher in the most deprived quintile than the least deprived quintile for ischaemic heart disease (14% vs 10%, p<0.0001), stroke (4.7% vs 3.5%, p<0.0001), peripheral vascular disease (2.6% vs 1.4%, p<0.0001) or any vascular disease (18% vs 13%, p<0.0001). Even after adjusting for potential confounding factors (as given above) in multivariable logistic regression the odds ratio (95% CI) for a hospital admission for any vascular disease within the last five years for the most deprived compared to the least deprived quintile was 1.51 (1.39 to 1.63). The most marked effect of deprivation for hospital admissions within the last five years was for peripheral vascular disease (odds ratio (95% CI) for the most deprived compared to the least deprived quintile 2.08 (1.69 to 2.55).

Conclusions: History of hospital admission with all major cardiovascular complications of diabetes is more common among deprived than affluent populations and these relationships persist after adjusting for current risk factor levels. The findings suggest that deprivation may act as a marker of lifelong exposure to risk factors such as smoking. Addressing current risk factor levels alone is unlikely to reduce inequalities in cardiovascular complications of diabetes by deprivation.

091 SURVIVAL EFFECTS ON AGE PATTERNS IN HEALTH INEQUALITY: EVIDENCE FROM THE ENGLISH LONGITUDINAL STUDY OF AGEING

A. McMunn¹, J. Nazroo², E. Breeze¹. ¹Department of Epidemiology & Public Health, University College London; ²Department of Sociology, University of Manchester, UK

Background and Objectives: Studies have suggested that health inequalities decline with age. This study examines whether socioeconomic gradients in the incidence of illness decline with age, and, if so, whether this decline is explained by differential mortality.

Design: Wealth inequalities in deterioration of health and mortality over a two-year period are examined using the first two waves of the English Longitudinal Study of Ageing (ELSA), a large, longitudinal panel study of English people aged 50+.

Participants: Participants in the first two waves of ELSA who were disease free at wave 1 (n=6371 for self-reported health, n=6911 for activities of daily living, n=7262 for ischaemic heart disease).

Main Outcome Measures: Three health outcomes are used: self-reported fair or poor health; reporting difficulty with one or more activity of daily living (ADLs); and ischaemic heart disease (IHD), measured as self-reported diagnosed or symptomatic angina or myocardial infarction. General mortality was used for self-reported health and disability, and cardiovascular mortality was used in relation to IHD.

Results: A significant inverse wealth gradient in the proportion of new cases reporting poor health was seen up to age 75, with a weakening in the wealth gradient thereafter. The addition of mortality strengthened the gradient for people aged 80 and over with the overall odds ratio for trend in this age group increasing from 1.12 (0.97 to 1.31) before the inclusion of mortality to 1.22 (1.08 to 1.38) after. An inverse wealth gradient in the onset of ADL difficulties existed across all age groups, and the inclusion of fatalities did not change the strength of this relationship for any age group. The inverse wealth gradient in incidence of IHD declined with age so that from the age of 60 there was no significant gradient in new cases of IHD. The inclusion of circulatory-related deaths with new cases of IHD increased the odds for the trend in wealth substantially for the two oldest age groups as well as for those aged 60–64, with the odds ratio now significant in the 70–74 and 80+ age groups, as well as for participants in their fifties.

Conclusions: The relationship between wealth and onset of illness declined with age for self-reported health and heart disease. Selective mortality attenuated the decline of health inequalities somewhat in the oldest age groups, and more so for heart disease than for self-reported health or disability. Wealth inequality in the onset of disability did not decline with age.

092 INEQUALITIES IN CANCER INCIDENCE: DIFFERENT SOCIAL INDICATORS SHOW DIFFERENT IMPACT

N. Zengarini¹, T. Spadea¹, A. Kunst², A. d'Errico¹, R. Zanetti³, S. Rosso³, G. Costa^{1,4}. ¹Regional Epidemiology Unit, ASL 5 Piedmont Region, Grugliasco, Italy; ²Department of Public Health, Erasmus MC, University Medical Center Rotterdam, The Netherlands; ³Piedmont Cancer Registry, CPO Piedmont Region, Turin, Italy; ⁴Department of Hygiene and Public Health, University of Turin, Italy

Objective: (1) To compare the social gradient in cancer incidence in Turin (Italy) using different socioeconomic indicators (educational level, occupational class, material conditions); (2) to assess which social indicators are independently related to cancer incidence after controlling for the others.

Methods: Individual record-linkage between the Turin Longitudinal Study and the Piedmont Cancer Registry provided data on cancer incidence for 30–85 years old residents in Turin in the period 1985–99. We chose the cancer sites with good evidence of social inequalities in the literature: liver, lung, stomach and UADT cancers in men; cervix, stomach, breast and melanoma in women. Three socioeconomic indicators were selected to represent respectively early social position (education, 6 categories), current occupation (occupational class, 7 categories) and material living conditions (housing characteristics, 7 categories). A multivariate Poisson regression model was built for each cancer site according to a life course approach as a function of the social indicators, including them at first individually, and then all together: the first variable entered into the model was education, being the first individual characteristic acquired over the life course, followed by occupational class and housing characteristics.

Results: In both sex, social gradients for all cancer sites were significant and in the expected direction. Among men, the gradient between the most disadvantaged and the most advantaged social classes was strongest for all sites using education, except for liver cancer, where the occupational gradient was stronger, whereas among women education produced the

strongest gradients in risk for all cancer sites. When all three social indicators were included in a regression model, for liver cancer in men the gradient in risk by education and housing disappeared after controlling for occupational class, which instead remained a significant predictor; for the other sites all social indicators showed a significant independent effect, although the risk gradient for education remained strongest. Among women the gradient by education remained significant for all cancer sites, whereas the effect of both occupational class and housing lost significance, except for cervical cancer and, to a lesser extent, for breast cancer.

Conclusions: Socioeconomic inequalities in cancer incidence in Italy appear similar in magnitude and direction to those found in other western countries. Educational level, in general, is the socioeconomic indicator which shows a greater independent association with cancer incidence. These results suggest that unfavorable social circumstances early in the life course may have greater influence on cancer risk.

093 SOCIOECONOMIC DIFFERENCES IN STROKE INCIDENCE BY SUBTYPE AND GENDER IN ROME, 2001–4

G. Cesaroni, N. Agabiti, F. Forastiere, C. A. Perucci. Department of Epidemiology, Local Health Unit, Rome, Italy

Objective: Low socioeconomic position (SEP) is associated with overall stroke mortality rates; whether this is due to differences in stroke incidence or case fatality rates is less clear. We studied the relationship between SEP and stroke incidence (out of hospital deaths and hospitalised cases) by subtype (ischaemic and haemorrhagic).

Design: Population-based study.

Setting: Rome (Italy) 2001–4.

Participants: All 35–84 years old Rome residents who suffered from a first acute ischaemic (ICD-9-CM=434, 436, n=7734) or haemorrhagic stroke (ICD-9-CM=430–431, n=2623) in 2001–4. We linked hospital discharge abstracts and vital-status data.

Main Outcome Measures: Age-standardised rates of total incidence, out-of-hospital deaths, and hospitalisations were the outcome measures. SEP for each patient was inferred based on a five-level small area index (I least deprived, V most deprived). Poisson regression yielded age-adjusted rate ratios (RR) and 95% CI.

Results: First ischaemic stroke events in the study period were 7734 (6% out-of-hospital deaths, 94% hospitalised). Population incidence rates: 48×100 000 men, 29×100 000 women. The incidence of first ischaemic acute stroke, out-of-hospital deaths, and hospitalisations were statistically significant higher in men, and were higher in each successively disadvantaged group (SEP V vs SEP I: RR 1.66, 1.54, 1.76, respectively). An excess risk was found for more disadvantaged women compared to well-off counterparts for total incidence and hospitalisations (SEP V vs. SEP I: RR 1.67, 1.82, respectively), while no evidence of association was found between SEP and out-of-hospital deaths. First haemorrhagic stroke events were 2623 (8% out-of-hospital deaths, 92% hospitalisations). Population incidence rates: 17×100 000 men, 11×100 000 women. Among men, low SEP was associated with higher incidence, out-of-hospital deaths, and hospitalisations (SEP V vs SEP I: RR=1.49, 1.27, 1.52, respectively). Among women, the effects were slightly weaker (SEP V vs SEP I: RR=1.32 for incidence, and 1.40 for hospitalisations), while no effect was evident on out-of-hospital deaths.

Conclusions: Stroke incidence strongly differs between socioeconomic groups. While the higher risk of fatal out-of-hospital events among disadvantaged people may be related to greater disease severity, different access to high quality acute care services cannot be excluded as a potential mechanism.

094 INCREASING SOCIAL AND GEOGRAPHICAL INEQUALITIES OF ACUTE MYOCARDIAL INFARCTION INCIDENCE IN SCOTLAND, 1990–2 TO 2000–2

C. A. Davies, A. H. Leyland, R. Dundas. MRC Social and Public Health Sciences Unit, University of Glasgow, Glasgow, UK

Background: Ischaemic heart disease (IHD) is a leading cause of death in Scotland, and the Scottish IHD mortality rate is amongst the highest in Western Europe. Incidence and mortality have fallen over recent years; however, geographic variations and socioeconomic inequalities in IHD incidence and mortality still exist.

Objectives: To examine the changes in socioeconomic and geographic inequalities in incidence of acute myocardial infarction (AMI) in Scotland between 1990–2 and 2000–2.

Design: Linked hospital discharge and death records were used for the periods 1990–2 and 2000–2 for those aged 30+ years. Small area population estimates were available from the 1991 and 2001 Census. Area deprivation was measured using the 1991 and 2001 Carstairs Indexes.

Setting: Scotland, population 5.1 million.

Main Outcome Measures: Rate ratios (RR) of AMI incidence by area deprivation and age for men and women were estimated using multilevel Poisson modelling.

Results: During 1990–2 there were 72 358 people within 1010 postcode sectors in 32 local council areas (LCA) who had a first AMI event. The corresponding figure for 2000–2 was 52 813. Adjusting for area deprivation accounted for 61% of the geographic variability in AMI incidence rates in 1990–2 and 63% in 2000–2. In 1990–2 30% of the remaining variance was attributable to differences between LCAs. The corresponding figure for 2000–2 was 46%. There was a significant interaction between sex, deprivation and age group at both time points. The gradient across deprivation categories for male incidence in 1990–2 was most pronounced at younger ages; RR of AMI in the most deprived areas compared to the least was 2.38 (2.12–2.78) for those aged 30–44 years, 2.45 (2.14–2.80) for 45–59 years, 1.61 (1.46–1.78) for 60–74 years and 1.15 (1.02–1.29) for 75+. This association was evident in women but with stronger socioeconomic gradients; RRs for these age groups were 5.02 (2.52–10.0), 4.34 (3.42–5.53), 1.93 (1.69–2.20) and 1.17 (1.05–1.29). These inequalities had increased by 2000–2 for both sexes; for example, RR was 3.04 (2.59–3.58) for men and 5.50 (3.99–7.57) for women aged 45–59. Socioeconomic gradients also varied geographically and over time. The ratio of incidence in the most to least deprived areas for men aged 45–59 was 1.6 in 1990–2 and 3.1 in 2000–2 in Glasgow, but 2.6 at both times in Edinburgh.

Conclusions: Socioeconomic inequalities in AMI incidence have increased in Scotland. A substantial proportion of the geographic variation is between large areas suggesting strong regional patterning. Socioeconomic inequalities are greatest in young women.

Vascular diseases I

095 ASSOCIATION OF C-REACTIVE PROTEIN AND HEART RATE VARIABILITY IN AN ELDERLY GENERAL POPULATION

A. Kluttig¹, K. H. Greiser¹, B. Schumann¹, O. Kuss¹, J. A. Kors², C. A. Swenne³, J. Haerting¹. ¹Institute of Medical Epidemiology, Biostatistics and Informatics, Martin-Luther-University Halle-Wittenberg, Germany; ²Department of Medical Informatics, Erasmus University Medical Centre, Rotterdam, The Netherlands; ³Department of Cardiology, Leiden University Medical Centre, The Netherlands

Background: Reduced heart rate variability (HRV) and inflammatory markers are both associated with an increased mortality, morbidity and a worse prognosis of cardiovascular disease (CVD). Whether they are on a common causal pathway is unclear. To date, only few studies examined the association of HRV and inflammatory markers, and none of these used short-term HRV measures. However, recent observations suggest that standardised short-term recordings of heart rate dynamics may better reflect abnormalities in the intrinsic autonomic regulatory system and the associated risk of mortality than long-term HRV measures.

Objective: The aim of the study was to investigate the association of time- and frequency-domain parameters of HRV with high-sensitive C-reactive protein (CRP) as an inflammatory marker in an elderly general German population.

Methods: This analysis is based on data of 1779 participants (45–83 years) of the baseline investigation of the CARLA Study. Standard deviation of normal to normal intervals (SDNN), high-frequency power (HF), low-frequency power (LF) and LF/HF ratio were computed from stationary 5-min segments of highly standardised 20-min resting ECGs recorded under controlled conditions. Linear regression modelling was used to analyse the association of CRP with HRV, adjusted for age, CVD status, diabetes mellitus, systolic blood pressure, medical treatment, tobacco use, education and physical activity.

Results: We found weak inverse age-adjusted associations between CRP level and SDNN, LF and LF/HF ratio in men, but not in women. After multivariate adjustment only the inverse association of LF/HF ratio with CRP was statistically significant in both sexes. The multivariate adjusted means (95% CI) of LF/HF ratio for CRP-quartiles were 1.8 (1.6 to 2.1), 1.7 (1.5 to 1.9), 1.5 (1.3 to 1.6) and 1.3 (1.2 to 1.5) for men, and 1.2 (1.0 to 1.3), 1.1 (0.9 to 1.2), 1.0 (0.9 to 1.1) and 0.9 (0.8 to 1.0) for women. To

examine effect modification by health status, we repeated the analyses separately for subjects with and without apparent CVD or diabetes mellitus. Only the inverse association of CRP with LF/HF ratio remained stable and statistically significant in the subgroup analyses.

Discussion/Conclusion: A reduced HRV is weakly associated with the inflammatory marker CRP. In our analysis, especially the LF/HF ratio correlated with CRP, suggesting a possible pathophysiological link between inflammatory activity and a shift in the frequency spectrum toward higher frequency components. Lowered baroreflex sensitivity may have caused this HRV change. Whether an altered HRV and an altered CRP are causally related or whether both are caused by an independent unknown factor remains to be explored in a follow-up investigation.

096 C-REACTIVE PROTEIN, VASCULAR DISEASE RISK AND CHOLESTEROL REDUCTION AMONG 18 540 PATIENTS IN THE MRC/BHF HEART PROTECTION STUDY

E. Link, S. Parish, J. Armitage, R. Collins, on behalf of the Heart Protection Study Collaborative Group. CTSU, University of Oxford, Oxford, UK

Objective: To assess the ability of C-reactive protein (CRP) to predict vascular events in high-risk people, and to confirm whether statins are beneficial in those with low CRP.

Participants: The Heart Protection Study (HPS) in 20 536 UK adults (aged 40–80 years) with coronary disease, other occlusive arterial disease, or diabetes randomised participants to take simvastatin 40 mg daily or placebo for an average of five years. CRP was measured in 18 540 (90%) participants at baseline. Additional follow-up to record major events (for example, hospitalisation, death) and statin use for a further four years occurred.

Methods: Analyses of risk were conducted using Cox regressions with log CRP. Associations of log CRP with major coronary events (MCE: non-fatal MI or coronary death) (n=3565), major vascular events (MVE: MCE, stroke or revascularisation) (n=6800), strokes (n=1580), deaths from vascular (n=3237) and non-vascular (n=2365) causes are reported.

Results: During the scheduled treatment period, statin use yielded a 1 mmol/l difference in LDL cholesterol. Throughout the post-trial period statin use was similar in the two randomised groups. Using the in-trial and post-trial data, baseline CRP was strongly predictive of future vascular events independently of other characteristics. Compared to participants in the lowest CRP quintile (age-sex adjusted CRP <1.32 mg/l), those in the highest quintile (>6.84 mg/l) had relative risks adjusted for known risk factors for MVE of 1.44 (95% CI 1.36 to 1.51), for MCE of 1.55 (1.45 to 1.66), for stroke of 1.55 (1.39 to 1.72), for vascular death of 1.83 (1.71 to 1.97) and for non-vascular death of 1.69 (1.55 to 1.84) (all p<0.0001). During the scheduled treatment period, the benefit of statins on MCE and MVE were similar in each CRP quintile, and similar to the overall observed effect in HPS (reduction in MVE of 24% (19 to 28), p<0.0001). There were no significant differences in the relative benefit of statin treatment for MVE in the four groups defined by high and low LDL-cholesterol (< vs ≥3.86 mmol/l (149 mg/dl)) and high and low CRP (< vs ≥1.6 mg/l).

Conclusions: CRP predicts risk of cardiovascular events, vascular and non-vascular mortality independently of other risk factors. Statin therapy is effective in preventing coronary events irrespective of the level of CRP.

097 BIOMARKERS OF INFLAMMATION PREDICT BOTH VASCULAR AND NON-VASCULAR MORTALITY IN OLDER PEOPLE

J. Emberson¹, R. Clarke¹, E. Breeze², J. Casas³, S. Parish¹, A. Hingorani², A. Fletcher³, R. Collins¹, L. Smeeth². ¹Clinical Trial Service Unit and Epidemiological Studies Unit, Richard Doll Building, University of Oxford; ²Department of Epidemiology and Public Health, University College London Medical School; ³London School of Hygiene and Tropical Medicine, UK

Context: Many diseases of old age share a chronic inflammatory component, hence biomarkers such as C-reactive protein (CRP) may be associated with both vascular and non-vascular mortality.

Aim: To compare the independent relevance of biomarkers of inflammation with blood lipids for prediction of vascular and non-vascular mortality in older people.

Design, Setting and Participants: Seven-year follow-up of 5360 older men (mean age 77 years) living in the UK, involving 853 vascular and 1106 non-vascular deaths.

Main Outcome: Mortality associations with log C-reactive protein (lnCRP), fibrinogen, albumin, and total/HDL-cholesterol in men taking account of self-reported prior disease.

Results: CRP, fibrinogen and total/HDL-C were positively associated, and albumin was inversely associated, with vascular mortality both in men with and without prior disease. In all men, after adjustment for age and other vascular risk factors except lipids, lnCRP was more strongly associated with vascular mortality than was total/HDL-C (hazard ratio, HR 1.92 per 2 SD; (95% CI 1.62 to 2.28) vs 1.30 (1.13 to 1.50)). Albumin also displayed a strong relationship (HR 0.51 (0.42 to 0.62)), as did fibrinogen (HR 1.50 (1.26 to 1.79)). After additional adjustment for blood lipids and other markers of inflammation, both lnCRP (HR 1.60 (1.29 to 1.97)) and albumin (HR 0.61 (0.49 to 0.75)) were still strongly associated with vascular mortality, but fibrinogen was not (HR 1.01 (0.82 to 1.24)). 2 SD higher lnCRP and albumin levels were also associated with an approximate doubling and halving of non-vascular mortality, respectively. The probability of surviving from age 70 to age 80 with or without elevated CRP > 3 mg/l was 77% vs 89%, respectively, in men without prior disease; and 58% vs 72% in men with prior disease.

Conclusions: Biomarkers of inflammation were strongly associated with both vascular and non-vascular mortality in old age and the associations with vascular mortality were stronger than those with blood lipids.

098 HOW MUCH OF THE RECENT DECLINE IN MYOCARDIAL INFARCTION (MI) INCIDENCE IN BRITISH MEN CAN CHANGES IN CARDIOVASCULAR RISK FACTORS EXPLAIN?

S. Hardoon¹, P. Whincup², L. Lennon¹, G. Wannamethee¹, S. Capewell³, R. Morris¹. ¹Department of Primary Care & Population Sciences, UCL, London; ²Division of Community Health Sciences, St George's, University of London, London; ³Division of Public Health, University of Liverpool, Liverpool, UK

Background: The incidence of myocardial infarction (MI) in Britain has fallen markedly in recent years. Few studies have investigated the cause of this decline, and none using individual level data.

Objective: To investigate how much of the recent decline in MI incidence in British men can be explained by concurrent changes in cardiovascular risk factors in this population.

Design: Prospective cohort study using individual level data.

Setting: General Practices in 24 British towns.

Participants: Socially and geographically representative sample of 7735 men aged 40–59 at baseline (1978–80). Men reporting a prior MI at baseline were excluded.

Methods: Over a 20-year period to 2000, study men were examined twice and completed five lifestyle questionnaires, providing repeated information on key risk factors. They were followed up for MI (fatal and non-fatal) over 25 years. Cox regression with time-updated covariates gave estimates of the change in the hazard of experiencing a first MI over this time and the contribution of trends in each risk factor to this change.

Results: The age-adjusted hazard of MI decreased by 2.8% (95% CI 1.1 to 4.5), $p < 0.001$ per annum, corresponding to a 51% decline over 25 years. In the 20 years from baseline, after adjustment for age, cigarette smoking prevalence fell by three-quarters, mean systolic blood pressure (SBP) fell by 6.4 mmHg (4.2 to 8.7), non-HDL cholesterol fell by 0.32 mmol/l (0.20 to 0.43), HDL cholesterol rose by 0.16 mmol/l (0.12 to 0.19) and body mass index (BMI) rose by 1.72 kg/m² (1.43 to 1.99). Physical activity levels increased, whilst there was no significant change in alcohol consumption. 61% (35 to 164) of the decline in MI could be statistically explained by the risk factor changes combined. The fall in cigarette smoking explained the greatest single part of the decline in MI (37%), followed by the changes in HDL cholesterol, non-HDL cholesterol and SBP. Physical activity and alcohol consumption had little influence, whilst the increase in BMI would have produced a rise in the risk of MI.

Conclusions: Modest favourable changes in the major cardiovascular risk factors appear to have contributed to considerable reductions in MI incidence. This highlights the potential value of population-wide measures to reduce exposure to these risk factors in the prevention of coronary heart disease.

099 CHOLESTEROL FRACTIONS AND APOLIPOPROTEINS AS RISK FACTORS FOR HEART DISEASE MORTALITY IN OLDER MEN

R. Clarke¹, J. Emberson¹, S. Parish¹, A. Palmer¹, M. Shipley², P. Linksted¹, P. Sherliker¹, S. Clark¹, J. Armitage¹, A. Fletcher³, R. Collins¹. ¹Clinical Trial Service Unit and Epidemiological Studies Unit, University of Oxford; ²Department of Epidemiology and Public Health, University College London Medical School; ³London School of Hygiene and Tropical Medicine, UK

Context: The relevance of blood lipids as risk factors for ischaemic heart disease (IHD) in older people is uncertain and hence cholesterol-lowering therapy is not routinely prescribed in the elderly.

Objective: To assess IHD mortality associations with plasma levels of total cholesterol, LDL-cholesterol (LDL-C), HDL-cholesterol (HDL-C), apolipoprotein B (Apo B), and apolipoprotein A₁ (Apo A₁), when measured in older men (aged 66 to 96 years).

Design: Prospective study.

Setting: Seven-year follow-up of a cohort of 5344 men (mean age 77 years), including 74% without diagnosed cardiovascular disease (CVD) or statin use, and 26% with CVD or statin use.

Participants: Re-survey of surviving participants in 1970 Whitehall study of London Civil servants.

Main Outcome Measure: Hazard ratios (HR) for IHD deaths ($n = 447$) were estimated for a 2 standard deviation difference in usual plasma lipids with or without stratification for prior diagnosis of CVD.

Results: IHD mortality was not significantly associated with total cholesterol in all men (HR 1.05), but a significant positive association in men without CVD and a slight, non-significant inverse association in men with CVD was observed (HR 1.47 vs 0.84). The patterns were similar for LDL-C (HR 1.50 vs 0.98) and Apo B (HR 1.68 vs 0.93). IHD risks were inversely associated with HDL and with Apo A₁ in men with and without CVD. IHD risks were strongly associated with total/HDL-C (HR 1.57) and Apo B/Apo A₁ (HR 1.54), and remained strongly related at all ages.

Conclusion: Blood lipids other than total cholesterol were associated with IHD in older men. Differences in lipids that are achievable by statins were associated with about one-third lower risk of IHD, irrespective of age.

Health services research

100 CONTEXTUAL DETERMINANTS OF DOCTORS' PROPENSITY TO ADOPT AND PRESCRIBE A NEW STATIN (ROSUVASTATIN): A MULTILEVEL ANALYSIS USING GEE-ALR METHODOLOGY

H. Ohlsson, J. Merlo. *Social Epidemiology and Health Economics, Department of Clinical Sciences, Lund University, Malmö, Sweden*

Objective: Drug expenditure is increasing rapidly in relation to overall health care costs. A greater variety and availability of new expensive drugs is one of the key factors behind this increase. Adopting a new drug could be appropriate for the health of the patient and cost-effective for the community. It can also express the belief that new drugs are always better than the older. However when the same pharmacological therapy is available as different brands at different prices and the prescriber selects the more costly, there are reasons to question the suitability of the observed practice variation. It could also express differences in information and knowledge, and the adoption time might vary between practitioners. In turn, the process of prescription of a new drug could be influenced by contextual factors at the health care centre where the physician works. The objective of this paper was to investigate the relevance of the outpatient healthcare centres (HCC) for understanding doctors' propensity to adopt a new statin (that is, Rosuvastatin).

Participants: All patients in the county of Scania, Sweden, that received a statin prescription from July 2003 (that is, the date when rosuvastatin was included in the Swedish reimbursement system) to December 2004.

Design: The data were hierarchically structured with 110 253 prescriptions to patients (first level) nested within 175 HCCs (second level). Therefore, we apply generalised estimation equations (GEE) and alternating logistic regression (ALR). We calculated pair-wise odds ratio (PWOR) for measuring the similarity in Rosuvastatin prescription within HCCs. The analysis were stratified in six consecutive periods of three months.

Results: Despite low prevalence of Rosuvastatin prescriptions (1.8% of all statin prescriptions), after nine months almost 50% of the HCCs had adopted the new statin. The PWOR indicates that prescriptions of Rosuvastatin co-occurs within HCCs approximately three times more often during the first period than one would expect if it were distributed randomly across HCCs and this clustering continued being high for all observation periods (PWOR > 2.5). The probability of prescribing Rosuvastatin was almost four times higher in private than in public administrated HCCs.

Conclusion: Contextual factors (for example, therapeutic traditions) at the HCC might be relevant for understanding doctors' propensity to adopt and prescribe a new statin (Rosuvastatin), especially in the private sector. The GEE-ALR and PWOR methodologies seem useful for investigating determinants of prescription at different levels of analysis.

101 HEALTH SERVICE IMPLICATIONS OF DIFFERING PSA TESTING GUIDELINES

A. Black¹, D. Connolly², A. Gavin³, P. F. Keane², L. J. Murray¹. ¹Cancer Epidemiology & Prevention Research Group, Centre for Clinical and Population Sciences, Queen's University Belfast; ²Department of Urology, Belfast City Hospital; ³Northern Ireland Cancer Registry, Queen's University Belfast, Northern Ireland

Background: As PSA screening for prostate cancer is not recommended in the UK, the Prostate Cancer Risk Management Programme (PCRMP) was introduced to provide balanced information to men regarding the advantages and disadvantages of PSA testing. Traditionally, as PSA increases with age, age-specific reference ranges for PSA have been used to recommend further investigation. As interim guidance, the PCRMP have recommended the use of new (and lower) age-specific PSA cut-off values for referral. The PSA threshold at which biopsy is recommended will dictate the number of biopsies required to be performed and ultimately the burden of prostate referrals on the NHS. We assessed and compared the role of traditional age-specific PSA values, the PCRMP cut-off values, and a single cut-off of 4.0 ng/ml in a population based cohort.

Methods: PSA results from all men in Northern Ireland are maintained on a confidential electronic database by the Northern Ireland Cancer Registry (NICR). These data are linked to the NICR database of incident cancers occurring within the region. Men who had their first PSA test between 1 January 1994 and 31 December 2000 were included. These men were followed for a diagnosis of prostate cancer until 31 December, 2003

Results: 96 304 men were included, with 3530 (3.7%) diagnosed with prostate cancer. 18 008 men aged 60 years and over had an initial PSA ≥ 4 ng/ml. Of these men, 2734 were diagnosed with prostate cancer. When the PCRMP guideline thresholds were applied, 15 740 had a PSA greater than their age-specific values of whom 2678 were diagnosed with cancer. Using the traditional cut-points, 12 673 men had a PSA greater than their age-specific value and 2575 cancers were diagnosed. In men aged less than 60 years, using the PCRMP guidelines, twice as many men were above the age-specific thresholds compared to a cut-point of 4 ng/ml (3869 vs 1951). Using a PSA cut-off of 4 ng/ml, 294 men were diagnosed with cancer. The lower PCRMP cut-points predicted 326 prostate cancers. Using the traditional age-specific values, 2714 men exceeded the threshold and 316 cancers were predicted.

Conclusions: Lowering the PSA cut-off values would result in a substantially greater number of men referred for biopsy but this would yield relatively few extra prostate cancers. When establishing workable and practical guidelines it is important to consider the potential increased burden of biopsy referrals on the NHS and to balance the need to detect clinically significant prostate cancers with reducing unnecessary prostate biopsies.

102 BIAS IN NON-RANDOMISED EVALUATIONS OF SERVICE DEVELOPMENTS: A CASE STUDY FROM THE INTRODUCTION OF CRITICAL CARE OUTREACH SERVICES

D. Harrison, H. Gao, C. Welch, K. Rowan. *Intensive Care National Audit & Research Centre, London, UK*

Background: In 2002, critical care outreach services (CCOS) were introduced despite no evidence for their effectiveness. In 2004, the NHS SDO R&D Programme commissioned an evaluation of CCOS and, by this time, a randomised controlled trial was infeasible so a mixed-methods approach, including a non-randomised matched cohort analysis, was undertaken.

Methods: During a one-year period, 52 hospitals collected prospective data on all CCOS visits and these were linked to the same patients in the Case Mix Programme Database of ICU admissions. Patients visited by the CCOS post-discharge from ICU (cases) were matched 1:1 with controls from three pools: (1) patients discharged from the same ICU during the study period but without a CCOS visit; (2) patients discharged from the same ICU but prior to the introduction of CCOS; (3) patients discharged from an ICU in a hospital with no CCOS. Matching was based on patient characteristics at ICU admission.

Results: 6150 cases were identified. From match (1), CCOS post-discharge was not associated with differences in hospital mortality (risk ratio 1.08, 95% CI 0.94 to 1.25) or post-discharge hospital stay (mean difference +0.5 days, -0.5 to +1.6) and was associated with significantly increased cost per patient (mean difference +£688, +£245 to +£1132). In contrast, for matches (2) and (3), CCOS post-discharge was associated with decreased hospital mortality (0.88, 0.77 to 1.00, and 0.89, 0.81 to 0.99) and shorter hospital stay (-3.3 days, -4.4 to -2.1, and -2.9 days,

-3.8 to -2.0), which offset the cost of CCOS (-£322, -£825 to +£180, and -£277, -£623 to +£68).

Discussion: Non-randomised comparisons suffer from different types and different degrees of bias. Matched analyses attempt to reduce bias by identifying a control population similar to the cases in every respect except treatment. Success depends on the ability to match on all factors relating to the treatment decision. We anticipated that selection bias would be strongest in match (1), as an active decision was made not to visit the controls post-discharge. However in matches (2) and (3), CCOS visits were unavailable but additional historic (2) and quality of care (3) biases may exist. In three matched comparisons, if one match is deemed, a priori, to be subject to a greater degree of bias and the other two matches give consistent results, does this aid or hinder interpretation?

103 PATTERNS OF CARE FOR COLORECTAL CANCER IN IRELAND: FACTORS PREDICTING RECEIPT OF TREATMENT AND MORTALITY IN A LARGE, POPULATION-BASED SERIES

A-E. Carsin¹, A. Ó. Céilleachair¹, D. P. Cronin², L. Sharp¹. ¹National Cancer Registry Ireland, Elm Court, Boreenmanna Road, Cork, Ireland; ²Department of Clinical Epidemiology, Aarhus University Hospital, Aarhus, Denmark

Objective: To investigate the factors predicting receipt of treatment and mortality amongst colorectal cancer (CRC) patients in Ireland.

Design: A population-based study of incident CRC, followed-up from diagnosis to death or 31 December 2004. Factors associated with treatment receipt within one year of diagnosis, overall and separately by stage, were investigated using logistic regression. Factors associated with all-cause mortality were investigated using Cox proportional hazards methods.

Setting: Republic of Ireland.

Subjects: 15 249 individuals with primary colorectal cancer (ICD-10 C18.0-C20.0), diagnosed 1994-2002, and registered with the National Cancer Registry.

Main Outcome Measures: Proportions receiving any surgery, any chemotherapy or any radiotherapy; odds ratios; hazard ratios.

Results: Overall 78% of patients underwent cancer-directed surgery (79% of colon; 76% of rectal cancers), 31% had chemotherapy, (similar for colon and rectal tumours) and 13% radiotherapy (4% of colon and 28% of rectal). More than 96% of tumours staged I, II or III had surgery. In total 2526 patients (17%) received no-cancer directed treatment; almost all of them stage IV (45%) or unstaged tumours (50%). Over time, the proportions receiving chemotherapy increases significantly for all stages as did the proportion having radiotherapy for rectal cancer. Older, unmarried patients, with stage IV or unknown disease were significantly ($p < 0.05$) less likely to receive cancer-directed surgery. Women with stage I CRC were significantly less likely to receive chemotherapy than men with same stage ($p = 0.03$), and women with rectal cancer were less likely to have radiotherapy ($p = 0.003$). Five-year survival was 72%, 60%, 44%, 7% and 42% for stage I, II, III, IV and unstaged tumours, respectively. Male, older and not married patients had a significantly higher risk of death. Stage III and IV CRC was associated with an increased mortality.

Conclusions: In this population-based setting, use of adjuvant cancer-directed therapy increased significantly over time. Patient-related factors predicted the likelihood of treatment and mortality. If such disparities were addressed, this might bring about improvements in terms of survival and mortality rates for CRC.

104 THE COST-EFFECTIVENESS OF HOME-BASED POPULATION SCREENING FOR CHLAMYDIA TRACHOMATIS IN THE UK: ECONOMIC EVALUATION OF THE CHLAMYDIA SCREENING STUDIES (CLASS) PROJECT

T. E. Roberts¹, S. Robinson¹, P. M. Barton¹, S. Bryan¹, A. McCarthy², J. Macleod³, M. Egger⁴, N. Low⁴, for the Chlamydia Screening Studies (CLASS) Project Group. ¹Health Economics Facility, HSMC, University of Birmingham, UK; ²Department of Community Based Medicine, University of Bristol, UK; ³Department of Primary Care and General Practice, University of Birmingham, UK; ⁴Department of Social and Preventive Medicine, University of Berne, Switzerland

Background: *Chlamydia trachomatis* is the commonest reported sexually transmissible infection in developed countries. Most published economic evaluations suggest screening for chlamydia is cost-effective but the validity of this conclusion is in doubt. We have shown, in a systematic review, that most studies used the wrong modelling approach and some unrealistic

assumptions for this disease. The National Chlamydia Screening Programme offers opportunistic screening to sexually active women and men and is currently being rolled out across England.

Objective: To investigate the cost-effectiveness of proactive screening for *Chlamydia trachomatis* compared to a policy of no organised screening in the UK.

Design: Economic evaluation based on original data from a prospective project based on proactive register-based screening using home-collected and mailed specimens. Cost data were collected as part of the project. A transmission dynamic mathematical model was used to examine the impact of the screening intervention.

Setting: Central and South West England.

Participants: Hypothetical population of 50 000 men and women in which all women and men aged 16–24 years were invited to be screened each year.

Main Outcome Measures: Cost in 2005 pounds Sterling per major outcome averted, defined as pelvic inflammatory disease, ectopic pregnancy or infertility and neonatal complications. The results are presented as incremental cost-effectiveness ratios (ICER) which present the cost per additional major outcome averted of proactive population screening compared to a policy of no organised screening.

Results: The incremental cost per major outcome averted for a programme of screening women only after eight years of screening was £19,300, compared to no organised screening. For a programme screening both males and females, the incremental cost effectiveness ratio was approximately £24,900. Pelvic inflammatory disease requiring hospitalisation was the most frequently averted major outcome. The model was highly sensitive to the incidence of major outcomes and screening uptake. When both were increased the cost effectiveness ratio fell to £5400 per major outcome averted for screening women only.

Conclusions: Our evaluation of proactive population Chlamydia screening, using a dynamic model, incorporating realistic estimates of partner notification, the uptake of screening and the incidence of severe complications, has shown it to be an expensive intervention which probably does not represent good value for money. The results based on our data are relevant to discussions about the cost-effectiveness of the opportunistic model of Chlamydia screening currently being introduced in England.

Work and health

105 SOCIOECONOMIC POSITION AND LOW BACK PAIN, THE ROLE OF BIOMECHANICAL STRAINS AND PSYCHOSOCIAL WORK FACTORS

S. Plouvier^{1,2}, A. Leclerc^{1,2}, S. Bonenfant³, J. F. Chastang^{1,2}, M. Goldberg^{1,2}. ¹INSERM, U687; ²Université Paris XI, IFR69; ³CETAF-RPPC, INSERM U687, France

Objective: To analyse the contribution of biomechanical strains and psychosocial work factors to occupational class disparities for low back pain (LBP) in the GAZEL cohort.

Methods: The study population comprised 1487 men from the GAZEL-LBP sub-project, who had also completed a questionnaire in 1997 on psychosocial work factors assessed by the job strain model, and a questionnaire which included a French version of the Nordic questionnaire for assessment of LBP in 2001. All those subjects had also completed in 1996 a questionnaire on past occupational exposures which included the number of years of exposure in the past, for three biomechanical strains specific for LBP (manual material handling, bending/twisting, driving). The associations between LBP lasting more than 30 days in the 12 months of 2000, and social position in the company in 1989 (four categories according to the French classification) were analysed using a Cox model. First, relative risks for the social position were computed, professionals being the reference group. The contribution of biomechanical strains and psychosocial factors to these relative risks was then estimated by comparing relative risks adjusted and non-adjusted for these factors.

Results: Prevalence of LBP lasting more than 30 days was 14% in the whole population. The proportion of the relative risk for blue-collar workers compared to professionals which could be associated with biomechanical strains was higher than 70%; the corresponding figure for psychosocial work factors was 11%. For clerks, the figures were 45% for biomechanical strains and 11% for psychosocial work factors. Additional analyses for a larger sample (including also those with missing data for psychosocial factors, mainly because they were retired in 1997) were conducted in order

to validate the results on the role of biomechanical strains in a slightly different population.

Discussion/Conclusion: In this population, exposure to biomechanical strains seems to have an important role in occupational class disparities. The role of physical risk factors might have been underestimated in previous studies, due to a lack of precision in exposure assessment or a lack of precision for the health outcome.

106 "A HARD DAY'S NIGHT"? THE EFFECTS OF COMPRESSED WORK WEEK INTERVENTIONS ON THE HEALTH AND WORK-LIFE BALANCE OF SHIFT WORKERS: A SYSTEMATIC REVIEW

C. Bamba¹, M. Petticrew², M. Whitehead³, A. Sowden⁴, J. Akers⁴. ¹Centre for Public Policy and Health, Durham University; ²MRC Social and Public Health Sciences Unit, Glasgow; ³Division of Public Health, University of Liverpool; ⁴Centre for Reviews and Dissemination, University of York, UK

Background: The workplace is increasingly being recognised by policy-makers as an important intervention point at which health can be improved and health inequalities reduced. There is a largely untapped literature which describes the (often negative) effects of shift work on health and wellbeing. Shift work may therefore be an important, but largely overlooked determinant of health and wellbeing for many workers. Changes to the organisation of shift work therefore have the potential to reduce negative health effects and perhaps also impact upon social inequalities. A popular organisational level intervention is the Compressed Work Week, an alternative work schedule in which the hours worked per day are increased whilst the days worked are decreased.

Objective: To systematically review primary studies in any language on the effects of Compressed Work Week interventions on the health and work-life balance of shift workers, and to identify any differential impacts by socioeconomic status.

Design: Systematic review. Following QUORUM guidelines we searched electronic databases, websites and bibliographies for published or unpublished experimental and quasi-experimental studies that evaluated the effects of Compressed Work Week interventions on the health and work-life balance of shift workers.

Data Sources: Twenty seven electronic databases (medical, social science and economic), bibliographies, and expert contacts.

Results: Forty studies were found. Compressed Work Week interventions did not always improve the health of shift workers, but they were seldom detrimental. However, the interventions generally improved work-life balance. There were few effects on organisational outcomes. No studies reported on the effects of the interventions on socioeconomic inequalities in health.

Conclusion: This systematic review suggests that the Compressed Work Week considerably improves the work-life balance of shift workers, and it appears to do so with little or no adverse effects on health or organisational outcomes. This should be taken into consideration by those policymakers and practitioners charged with creating healthier workplaces. However, further research is needed into the effects of such interventions on socioeconomic inequalities in health.

107 OCCUPATIONAL EXPOSURE TO PESTICIDES AND RISK OF TESTICULAR CANCER

N. Schmeißer¹, C. Baumgardt-Elms², K.-H. Jöckel³, A. Stang⁴, C. Stegmaier⁵, T. Behrens¹, W. Ahrens¹. ¹Bremen Institute for Prevention Research and Social Medicine (BIPS), University of Bremen; ²Authority for Social Affairs, Family, Health and Consumer Protection, Hamburg; ³Institute for Medical Informatics, Biometry and Epidemiology, University Clinics Essen; ⁴Institute for Medical Epidemiology, Biometry und Informatics (IMEBI), Martin-Luther-University Halle; ⁵Cancer Registry Saarland, Saarbrücken, Germany

Objective: To investigate the association between occupational pesticide exposure and the risk of testicular cancer.

Design: Population-based national multicentre case-control-study.

Setting: Germany.

Participants: Incident cases were reported through an active reporting system of clinical and pathological departments in the study regions (cities of Bremen, Essen, Hamburg and the Saarland). 269 (99 non-seminoma; 170 seminoma) of 353 eligible cases of confirmed testicular cancer were interviewed. 797 matched by five-year age group and study centre were selected from residential registries.

Outcome Measure: Odds ratios and 95% confidence intervals.

Statistical Analysis: Conditional logistic regression adjusted for cryptorchidism.

Results: Low prevalences for pesticide exposure were reported in both groups (cases: 5.20%; controls: 4.14%). The adjusted odds ratio for ever use of pesticides was marginally elevated (OR 1.31; 95% CI 0.77 to 2.25). The highest risk was found among men first exposed after 1985 (OR 2.26; 95% CI 1.00 to 5.10) and among men first exposed after age 22 (OR 2.37; 95% CI 1.11 to 5.06). Use of insecticides only showed an OR of 2.19 95% CI 0.90 to 5.31, whereas no elevated risks were observed with the use of other types of pesticides. Quantifying exposure by using the EUROPOEM database and take into account application mode and use of personal protective device, a positive dose-response relationship for cumulative exposure to pesticides was implied. However in the original data no evidence was found of an increase in risk with increasing duration of lifetime exposure to pesticides.

Conclusion: Our results indicate that exposure to pesticides is a potential risk factor for the occurrence of testicular cancer.

108 ASSESSING WORKLOAD AMONG GPs AND PRACTICE NURSES BEFORE AND AFTER THE INTRODUCTION OF THE PAY-FOR-PERFORMANCE CONTRACT FOR GPs IN ENGLAND

I. Gemmell, S. Campbell, M. Hann, D. Whalley, B. Sibbald. *National Primary Care Research and Development Centre, University of Manchester, UK*

Background: In 2004 the UK government introduced a new pay-for-performance contract for general practitioners (GPs) in England. It is anticipated that such a scheme, increasingly adopted in many countries, could lead to changes in the way work is structured and distributed across the general practice team.

Aim: To describe changes in team size, composition, workload and work allocation within general practice teams between 2003 and 2005.

Design: Before and after study.

Setting: Forty two general practices in England.

Methods: Workload diaries were completed by GPs and nurses in each practice for a one week period. Changes in the volume and distribution of workload were analysed at the practice level using the Wilcoxon signed rank test. Changes in severity and complexity of consultations were assessed using χ^2 tests. The z test for comparison of proportions was used to analyse patterns of testing and referral.

Results: The number of hours worked in general practice by nurses and GPs increased between 2003 and 2005 but there was no change in the hours spent on direct or indirect care. The proportion of problems classified by GPs as chronic or prevention increased after the introduction of the new GMS contract (χ^2 42.74, $p < 0.001$) and although the total number of problems seen by nurses increased by 40% there was no change in the type of problem dealt with by nurses. Nurses were more likely to describe their consultations as complex or very complex in 2005 compared to 2003 (χ^2 30.70, $p < 0.001$) but there was no change in the complexity of consultations dealt with by GPs.

Conclusion: The findings suggest that general practices may have responded to the 2004 GP contract by increasing the staffing levels of both GPs and nurses, with nurses absorbing a higher proportion of the extra workload than GPs.

109 MODE OF EXPOSURE TO ASBESTOS IN MESOTHELIOMA CLUSTERS

S. McPhail, A. Evans, A. Pring, J. Verne. *South West Public Health Observatory, Bristol, UK*

Background: There are several large clusters of mesothelioma known to be associated with ship-building and other industries in the South West of England.

Objectives: This study investigates the mode of exposure to asbestos and occupational patterns in males and females in these clusters.

Design: Cases of mesothelioma diagnosed between 1980 and 2004, were selected from the regional cancer registry database. A GIS analysis used to define the boundaries and size of each cluster. The incidence rates for each cluster were modelled by age-band and birth cohort and the gender ratio of each cluster examined. Death certificate data were used to obtain information on occupations for individuals dying between 1999 and 2005. These were classified into broad occupational categories for comparison between the sexes.

Results: All but one cluster of male cases have a associated female cluster with an average male:female ratio of approximately 7:1. While this appears to indicate a common exposure for each gender the occupation patterns for male and female mesothelioma deaths are very different. The occupations of males who died of mesothelioma were predominantly in the engineering and construction (45%) and manufacturing and manual (23%)

sectors, whereas for females who died of mesothelioma they were the service (38%) and office and professional (30%) sectors. However the occupations of husbands of female mesothelioma deaths followed a similar pattern to those of male mesothelioma deaths. Moreover, the only male cluster without an associated female cluster occurred in a port city known to provide a laundry service for its workers.

Conclusions: The patterns suggest a link between the development of mesothelioma in a female and the occupation of her husband. This may be explained by exposure to asbestos trapped in work clothing brought home by her spouse.

Mental health

100 HIGH INCOME, EMPLOYMENT, POSTGRADUATE EDUCATION AND MARRIAGE: A SUICIDAL COCKTAIL AMONG PSYCHIATRIC PATIENTS?

E. Agerbo. *National Centre for Register-based Research, University of Aarhus, Denmark*

Background: Studies dating back over 100 years have shown that the risk of suicide in the general population is associated with low income, unemployment, educational underachievement and singleness. However, little is known about the association between suicide risk and these factors in psychiatric patients.

Objective: To estimate the association between suicide risk, socioeconomic position and marital status in psychiatric patients.

Design, Setting and Patients: Population-based cohort study of all first-ever psychiatric patients aged 16–65 years admitted during 1981–98 with administrative longitudinal data on income, labour market affiliation, educational attainment, marital and cohabitational status (patients = 96 369, admissions = 256 619, suicides = 2727).

Main Outcome Measures: Suicide risks after hospital discharge were depicted using Kaplan-Meier product-limit methods. Hazard ratios for suicide from Cox regression and case-crossover/individually stratified analyses were calculated while adjusting for overall social drift.

Results: Using Cox regression, compared with patients in the highest income quartile, the suicide hazard ratio (HR) fell from 0.90 (95% CI 0.79 to 1.02) in the third, to 0.83 (0.73 to 0.93) in the second lowest, and 0.68 (0.61 to 0.76) in the lowest income group. The HR for unemployed patients was 0.85 (0.77 to 0.93); for social benefits recipients 0.58 (0.48 to 0.70); disability pensioners 0.63 (0.55 to 0.71) compared with the fully employed. Compared with postgraduate education, HRs associated with bachelor, vocational or primary school education were 0.82 (0.67 to 1.02), 0.66 (0.55 to 0.80) and 0.54 (0.44 to 0.65). HRs for widowed, divorced and never married patients were 1.07 (0.89 to 1.30), 0.74 (0.66 to 0.84) and 0.88 (0.79 to 0.98). Using individually stratified analyses, HRs for transition into the third, the second and lowest income quartile were 1.19 (0.76 to 1.86), 1.47 (0.92 to 2.34) and 1.84 (1.14 to 2.97). HRs for patients who became unemployed, social benefits recipients, disability pensioners, widowed and divorced were 1.41 (1.01 to 1.95), 1.73 (1.06 to 2.80), 1.45 (0.91 to 2.30), 2.59 (0.76 to 8.89) and 1.86 (1.07 to 3.21).

Conclusions: Suicide risk is generally associated with low income, unemployment, educational underachievement and singleness, but this study suggests that the opposite is true among psychiatric patients. However, loss of income, labour market status and marriage increase the suicide risk.

111 IS YOUNG PEOPLE'S PERSONAL INCOME GOOD OR BAD FOR THEIR MENTAL HEALTH?

P. West, H. Sweeting, R. Young, G. Der. *MRC Social & Public Health Sciences Unit, Glasgow, UK*

Objective: To examine the relationship between young people's personal income and mental health, and to test whether higher income predicts better health (as in adulthood), or worse health (as predicted by anti-consumer theorists) or whether the causal relationship is reversed (those in better/poorer health get more money).

Design: Prospective study of 2500 young people surveyed at age 11 in primary school and at 13 and 15 while in secondary school.

Setting: The West of Scotland (Glasgow area).

Measures: Personal income (from pocket money and/or earnings), self-esteem, depressed mood and antisocial behaviour (ASB). In addition, teachers completed a behaviour checklist at age 11, and symptoms of conduct disorder were elicited via a structured psychiatric interview at age 15.

Analyses: Cross-sectional analyses using OLS linear models, controlling for gender and social class. Longitudinal analyses via Structural Equation models using both simultaneous and lagged models to determine causal direction.

Results: At age 11, personal income exhibits a curvilinear relationship with self-esteem and depression together with a positive linear relationship with ASB, the latter corroborated by teachers' reports. At age 13 and 15, income is positively related to both self-esteem and ASB and (slightly) to improved mood. At 15, the relationship between income and ASB is confirmed in an analysis of conduct symptoms, and is not attributable to theft. SEM analyses suggest that self-esteem predicts income rather than the reverse, though the effect is small, and that conversely income predicts improved mood over the same period. Analyses of income and ASB reveal evidence of reciprocal effects in the earlier period (11–13) together with an effect of ASB on income between 13 and 15. All these effects are much larger than those between income and self-esteem and depression.

Conclusions: With the exception of a small positive effect of personal income on mood, there is little evidence in these results that higher personal income bestows better health in youth. Most of the evidence is consistent with reverse causation; that higher incomes are secured both by young people with higher self-esteem and those who engage in antisocial behaviour. There is also some support for the anti-consumerist view that personal income and antisocial behaviour are inextricably linked.

112 IMPACT OF HEALTH-RELATED STIGMA AMONG PEOPLE WITH MENTAL DISORDERS: RESULTS OF THE ESEMED PROJECT

A. Buron^{1,2}, J. Alonso¹, S. Rojas¹, G. Vilagut¹, R. de Graaf³, J. M. Haro⁴, and the ESEMED/MHEDEA 2000 Investigators. ¹Health Services Research Unit, Institut Municipal d'Investigació Mèdica, Barcelona, Spain; ²Preventive Medicine and Public Health Training Unit IMAS-UPF-ASPB, Barcelona, Spain; ³Netherlands Institute of Mental Health and Addiction (Trimbos Institute) Utrecht, The Netherlands; ⁴Research and Development Unit, Hospital Sant Joan de Deu-Serveis de Salut Mental, Barcelona, Spain

Objective: To assess the relationship between health-related stigma and sociodemographic factors, as well as its impact on quality of life, social and life activities limitation, among people with mental disorders and significant disability.

Design: Analysis of data from a cross-sectional face to face household interview survey.

Setting: Representative samples of the adult population of six European countries: Belgium, France, Germany, Italy, The Netherlands and Spain.

Participants: 21 425 respondents provided data between 2001 and 2003.

Main Outcome Measures: Health-related stigma was assessed through two questions regarding emotional reactions (embarrassment) and discrimination experiences, and was endorsed if the respondent declared at least "a little" in both items.

Results: 815 respondents had a 12-month mental disorder and significant disability. Among those, 14.7% (95% CI 10.8 to 19.7) declared stigma. Stigma was higher among individuals with lower education and those married or cohabiting. Stigma was positively and significantly associated with low education (having studied ≤ 12 years vs >12 years, OR 2.84), having been previously married (vs being married or living with someone, OR 0.37), unemployment (vs working, OR 5.13) and not working due to disability (vs working, OR 3.97). The multivariate analysis showed that stigma had a significant effect over the SF-12 physical component summary score (PCS) (-4.65 ; $p<0.05$), while the impact on the SF-12 mental component summary score (MCS) (-3.7) did not reach statistical significance. Stigma was also associated to a higher proportion of limitation in life activities (14.62; $p<0.05$) and of social limitation (28.09; $p<0.001$).

Conclusion: In Europe, around one in seven individuals with mental disorder and significant disability experienced health-related stigma. Stigma, which is more frequent among people with less education, married and unemployed or laid off due to disability, is associated with worse physical quality of life and more life activities and social limitation. Routinely exploring stigma in the assessment of individuals with mental disorders is recommended.

113 PSYCHIATRIC PATIENTS ARE LESS LIKELY TO DEVELOP CANCER THAN TO DIE OF IT: RESULTS OF AN EPIDEMIOLOGICAL STUDY FROM NOVA SCOTIA

S. Kisely¹, A. Mackenzie², M. Smith², L. A. Campbell¹. ¹Departments of Psychiatry, Community Health & Epidemiology; ²Population Health Research Unit, Dalhousie University, Canada

Objectives: There are conflicting data on the risk of cancer in psychiatric patients, possibly due to the use of different methodologies and outcomes

such as incidence or mortality. Mortality is not an ideal risk marker as it affected by both susceptibility to developing the disorder, and subsequent survival. We investigated the association between mental illness and cancer incidence, first admission rates, and mortality across an entire jurisdiction (Nova Scotia) using a standard methodology

Method: A population-based record-linkage study of all patients in contact in contact with primary care or specialist mental health services for a psychiatric problem from 1995–2001. We used the Public Health Agency of Canada's case definition for surveillance of psychiatric disorder. Records were linked with cancer registrations and death records. We used the inception cohort method to calculate standardised incidence, first admission and mortality rates, and proportional hazards or logistic regression to control for other confounders

Setting/Participants: Patients attending primary care and specialist psychiatric services ($n=247\ 344$) including inpatient, outpatient and community settings in both private and public sectors in Nova Scotia (population = 1 million).

Main Outcome Measures: Standardised incidence, first admission and mortality rate ratios (RRs) relative to the rate in the general population.

Results: 4690 people had cancers diagnosed after their first contact with mental health services. There were 2486 carcinoma deaths. Cancer mortality was 72% higher in males (95% CI 63 to 82%) and 59% higher in females (95% CI 49 to 69%) with a similar pattern for first admissions. Cancer incidence for psychiatric patients was significantly lower than mortality in both males (RR 1.21 (95% CI 1.18 to 1.24)) and females (RR 1.31 (95% CI 0.80 to 0.91)). The incidence RR varied from 1.88 for brain cancer in males (95% CI 1.65 to 2.15) to 0.91 for melanoma in females (95% CI 0.33 to 0.45). Incidence of colorectal (for males), prostate, bladder and ovarian cancer was no higher than for the general population. After adjusting for demographic factors and comorbidity (Charlson-Deyo index), there was a 28% excess mortality in psychiatric patients. Patients of lower income and from rural areas also had significantly higher mortality.

Conclusion: People with mental illness in Nova Scotia have a higher cancer case fatality rate, rather than increased incidence for several cancer sites. It is unlikely that lifestyle explains this finding as incidence should better reflect the increased mortality rate. Other possibilities include delays in detection or initial presentation, with more advanced staging at presentation, and difficulties in communication or accessing health care (for example, inequity in access to specialised procedures or surgery).

114 INEQUALITIES IN MENTAL WELL-BEING OF 11–15-YEAR-OLD BOYS AND GIRLS IN SCOTLAND, 1994–2006

K. Levin, C. Currie. Child and Adolescent Health Research Unit, University of Edinburgh, Edinburgh, UK

Background: The mental well-being of children and adolescents is a priority area for the Scottish Executive, as is tackling socioeconomic inequalities in health. Previous research has shown that emotional and mental health problems are predictors of externalising behaviour and mental well-being in later life. Promoting young people's health therefore has long-term benefits to individuals and society as a whole.

Objective: The aim of this study is to describe changes in mental well-being amongst adolescents living in Scotland between 1994 and 2006, to investigate socioeconomic inequalities in mental well-being and changes in inequalities over time.

Methods: Data from the 1994, 1998, 2002 and 2006 Health Behaviour in School-Aged Children survey were modelled using Multilevel Binomial modelling for boys and girls, adjusting for age, year and deprivation using the Family Affluence Scale.

Results: For measures of confidence, happiness, multiple health complaints (MHC), helplessness, feeling left out and perception of looks, positive mental well-being is higher among boys than girls, and among younger than older adolescents. Adjusting for age, the odds of "feeling very happy" in 2006 among boys is 1.70 (95% CI 1.49 to 1.94) and among girls 1.75 (1.50 to 2.03) that of 1994. Similarly, there is a significant increase in confidence among girls, and a significant decrease in MHC, helplessness, and feeling left out. For boys, significant reductions are seen in MHC helplessness and feeling left out. Among boys and girls, socioeconomic inequalities in happiness, MHC and perception of looks are evident. Inequalities in confidence and helplessness also exist among girls. Between 1998 and 2006 socioeconomic inequalities in MHC and happiness increased for boys, and inequalities in happiness, MHC and perception of looks increased for girls so that, for example, the odds of happiness among girls with high FAS relative to low FAS in 2006 are 1.46 (1.11 to 1.91) those of high FAS relative to low in 1998. Inequalities in all other indicators do not change significantly over time.

Conclusions: Indicators of adolescent mental well-being in Scotland appear to be improving over time. However, gender and age differences in mental well-being persist, as do socioeconomic inequalities. Inequalities are seen to widen for some indicators suggesting that a targeted approach is required in addressing the mental health of young people in Scotland.

Qualitative and mixed methods

115 EXPLORING RESPONSIBILITY FOR HEALTH IN FAMILIES: ANALYSING SOCIAL RELATIONSHIPS THROUGH A FOCUS GROUP STUDY

S. MacDonald, S. Murphy, E. Harrop, H. Rothwell. *Cardiff Institute of Society, Health & Ethics, School of Social Science, Cardiff University, UK*

Background: Against a backdrop of policy rhetoric emphasising parental responsibility for child health it is important to explore the opportunities and constraints facing parents in undertaking these responsibilities. Focus groups have the potential of providing a dynamic understanding of how responsibility is shaped by social contexts and social relationships by encouraging people to construct their meaning of health through interactions with others.

Objectives: To explore how concepts of responsibility for health in families are shaped by social relationships, using focus groups as a means of accessing social interactions.

Design: Twelve focus groups were conducted with naturally occurring groups in Wales. A semi-structured schedule, newspaper headline prompts and a prioritisation task were used to guide the discussion. Transcriptions were analysed using a grounded theory approach and main themes identified and validated by a second researcher. Areas of consent and disagreement within groups were identified and key areas of similarity and difference between socioeconomic groups identified.

Participants: Participants (n=101) included a range of age groups and family backgrounds, with 57% female. A broad range of socioeconomic backgrounds were represented, 27% of participants lived in the 10% most deprived wards in Wales and 23% in the 50% least deprived wards.

Results: Discussions highlighted a common expectation that family members could positively influence health behaviours and parents presented their experiences of trying to provide positive role models within the home. As discussions developed it became clear that parents faced many challenges in meeting these responsibilities and they explained these difficulties within a dynamic context of social and economic change. Family relationships were also interwoven with other social relationships. Community relationships provided a supportive framework for health improvement but tensions within and between communities also worked to undermine these support structures. In terms of relationships between individuals and the state, there were significant differences based on socioeconomic background with variations in levels of reliance on the state coupled with different attitudes to public health information.

Conclusions: Examining social relationships provides an important additional dimension to understanding how responsibility for health is constructed and focus groups provide an insight into the ways in which social relationships are interwoven in the fabric of everyday life. These findings have implications for public health interventions and adds to the case for moving away from individual-behaviour-based approaches towards more collective approaches which acknowledge the inter-relationships between different social relationships and what this means to different groups.

116 WHAT DO PEOPLE VALUE WHEN PROVIDING UNPAID CARE? DETERMINING ATTRIBUTES FOR A DISCRETE CHOICE EXPERIMENT

H. Al-Janabi¹, J. Coast², T. Flynn¹. ¹MRC Health Services Research Collaboration, University of Bristol; ²Health Economics Facility, University of Birmingham, UK

Background: The impact healthcare interventions have on unpaid carers can be extremely important but is rarely considered in economic evaluations. In view of this, a preference-based instrument has been developed to capture this impact. This has been designed from first principles, to include non-health items (attributes) that influence a person's welfare (utility) when they provide unpaid care. A discrete choice experiment (DCE) will be used to test the instrument and determine valuations for different caring profiles.

Objective: Determine attributes and levels for a DCE to quantify preferences for different caring profiles.

Design: Meta-ethnography of qualitative studies followed by semi-structured interviews with carers.

Meta-ethnography: Forty four qualitative studies were reviewed for the meta-ethnography. These were reduced on the basis of maximum variation sampling to 6 for the final synthesis. The findings from the 6 studies were then analysed, contrasted and combined through 7 structured steps. The results of the meta-ethnography were expressed as 6 conceptual attributes.

Interviews: Sixteen semi-structured interviews were conducted with a heterogeneous group of carers. Interviews were conducted in three iterations to (1) refine the attributes, (2) develop levels for the attributes and (3) check the feasibility of discrete choice experiment.

Results: Six conceptual attributes were developed from the meta-ethnography. These were: relationship, informal support, institutional support, activity, control and duty fulfilment. The attributes derived from the meta-ethnography were modified through the interviews. New issues were captured within two substantially revised attributes: "getting-on" and "fulfilment". The wording and issues covered by the other four attributes (social support, organisational assistance, activities and control) changed slightly. Three levels were assigned to each of the attributes. These levels corresponded with the frequency, or amount, of the attribute.

Conclusions: The development of attributes and levels for a DCE has often been carried out with a lack of rigour and transparency. This creates problems in validating the work, and potential bias, if important attributes are excluded. Meta-ethnography with interview follow-up offers a new route for developing attributes and levels for a DCE. It is likely to be best applied when the researcher is unfamiliar with the topic area, but a body of qualitative literature on the topic exists. This work qualitatively revealed a number of factors that are important to carers when they provide unpaid care, that are traditionally neglected in economic evaluations.

117 PATIENTS' UNDERSTANDING OF THE SURVIVAL BENEFITS OF PALLIATIVE CHEMOTHERAPY: FINDINGS FROM ASPECTS (A STUDY OF PATIENTS' EXPERIENCES OF TREATMENTS)

S. Audrey¹, J. Blazeby¹, J. Abel², R. Campbell¹. ¹Department of Social Medicine, University of Bristol; ²Weston Area Health Trust, Bristol, UK

Objective: Every year in the UK many thousands of patients are told they have inoperable cancer and are offered palliative chemotherapy treatment. Survival benefit is often a main outcome measure (along with disease progression, quality of life, and toxicity) in clinical research. It is also an important concern to patients. The evidence suggests that, in cases of advanced cancer, survival benefits are modest (often measured in weeks or months, rather than years). In this paper we consider whether patients have a clear understanding of the survival benefits of palliative chemotherapy when making decisions about treatment.

Design and Setting: ASPECTS (A Study of Patients' Experiences of Treatments) is a qualitative, longitudinal study examining patients' and clinicians' views and experiences of palliative chemotherapy. Fieldwork was undertaken at Bristol Haematology and Oncology Centre (BHOC), Weston General Hospital, and in patients' homes.

Participants: Patients with three relatively common cancers: pancreatic (15), non-small cell lung cancer (15) and colorectal cancer (15). These disease sites were chosen because they have differing life expectancies, and differing survival benefits are associated with the respective palliative chemotherapy treatment.

Methods: A cohort of 45 patients was studied before they saw an oncologist, at the consultation where palliative chemotherapy was discussed, and on through palliative chemotherapy treatment. Interviews and consultations were digitally recorded and anonymised to protect confidentiality. All recordings were fully transcribed and coded using Atlas.Ti software. Common themes and concepts were identified. Further analysis employed the constant comparison method of grounded theory in which the textual data were scrutinised for differences and similarities within themes.

Results: Clinicians informed patients that the intent of palliative chemotherapy was not curative but that the treatment had three main benefits: "improved quality of life", "relief of symptoms" and "prolonging life". Patients were given detailed information about the treatment regimen, and potential side effects. However, survival benefits of the treatment were often not discussed. The majority of patients accepted palliative chemotherapy. Those who rejected chemotherapy, or were considered unsuitable for the treatment, were more likely to receive information about survival benefits than those who accepted the treatment.

Conclusion: Despite the importance placed on survival benefit as an outcome measure in clinical research about palliative chemotherapy,

survival benefits (including the lack of survival benefit associated with some chemotherapy) is often not included in the discussions about treatment options between clinicians and patients. Patients often accept palliative chemotherapy without a clear understanding of the survival benefits.

118 EXPLAINING VARIATIONS IN PATIENT SATISFACTION WITH REHABILITATION PLANNING AND GOAL SETTING: A MIXED METHOD APPROACH

T. Meyer, N. Pohontsch, H. Raspe. *Institute for Social Medicine, University Clinics Schleswig-Holstein, Campus Luebeck, Germany*

Objective: To explain satisfaction with rehabilitation planning and goal setting in German patients attending inpatient medical rehabilitation that was found to be more than 0.5 standard deviations lower compared to other satisfaction domains (doctors, nurses, psychologists, services, therapies).

Design: Two-phased mixed method approach. (1) Quantitative analysis of patient satisfaction data from the quality assurance programme of inpatient rehabilitation of the German statutory pension insurance. Two clinics rated above average and two clinics rated below average in satisfaction with rehabilitation planning and goals were identified after case-mix adjustment. (2) Qualitative interviews, blinded to ranking, with patients from the selected clinics.

Setting: Medical rehabilitation clinics in Germany, somatic indications (quantitative phase) and in Northern Germany, cardiovascular and musculoskeletal disorders (qualitative phase).

Participants: *Quantitative phase:* n=142 327 patients in k=548 rehabilitation clinics; *qualitative phase:* n=40 patients in k=4 rehabilitation clinics.

Analysis: *Quantitative phase:* multilevel linear regression analysis to model the relation between predictors (patient characteristics, process variables, outcome ratings, health status after rehabilitation, different aspects of patient satisfaction) and satisfaction with rehabilitation planning and goals (dependent variable). *Qualitative phase:* identification of categories within transcribed patient interviews that distinguish between clinics rated above or below average by thematic coding approach.

Results: *Quantitative phase:* while patient characteristics were only of marginal importance, behavioural recommendations given by the clinic with regard to home tasks, job as well as leisure activities (process variables) accounted for a substantial amount of variance (21.7%) of satisfaction with rehabilitation planning and goals. Of the reported outcomes only change in psychological distress accounted for 2.2% variance. Health status after rehabilitation did not show independent associations. Satisfaction with doctors, satisfaction with housing, and with their rehabilitation in general accounted for additional 21.1% variance. *Qualitative phase:* no substantial differences between clinics were found with regard to rehabilitation planning and explicit goal setting. Clinics rated above or below average differed in terms of perceived continuity of care (medical contact person, knowledge about patient's status, perception of changes in the patient, stringent therapeutic regime), doctors' concern for the patient (appreciation of patient, trust in doctor), and organisational characteristics (for example, perception of high work load of staff, schedule disruptions).

Conclusion: The mixed method approach yielded converging and complementing results. Higher levels of satisfaction with rehabilitation planning and goal setting might be accomplished by focussing treatment on areas relevant for patients' daily life, on continuity of care, on a respectful doctor-patient relationship, and on organisational prerequisites.

119 AN EXPLORATORY STUDY OF ANTIDEPRESSANT PRESCRIBING IN SCOTLAND: THE GP PERSPECTIVE

S. MacDonald¹, M. Maxwell², J. Morrison¹, R. Munoz-Arroya³, M. Smith¹, M. Sutton⁴, P. Wilson¹. ¹General Practice & Primary Care, University of Glasgow; ²General Practice & Primary Care, University of Edinburgh; ³Information Statistics Division, Scottish Executive; ⁴HERU, University of Aberdeen, UK

Objective: This study aimed to explore the reasons for the increase and variation in prescribing of antidepressants in Scotland.

Design: In-depth qualitative interviews.

Setting: General Practices across Scotland.

Participants: Sixty three general practitioners in 30 practices.

Results: General practitioners offer a range of explanations for the rise in antidepressant prescribing in Scotland. Interestingly, an increase in the incidence of depression was rarely among the reasons given. Instead, a number of linked factors including the success of campaigns, such as the

Defeat Depression Campaign, to raise awareness of depression coupled with a willingness to present on the part of patients were suggested. GPs also tended to recognise a trend towards a higher overall index of suspicion in communities, for example, the identification of postnatal depression or depressive illness among those who require chronic disease management. This had resulted in a cultural shift towards acceptance of antidepressant medication by both patients and GPs. The perceived safety of SSRI medication provides GPs with an option of managing depression in primary care that is relatively risk-free. Many GPs questioned the appropriateness of prescribing at current levels, and talked about the medicalisation of unhappiness, which is exacerbated by social deprivation and the breakdown of traditional social structures. In spite of this, the decision to prescribe is a considered one, and arriving at a diagnosis of depression is patient-centred and symptom-driven. Nevertheless, GPs feel compelled "to do something" and alternatives to prescribing are seen to be scarce and poorly resourced. Increased availability of alternatives such as "talking therapies" may reduce prescribing but many GPs would use these in addition to prescribing. Variations in prescribing are the result of individual GP personality and experience.

Conclusions: GPs perceive themselves to be surrounded by social change, which has demanded a solution to mild/moderate depressive illness in primary care. This solution has been medical. Consequently, GPs find themselves operating in a policy climate that aims to reduce the prescribing of antidepressants, without any indication of the "correct" level of prescribing. On a macro level, GPs recognise that some inappropriate prescribing exists, yet at an individual level, prescribing decisions are measured.

Parallel session E

Lifecourse III

120 CUSTOMISED BIRTHWEIGHT NORMS FOR EARLY DETECTION OF RISK FACTORS OF METABOLIC SYNDROME IN ADULT LIFE

K. Szamotulska¹, J. Zeitlin², D. Szostak-Wegierek³. ¹Department of Epidemiology, National Research Institute of Mother and Child, Warsaw, Poland; ²U 149, INSERM, Paris, France; ³Department of Prevention of Civilization Diseases with Clinic of Metabolic Diseases, National Food and Nutrition Institute, Warsaw, Poland

Background: Studies have found that customised norms improve the identification of fetal growth restriction (FGR) among newborns; however this approach has yet to be applied to studying the relationship between FGR and risk of adult chronic disease.

Aims: To explore the association between growth restriction and insulin resistance using customized versus standard norms of birthweight in a young adult population.

Material: 143 of 215 Polish men aged 24–29 years examined in 2000–4, whose mothers participated in a follow-up study during pregnancy in Warsaw's Wola district in 1974–7. From the original cohort of 1912 babies (including 945 boys) exclusions were: those born from pregnancies with uncertain gestational age or with late first visit and not being involved in laboratory testing in 2000–4.

Methods: Standard norms for fetal growth restriction (FGR) were taken from population growth charts. Customised norms were computed by applying Hadlock's formula to Gardosi's model of optimal birthweight at 40 weeks. The HOMA-IR index was used to estimate insulin resistance. The linear regression model on log-transformed HOMA-IR index was applied and adjusted for current body mass index.

Results: 6.3% of the sample was classified as growth restricted using standard norms versus 11.9% using customised norms. Both definitions of FGR were significantly associated with higher HOMA-IR (customised: 2.56 for FGR and 1.80 for non-FGR and standard 2.74 for FGR and 1.83 for non-FGR). The combination of both norms identified a subgroup with relatively high HOMA-IR index among those classified as non-FGR using standard norms, but identified as growth restricted using with customised norms. The adjusted mean HOMA-IR index for babies classified as non-FGR by both standards was 1.80 (95% CI 1.66 to 1.96), 2.39 (95% CI 1.72 to 3.30) for standard non-FGR but customized FGR, and 2.73 (95% CI 2.01 to 3.71) for those classified as FGR using both norms ($p_{trend} < 0.01$).

Conclusions: Using customised fetal growth restriction indices could help in detecting groups at risk of metabolic syndrome in adult life and should be explored in future research.

121 PRENATAL STRESS EXPOSURE TO BEREAVEMENT AND RISK OF EPILEPSY: DEVELOPMENTAL ORIGINS OF EPILEPSY?

J. Li¹, M. Vestergaard¹, C. Obel¹, J. Christensen², D. H. Precht³, J. Olsen^{1,4}.
¹Department of Epidemiology, Institute of Public Health, University of Aarhus, Denmark; ²Aalborg Hospital, Denmark; ³Pediatric Department, University Hospital of North Zealand, Denmark; ⁴Department of Epidemiology, University of California, Los Angeles, USA

Objectives: By examining the association between the exposure to bereavement during prenatal period and the risk of epilepsy later in life, we aim to test the hypothesis that there are developmental origins of epilepsy from exposure to stress in fetal life in a large longitudinal study.

Design: Retrospective cohort study with up to 35 years of follow-up.

Setting: The data linkage of four national registers in Denmark.

Participants: All 2.3 million persons born in Denmark from 1970 to 2004.

Main Outcome Measures: Hospitalisation due to epilepsy from 1970 to 2004; outpatients due to epilepsy from 1995 to 2004.

Results: After the data linkage, a total of 43 384 persons were included into exposed group, whose mothers experienced bereavement from one year before conception to the date of birth of these children. A total of 2 316 255 children were in unexposed group. The mean follow-up time is 15 years. There were 206 epilepsy cases among the exposed children (2.24%) and 37 798 cases in the unexposed group (1.60%), yielding a relative risk of 1.69 (95% CI 1.57 to 1.83) after adjusting for mother's age, education, residence.

Conclusion: We observed an increased risk of epilepsy in the offspring of mothers who had been exposed to loss of a child during the pregnancy period. Our data support the hypothesis that bereavement might cause patho-physiological changes in pregnant mothers, which could subsequently affect the brain development of the fetus. Epilepsy might have developmental origins from stressful life events in fetal life.

122 CHILDHOOD RESIDENTIAL STABILITY AND HEALTH IN ADOLESCENCE: FINDINGS FROM THE WEST OF SCOTLAND TWENTY-07 STUDY

D. Brown, A. H. Leyland, S. Macintyre. *MRC Social and Public Health Sciences Unit, University of Glasgow, Glasgow, UK*

Background: Moving can be a major life event for children as well as adults. Previous research has shown that residential mobility has a negative effect on educational attainment and can lead to health problems and poor health behaviours. Residential stability in childhood may help children to develop and maintain social networks. These strong social networks, known to offer protective health benefits, may carry over into adolescence and later on into adulthood.

Objective: To investigate the relationship between childhood residential stability and health outcomes and behaviours in adolescents.

Data and Methods: Analysis of the youngest cohort (born in the 1970s) of the Twenty-07 Study. Data were available on 1515 respondents, sampled from 62 postcode sectors in Clydeside, aged around 15 at baseline in 1987/8. Residential stability was derived from the number of addresses at which the respondent had lived between birth and interview and was categorised as no moves (stable), 1–2 moves (moderately mobile) or 3–4 moves (frequently mobile). Multiple regression models were used to assess the relationship between residential stability and a number of health outcomes. Analyses were controlled for age, sex, housing tenure, family stability, area deprivation (Carstairs) and social class of head of household.

Main Outcome Measures: BMI, waist:hip ratio, longstanding illness and smoking status.

Results: Twenty four per cent of adolescents had never moved, 61% had moved 1–2 times and 15% had moved 3–4 times. Mobility differed in terms of all socio-demographic characteristics except age and sex. There was no change in mean BMI or waist:hip ratio as the number of moves increased. Reports of a longstanding illness in adolescence were not significantly related to the number of moves made in childhood (OR 1.07 (0.66 to 1.73) for those who moved 1–2 times relative to those who had never moved, OR 1.37 (0.75 to 2.49) for those who moved 3–4 times) although odds were elevated for increased moves. Those who moved 1–2 times had elevated odds of smoking at 15 (OR 1.14 (0.82 to 1.60)) while those who had moved 3–4 times had significantly greater odds (OR 1.65 (1.07 to 2.55)) compared to those who had lived at the same address since birth.

Conclusions: Increased mobility during childhood is independently associated with adverse health status by the age of 15. This appeared to be true for self-reported longstanding illness and smoking status, although

the only significant result in this sample is for smoking status. Directly measured adolescent health variables do not appear to be associated with childhood mobility.

123 EARLY MOTHERHOOD AND CORONARY HEART DISEASE: BIOLOGY OR LIFESTYLE? AN INVESTIGATION OF AGE AT PARENTHOOD AND CORONARY HEART DISEASE RISK FACTORS AT AGE 53 YEARS IN MEN AND WOMEN

R. Hardy¹, D. Lawlor², S. Black¹, D. Kuh¹. ¹MRC National Survey of Health and Development, Department of Epidemiology and Public Health, Royal Free and University College Medical School, London; ²Department of Social Medicine, University of Bristol, UK

Background: Detrimental changes to the coronary heart disease (CHD) risk profile occur during pregnancy. If such changes were permanent, early motherhood would be a risk factor for CHD. Alternatively, any association with age at first birth may reflect social differences in age at starting a family or lifestyle factors associated with child rearing. One way of exploring these hypotheses is to consider associations in men and women.

Objectives: To examine the association between parental age at the birth of first child and CHD risk factors at age 53 years and to assess whether the relationships are stronger in women than men.

Design: Birth cohort study.

Setting: England, Scotland and Wales.

Subjects: 2538 men and women from the MRC National Survey of Health and Development, followed up since their birth in 1946, who reported having at least one biological child.

Outcomes: Body mass index (BMI), waist:hip ratio, systolic and diastolic blood pressure (SBP, DBP), total, LDL and HDL cholesterol and glycated haemoglobin at 53 years.

Methods: Self-reported records of births collected throughout adult life were used to define age at birth of first child (categorised as <20; 20–25; 25–30; >30 years). Regression models were used to investigate the association of age at birth of first child with all outcomes.

Results: There were significant associations between age at first child and all risk factors, except total and LDL cholesterol. Poorer mean risk factor levels were observed with decreasing age at parenthood. The associations were generally stronger in men than women, but did not differ significantly (all p values for test of sex interaction >0.2). The mean difference (95% CI) in BMI between those who had been teenage mothers compared with those who became mothers after age 30 was 1.3 kg/m² (0.1 to 2.5). For men, the difference was 1.1 kg/m² (0.2 to 2.1). SBP was 4.5 mmHg (0.2 to 8.8) higher in teenage mothers and 5.4 mmHg (0.6 to 10.2) in teenage fathers than in the oldest parental age group. Similarly, the differences for glycated haemoglobin were 2.2% (–0.3 to 4.7) for women and 3.7% (1.1 to 6.2) for men. The associations were not explained by family size. All associations, except those with blood pressure, were largely explained by potential predictors of age at parenthood or by adult behavioural and social factors.

Conclusions: These findings, being the same in men and women, suggest lifestyle factors associated with early childrearing have detrimental long-term impacts on health. Family based interventions targeted at young parents may reduce CHD risk.

Ethnicity and health

124 ETHNIC DIFFERENCES IN CHILDHOOD COGNITIVE DEVELOPMENT: FINDINGS FROM THE MILLENNIUM COHORT STUDY

L. Panico, Y. Kelly, on behalf of the ETHNIC team. *Department of Epidemiology & Public Health, UCL, UK*

Background: Preschool children with unfavourable cognitive and/or socio-emotional skills are less likely to do well in a range of educational, health and socioeconomic outcomes compared with their better-off counterparts throughout life. Ethnic inequalities in child and adult health have been widely documented; however, it is unclear how cognitive development during early childhood varies across ethnic groups in the UK.

Objectives: This paper seeks to determine whether cognitive development differs across ethnic groups and whether observed patterns can be explained by socioeconomic, cultural and home environment factors.

Methods: Data from the second sweep of the UK Millennium Cohort Study on 12 624 White, 415 Indian, 719 Pakistani, 271 Bangladeshi, 354 Black Caribbean, 325 Black African children were analysed. Home visits including parental interviews and cognitive skills tests were conducted when the cohort member was aged approximately 3½ years. Cognitive development was assessed by testing children on naming vocabulary, colours, shapes, sizes, numbers and letters. We examined the effect of explanatory factors, including household income, occupational class, parental education, household language, whether the child understood a story in English, maternal migration status, and a range of home environment factors (whether the household was noisy, whether the child was distracted during testing, etc) on cognitive test scores. Using the White group as the reference category, ethnic differences in cognitive tests are given as z scores.

Results: Children from non-White ethnic minority groups had significantly lower cognitive test scores compared to White children. On vocabulary tests, the z scores for the difference between ethnic minority and White children were: Indian -0.60, Pakistani -1.15, Bangladeshi -1.31, Black Caribbean -0.34 and Black African -0.69. On identifying colours, shapes, letters and numbers, z score differences between ethnic minority and White children were: Indian -0.15, Pakistani -0.90, Bangladeshi -1.18, Black Caribbean -0.32 and Black African -0.47. Up to 70% of these differences were accounted for by socioeconomic and cultural factors, though the extent of this varied according to ethnic group. For example, most of the Black Caribbean disadvantage was explained by socioeconomic factors, while the Pakistani and Bangladeshi disadvantage was explained by both socioeconomic and cultural markers.

Conclusion: Differences exist in cognitive test scores across ethnic groups during early childhood. Explanations for these differences were not homogeneous across groups. These results have important implications for future educational performance and the life chances linked to this, such as disadvantage and ill health. Our paper highlights different needs across different ethnic groups.

125 ETHNIC DIFFERENCES IN DIABETES AND CARDIOVASCULAR RISK FACTORS ORIGINATE IN EARLY LIFE: PRELIMINARY RESULTS OF THE CHILD HEART AND HEALTH STUDY IN ENGLAND (CHASE)

P. H. Whincup¹, C. G. Owen¹, L. Orfei¹, I. Gibb², C. McKay¹, D. G. Cook¹.
¹Division of Community Health Sciences, St George's, University of London, London; ²Department of Clinical Biochemistry, Newcastle Hospitals NHS Trust, UK

Background: Compared with white Europeans, British South Asian adults have greatly increased risks of type 2 diabetes associated with insulin resistance, hypertriglyceridaemia and central obesity. British African-Caribbean adults have less marked increases in type 2 diabetes, associated with low triglyceride levels and general adiposity. Coronary heart disease rates are high in the former group, low in the latter.

Objective: To examine whether similar patterns of ethnic differences in adiposity and metabolic factors are apparent in British children in the first decade of life.

Design: Cross-sectional survey of children (CHASE Study) recruited from a sample of 200 Primary schools in London, Birmingham and Leicester, with standardised measurements of anthropometry, blood pressure and fasting blood sampling. Ethnicity was defined by parental self-definition. Biochemical analyses were conducted blind to ethnic group status.

Participants: 1257 South Asian, 1307 African-Caribbean and 1393 White European children aged 9–10 years (response rates 69% for physical measurements, 61% for blood measurements).

Results: In age-adjusted analyses, compared with white Europeans, South Asian children had higher mean truncal thickness while African-Caribbean children had a higher mean BMI. South Asian children had higher mean glycosylated haemoglobin (HbA1c) and triglyceride levels, with lower mean HDL-cholesterol levels. African-Caribbean children had a less marked elevation of mean HbA1c levels, higher mean HDL-cholesterol and lower mean triglyceride concentrations. Mean total and LDL-cholesterol and blood pressure levels did not differ appreciably between ethnic groups. The ethnic differences in HbA1c, triglyceride and HDL-cholesterol levels were unaffected by adjustment for measures of adiposity.

Conclusions: Ethnic differences in adiposity and metabolic factors are established by the end of the first decade of life. Important determinants of ethnic differences in adult disease appear to be operating early in life and may offer scope for early prevention.

126 INTERGENERATIONAL TRANSMISSION OF ETHNIC INEQUALITIES IN GENERAL HEALTH

N. R. Smith¹, Y. Kelly¹, J. Y. Nazroo². ¹Department of Epidemiology and Public Health, University College London; ²Department of Sociology, University of Manchester, UK

Background: Previous research strongly suggests that ethnic groups are more likely to suffer a poorer health profile compared to the overall population. Trends have emerged to suggest that social factors such as socioeconomic status and health behaviours are not fixed across generations and have a role to play in these inequalities in health.

Objectives: This project aimed to establish the degree to which ethnic inequalities in health are transmitted from the first to second generation, and to determine the extent that intergenerational changes in socioeconomic status and health behavioural factors might explain any variation that exists.

Methods: Data from the 1999 and 2004 Health Surveys for England which had ethnic boosts to their samples assessed the prevalence of fair/poor general health, raised glycated haemoglobin blood levels and diagnosed hypertension across first (n=4492) and second (n=5729) generations of seven ethnic minority populations (Black Caribbean, Black African, Indian, Pakistani, Bangladeshi, Chinese and Irish). A White population was selected as reference (n=28 576). The risk of poor health outcome was estimated by applying logistic regression models and stepwise inclusion of socioeconomic and behavioural variables, standardised for age and sex. Generational movement relative to the white baseline was assessed for all ethnic groups using logistic regression adjusted for age and sex.

Results: The second generation groups reported slightly poorer general health than the first migrant generation, although this was not statistically significant. This generational worsening in health was less consistent for levels of glycated haemoglobin and diagnosed hypertension where the direction of change tended to vary by ethnic group. Rates of reported ill health across all outcomes increased in the second generation after adjustment for socioeconomic position, whereas health behaviour had no effect. The Bangladeshi population showed significant intergenerational improvement in general health relative to the White reference, after adjustment for age and sex, showing a reduction in the odds ratio (95% CI) from 2.75 (2.13 to 3.56) for the first generation to 1.58 (1.17 to 2.13) in the second generation.

Conclusion: Cross-generational differences in health are likely to be mediated by changes in socioeconomic circumstances. It remains unclear as to what degree such social mobility is mediated by post-migration class reassertion and whether these trends in mobility and subsequent positive effects on health will persist across future generations.

127 MORTALITY FROM LIVER CIRRHOSIS AND HEPATOCELLULAR CANCER BY COUNTRY OF BIRTH IN ENGLAND AND WALES

N. Bhala¹, S. Wild², A. Brock³, C. Griffiths³, R. Bhopal². ¹University Hospital of Coventry & Warwickshire, and Warwick Medical School; ²Public Health Sciences Section, University of Edinburgh; ³Mortality Statistics, Office for National Statistics, London, UK

Objectives: The rates of liver cirrhosis and hepatocellular cancer (HCC) have been increasing in the UK and the rest of the world. Contributing aetiologies include alcohol intake, hepatitis B and C and non-alcoholic fatty liver disease. There is a paucity of data examining the racial and ethnic epidemiological burden of these conditions, of which country of birth can be a proxy. We sought to compare mortality in England and Wales from liver cirrhosis and hepatocellular cancer (HCC) by country of birth.

Design: Cross-sectional analysis of mortality statistics for people aged 20 years and over for 2001–3.

Main Outcome Measures: Standardised mortality ratios (SMRs) for liver cirrhosis and HCC.

Results: Deaths included 13 982 alcoholic liver disease, 10 461 other liver diseases and 9261 hepatocellular cancer respectively. Mortality rates for HCC were particularly high for men born in Bangladesh (SMR 523; 95% CI 380 to 701), China & Hong Kong (492; 168 to 667), and West Africa (440; 308 to 609). Alcoholic liver disease mortality was statistically significantly higher than the national average for men born in Ireland (SMR 241; 95% CI 219 to 265), Scotland (198; 180 to 219) and India (149; 128 to 174), and for women born in Ireland (218; 190 to 250) and Scotland (192; 165 to 223). Mortality from other liver diseases was similarly increased in men from Ireland (SMR 194; 95% CI 170 to 221), India (188; 158 to 224) and Scotland (147; 127 to 171) as well as women from Ireland (160; 137 to 187) and Scotland (138; 115 to 165). Alcoholic liver disease mortality was lower for men and women born in Bangladesh (male

SMR 4, 95% CI 0 to 23; female 9, 0 to 50), the Middle East (M17, 7 to 33; F21, 6 to 53), West Africa (M19, 7 to 38; F15, 3 to 45), Pakistan (M21, 12 to 36; F13, 4 to 34), China and Hong Kong (M29, 12 to 60; F24, 5 to 70) and the West Indies (M42, 28 to 59; F31, 17 to 53). Mortality from other liver diseases was decreased in men from China and Hong Kong only (SMR 40, 95% CI 13 to 93).

Conclusion: There are a number of statistically significant differences for liver cirrhosis and HCC mortality rates by country of birth. This would suggest that there are high-risk ethnic and racial groups for liver-related mortality. These data indicate there are major inequalities that demand clinical attention, education and research, as well as urgent public health action.

Vascular diseases II

128 CARDIOVASCULAR DISEASE IN IRELAND: ARE THERE REGIONAL AND GENDER DIFFERENCES?

T. O'Hara¹, K. Bennett¹, S. Jennings². ¹Department of Pharmacology & Therapeutics, Trinity Centre for Health Sciences, Dublin; ²HSE-Population Health, Dr Steevens' Hospital, Dublin, Ireland

Introduction: Health inequalities refer to a broad range of differences in both health experience and health status between demographic groups, regions and countries. Targets and mechanisms to reduce health inequalities now feature in Irish health policy in Quality and Fairness - A Health System for You. Cardiovascular disease remains a leading cause of death and disability in Ireland, which is addressed in the national cardiovascular strategy "Building Healthier Hearts".

Aim: To examine the pattern of coronary heart disease (CHD) mortality, morbidity and treatment among gender and geographical regions in Ireland.

Methods: Data on cardiovascular mortality and morbidity were obtained using the Public Health Information System (PHIS), Hospital In-patient Enquiry (HIPE), and CSO Vital Statistics. All data were age-standardised (direct method).

Results: There has been a significant decline in CHD mortality (males 24.6% and females 23.0% from 1994-8 to 1999-2003). However, differences in 1999-2003 five-year CHD mortality between former health board (HB) regions are evident, with the Eastern Regional Health Authority (ERHA) having the lowest CHD mortality for men (SDR per 100 000 population = 204 (95% CI 198 to 209) and women (SDR = 100 (97 to 103)) and the Midland HB having the highest mortality for men (SDR = 237 (223 to 250)) and Southern HB having highest mortality for women (SDR = 116 (111 to 120)). CHD hospitalisation in 2004 was highest in the South Eastern, Midland, North Eastern and North Western HBs for men and women, and lowest in Southern HB. There was a significant 2.45-fold difference in CHD hospitalisations between men and women. Uptake of cardiology interventions in 2004 varied widely across regions with the ERHA having the highest rates of percutaneous coronary intervention (PCI) for men and women and highest rates of coronary artery bypass grafting (CABG) for women. The Southern, South Eastern, and Mid-Western HBs had the lowest rates of PCI, and the Western and North Western the lowest rates of CABG. There was a significant 3.0-fold higher rate of PCI and 4.8-fold higher rate of CABG between men and women, and this inequality remained stable over time (overall male:female odds ratio of revascularisation in 2004 vs 1998, OR 1.06 (0.95 to 1.19)).

Conclusions: There have been significant improvements in CHD mortality and interventions over time. Further work on reducing inequalities between regions and gender would improve health outcomes for all in the future.

129 AGE DIFFERENCES ON THE IMPACT OF NON-FATAL ACUTE MYOCARDIAL INFARCTION RISK FACTORS: POPULATION ATTRIBUTABLE FRACTIONS IN PORTUGUESE MEN

A. Oliveira, C. Lopes, A. Azevedo, J. Bastos, H. Barros. Department of Hygiene and Epidemiology, University of Porto Medical School, Porto, Portugal

Objective: To estimate the population attributable fraction (PAF) of selected risk factors for the occurrence of non-fatal acute myocardial infarction, using a case-control study on male Portuguese adults, considering differences by age.

Design: Population-based case-control study.

Setting: Hospitals providing acute coronary care in Porto, the second largest city of Portugal.

Participants: Portuguese Caucasian male adults, aged ≥ 18 years. Cases were patients consecutively admitted to the Cardiology Department of the four hospitals providing acute coronary care in Porto (n=638). Controls

were a representative sample of Porto inhabitants, selected by random digit dialling (n=851).

Main Outcome Measures: PAF was estimated using the formula: $PAF = 1 - \Sigma(p/R)$, in which R is the relative risk estimated by the adjusted odds ratio and p the proportion of cases in that stratum. Odds ratios were adjusted for education, family history of infarction, waist-to-hip ratio, smoking, total energy intake and leisure-time physical activity. Confidence intervals for these estimates (95% CI) were calculated by bootstrapping. All the analyses were stratified by two age strata: ≤ 45 years and >45 years.

Results: High waist-to-hip ratio (>0.90), smoking, lower education levels and ethanol consumption (considering moderated ethanol consumers at lower risk) had the highest PAF among men under 46 years, explaining respectively 82.2% (95% CI 77.0 to 87.4), 59.5% (95% CI 34.6 to 79.5), 54.8% (95% CI 44.6 to 64.7), and 38.0% (95% CI 15.6 to 62.6) of the acute myocardial infarction cases. For the oldest men (>45 years), high waist-to-hip ratio (PAF=88.7%, 95% CI 80.0 to 94.5), lack of leisure-time physical activity practice (PAF=45.8%, 95% CI 34.7 to 57.4) and lower education levels (PAF=38.0%, 95% CI 22.6 to 54.5) were the risk factors with a higher relative impact.

Conclusions: Smoking was responsible for a higher proportion of acute myocardial infarction cases among young men, whereas the lack of regular leisure-time physical activity practice had a higher impact among the older. An increase of educational levels and sustained reduction of waist-to-hip ratios, involving changes on dietary and physical activity patterns, are indirectly demanded for men of all ages.

130 ANTIOXIDANT ENZYMES AND CORONARY HEART DISEASE: A META-ANALYSIS OF OBSERVATIONAL STUDIES

G. Flores-Mateo¹, P. Carrillo-Santisteve^{1,2}, E. Pujol¹, M. I. Covas³. ¹Institut de Recerca en Atenció Primària Jordi Gol, Barcelona; ²Department of Preventive Medicine, Bellvitge University Hospital, Barcelona; ³Unitat de Lipids i Epidemiologia Cardiovascular, Institut Municipal d'Investigació Mèdica, Barcelona, Spain

Background: It is hypothesised that low antioxidant enzymes activity is associated with an increased risk of cardiovascular disease. Studies of antioxidant enzymes and coronary heart disease (CHD) have yielded conflicting results.

Objective: To perform a meta-analysis of the association of glutathione peroxidase, superoxide dismutase and catalase activity with CHD endpoints in observational studies.

Methods: We searched MEDLINE and the Cochrane Library from 1966 through February 2007. Relative risk (RR) estimates were pooled using an inverse-variance weighted random-effects model. We assessed publication bias by using the funnel plots. Sensitivity analysis assessed the relative influence of each study by omitting one study.

Results: Thirty seven case-control studies and two prospective studies are included. The pooled relative risks for CHD were 0.54 (95% CI 0.40 to 0.72; p for heterogeneity <0.001 ; $I^2=91.9\%$); 0.53 (95% CI 0.39 to 0.73; p for heterogeneity <0.001 ; $I^2=92.1\%$); and 0.43 (0.21 to 0.89 p for heterogeneity $I^2=94.4\%$) for each 1-standard deviation increase in glutathione peroxidase, superoxide dismutase, and catalase activities, respectively. The funnel plots did not suggest the presence of publication or related bias. Sensitivity analysis indicated that all of the studies include in the pooled estimates seemed to contribute equally to the estimate.

Conclusion: Glutathione peroxidase, superoxide dismutase, and catalase activity were inversely associated with the risk of CHD in observational studies. Few prospective studies have addressed the cardiovascular effectiveness of antioxidant enzyme activity. More evidence from prospective studies is needed before to establish the fact that a low antioxidant enzyme activity is a CHD risk factor.

131 OBSERVATIONAL VERSUS SELF-REPORTED JOB CHARACTERISTICS AND HYPERTENSION IN THE WHITEHALL II STUDY

B. A. Greiner¹, J. Griffin², S. A. Stansfeld³, M. G. Marmot⁴. ¹Department of Epidemiology and Public Health, University College Cork, Ireland; ²Center for Chronic Disease Outcomes Research, Minneapolis, USA; ³Centre for Psychiatry, Queen Mary University of London, UK; ⁴International Centre for Health and Society, University College London, UK

Background: Research results on the association between job stressors and hypertension is not conclusive prompting suggestions of using more objective stressor measures. This cross-sectional study uses work characteristics data obtained by worksite observations and by self-report. The

main objectives include: (1) detailed description of objective stressors typical in each employment grade, (2) correlation of observational job characteristics with self-reported stress and (3) investigation of the association between job characteristics and hypertension using observational and self-reported measures.

Methods: Ninety eight white-collar workers from the Whitehall II cohort were randomly chosen from four major departments and three employment grades. Hypertension status (≥ 90 mmHG systolic and/or ≥ 140 mmHG diastolic and/or current use of antihypertensive medication) was assessed during a medical examination which included blood pressure measurements. Worksite observers estimated participants' level of skill utilisation and four job barriers: interruptions by persons, blockage and failure of automated processes; difficulties in information processing, and difficulty with handling work equipment. Job barriers were quantified in minutes of extra work necessary to deal with the barrier. Self-reported measures included modified versions of the Job Content Questionnaire demand/control scales and the Effort-Reward-Imbalance Model.

Results: Prevalence of hypertension was 18% with the highest prevalence in the low grade (24%). Workers in the middle employment grade had the highest stressor load (163 min of extra work due to barriers vs 93 min in the low and 89 min in the high grade, $p=0.17$). Extra work across all barriers was associated with the job strain quotient ($r=0.34$, $p<0.01$), observed skill utilisation was correlated with self-reported decision latitude ($r=0.59$, $p<0.01$). Of the observational measures, extra work due to blockages and failure of automated processes were significantly associated with hypertension after controlling for age, gender, family history of heart disease, and employment grade (OR 1.41, 95% CI 1.04 to 1.93). This association was confirmed with systolic ($b=1.8$, $p<0.05$) and diastolic blood pressure ($b=1.6$, $p<0.01$) after exclusion of medicated individuals. Of the self-reported measures, distress feelings due to constant time pressure and heavy work load were significantly associated with hypertension.

Discussion/Conclusions: This is one of the few studies that shows significant associations between observed work characteristics and hypertension. The results speak for the usefulness of multi-method studies in occupational stress research. The detailed descriptions of barriers obtained in job analysis provide information for developing targeted job redesign strategies.

Infectious disease

132 PRENATAL EXPOSURE TO MATERNAL INFECTIONS AND RISK OF EPILEPSY

Y. Sun^{1,2}, M. Vestergaard^{1,3}, J. Christensen⁴, A. Nahmias⁵, J. Olsen^{1,6}.
¹Department of Epidemiology, Institute of Public Health, University of Aarhus, Denmark; ²Shanghai Institute of Planned Parenthood Research, Shanghai, China; ³Department of General Practice, Institute of Public Health, University of Aarhus, Denmark; ⁴Department of Neurology and Department of Clinical Pharmacology, Aarhus University Hospital, Denmark; ⁵Pediatric Infectious Diseases, Epidemiology and Immunology, Emory University, Atlanta, USA; ⁶Department of Epidemiology, School of Public Health, University of California at Los Angeles, USA

Background: New evidence indicates that prenatal exposure to maternal infections increase the risk of cerebral palsy, mental retardation, and schizophrenia. Aetiology of childhood epilepsy is still unclear and may originate in prenatal life.

Methods: We identified 90 619 singletons born between September 1997 and June 2003 from the Danish National Birth Cohort (DNBC) and followed them from the 29th day after birth to 31 December 2005. Maternal infection (cystitis, pyelonephritis, diarrhoea, cough, vaginal yeast infection, genital herpes, venereal warts, and herpes labialis) were reported by their mothers in computer-assisted telephone interviews. We considered cases of epilepsy those with a diagnosis recorded in the Danish National Hospital Register as inpatients and outpatients. We estimated the incidence rate ratios (IRR) of epilepsy through Cox regression.

Results: Compared with unexposed children, the relative risk of epilepsy was higher for those exposed in prenatal life to maternal cystitis (IRR 1.44, 95% CI 1.17 to 1.77), pyelonephritis (IRR 2.12, 95% CI 1.00 to 4.48), and diarrhoea (IRR 1.23, 95% CI 1.03 to 1.47). The longer the duration of diarrhoea, the higher the relative risk of epilepsy with an IRR of 1.50 (95% CI 1.07 to 2.09) for diarrhoea lasting four days or more. Coughs, lasting more than one week, were associated with an increased risk of epilepsy, in the first year of life with an IRR of 1.54 (95% CI 1.09 to 2.17). Vaginal

yeast infection was associated with a higher risk of epilepsy but only in children born preterm (IRR 2.63, 95% CI 1.45 to 4.76). We found no association between clinically manifest genital herpes, herpes labialis, venereal warts, and the risk of epilepsy.

Conclusions: Exposure to maternal infections was associated with a higher risk of epilepsy. Our findings have implications for public health if they reflect causal associations since early surveillance and treatment may prevent adverse neurodevelopment outcomes.

133 INCIDENCE OF AND FACTORS RELATED TO ACUTE HEPATITIS B IN BARCELONA, 1995–2005

M. Grau^{1,2}, P. Garcia-Olalla¹, H. Pañella¹, I. Subirana³, J. Vila³, J. A. Caylà¹.
¹Servei d'Epidemiologia, Agència de Salut Pública de Barcelona; ²Unitat Docent Medicina Preventiva i Salut Pública IMAS-UPF-ASPB, Barcelona; ³Unitat de Lipids i Epidemiologia Cardiovascular, Institut Municipal d'Investigació Mèdica, Barcelona, Spain

Objective: To analyse trends in acute hepatitis B virus (HBV) infection incidence, to characterise the distribution between genders, age groups, country of origin, and groups at risk of infection in Barcelona during 1995–2005.

Design: Acute HBV cases are reported by physicians to the active surveillance system of the Public Health Agency of Barcelona. Incident case of acute HBV infection was defined by positive serology for HbsAg and anti-HBc IgM, or seroconversion to anti-HBc detected during epidemiological surveillance in patients with compatible illness. Standardised annual incidence rates of acute HBV were computed using the Barcelona population in 2005. Incidence rate ratios (IRR) of every year against the mean of the whole period (1995–2005) were computed in a parametric Poisson regression stratified by country of origin. Data on most probable route of transmission in individuals older than 19 years were collected. For analysis purpose, data were aggregated in three different periods of time 1995–8, 1999–2002 and 2003–5.

Setting: Population of Barcelona.

Main Outcome Measures: Standardised annual incidence rates by age and sex and annual IRR of acute HBV in Barcelona.

Results: Between 1 January 1995 and 31 December 2005, 576 acute HBV cases were reported. Mean age was 39 (SD 14) years for men and 42 (SD 19) for women. Men have more than threefold the risk of women through the 10 years. The highest standardised incidence rate was observed in 2005 for both men and women: 9.41 and 2.50 per 100 000, respectively. An interaction was found between the country of origin and the diagnostic year. IRR was significantly higher than the mean of the whole 11-year period in 1997 (2.00 (95% CI 1.54–2.60)) and in 1998 (2.36 (95% CI 1.84–3.01)) and significantly lower in 2001 (0.64 (95% CI 0.42–0.97)) and 2005 (0.34 (95% CI 0.20–0.34)) for native people. However, IRR followed an increasing trend in foreign people being significantly higher in 2005 (3.81 (95% CI 2.38–6.07)). The number of cases attributed to injecting drug use has decreased significantly (35.7%–17.1%–8.0%, $p_{\text{trend}}<0.001$). In contrast, a significant increasing trend was observed in men who have sex with men (4.0%–13.0%–25.3%, $p_{\text{trend}}<0.001$), and in those who reported more than one heterosexual partner (5.6%–10.1%–17.3%, $p_{\text{trend}}<0.001$).

Conclusions: HBV incidence has decreased among native people in the period 1995–2005, however an increasing trend has been observed since 2001 for foreign people. An increase in the number of cases attributed to sexual contact has been observed together with a decrease in the number of those attributed to injecting drug use.

134 ETHNIC DIFFERENCES IN ACQUISITION OF EPSTEIN-BARR VIRUS INFECTION IN PRESCHOOL CHILDREN IN THE UK

S. E. Bartington¹, C. Peckham¹, F. Aladdin², J. Gray², D. W. Brown², C. Dezateux¹. ¹MRC Centre of Epidemiology for Child Health, UCL Institute of Child Health, London; ²Centre for Infections, Health Protection Agency, Colindale, UK

Background: Epstein-Barr virus (EBV) is a herpes virus. Infection may occur in early childhood, when it is frequently asymptomatic, and in adolescents and young adults when it causes infectious mononucleosis. EBV also establishes a lifelong dormant infection in some cells of the immune system. It is recognised as a sufficient cause of malignancies of the lymphatic system with ethnic group and age at acquisition reported as significant risk factors. However, little is known of the epidemiology of EBV infection in early

childhood and its long-term outcomes. Infection with EBV results in increased IgG to the viral capsid antigen that is thought to persist for life. This can be measured in oral fluid, a non-invasive sample suitable for large scale population studies in children.

Objective: To determine the prevalence and factors associated with EBV infection in preschool-aged children in the UK.

Design: Cohort study. Sample stratification by UK country and electoral ward type.

Setting: UK.

Participants: 14 630 singleton children aged 32 to 55 (median 37) months born between September 2000 and January 2002 in the UK and members of the Millennium Cohort Study.

Methods: Social and demographic information was obtained by home interview at age three years when oral fluid samples were collected and analysed using an EBV capsid antigen Time Resolved Fluorescent Immunoassay. For preliminary analyses, seropositivity was defined as >7600 counts, determined by serum validation. Multivariable Poisson regression was conducted using STATA to report crude and adjusted rate ratios (RR) for risk factors of interest after adjustment for survey design. Ethical approval was granted by the London Multicentre Research Ethics Committee.

Results: Oral fluid samples were available for 11 882 (81.2%) children, 11 869 (99.9%) of whom had a valid EBV assay result. The overall prevalence of EBV in the UK was 20.8%, highest in Scotland (23.4%) and lowest in Northern Ireland (19.1%). After adjustment for country and electoral ward type, EBV infection was more common in children with mothers of Black African (RR 2.00; 95% CI 1.71 to 2.33), Pakistani (1.57; 1.31 to 1.89) Bangladeshi (1.52; 1.26 to 1.84) or Indian (1.24; 1.04 to 1.47) ethnicity, than in children with White mothers.

Conclusions: Over one fifth of preschool children have acquired EBV infection by age three years in the UK. Maternal ethnic group appears to be the most important factor independently associated with infection. Further analyses will use mixture modelling to define seropositivity and explore possible explanations for observed ethnic differences.

135 INEQUALITIES IN UPTAKE OF INFLUENZA VACCINE BY DEPRIVATION AND RISK GROUP: TIME TRENDS ANALYSIS

C. A. C. Coupland¹, S. Harcourt², Y. Vinogradova¹, G. Smith², C. Joseph³, M. Pringle¹, J. Hippisley-Cox¹. ¹Division of Primary Care, University of Nottingham, UK; ²Health Protection Agency, West Midlands, Birmingham, UK; ³Respiratory Diseases Department, Health Protection Agency, Centre for Infections, London, UK

Objective: To investigate trends in influenza immunisation rates in the UK over a period of six years, and to examine trends in uptake by deprivation, sex, rurality and risk group.

Design: A retrospective analysis of influenza immunisation rates for the 6-year period from 1 April 1999 to 1 April 2005 using the QRESEARCH primary care database.

Setting: 413 general practices contributing to the UK QRESEARCH database spread throughout every strategic health authority and each health board in England, Wales, and Scotland.

Participants: All patients registered with these practices for at least three months on 1 April of each year.

Main Outcome Measures: Our study outcome was the proportion of patients who received an influenza vaccination during each vaccination interval between 1 September of each year in the study period and 31 March of the following year. Influenza immunisation rates were grouped by year, deprivation, sex, rurality, and risk group. We undertook a modified Poisson regression analysis to determine relative risks (with 95% CIs) for uptake of influenza vaccination for different patient groups over the study period.

Results: There was a relative increase of 59.5% in the overall vaccination rate over the study period from 10.8% in 1999/2000 to 17.2% in 2004/5. In patients aged 65 and over the vaccination rate increased from 43.2% to 70.2% across the study period. The biggest increase across the risk groups was observed in patients with diabetes (71.1% increase), and the smallest increase was in immunosuppressed patients (40.1% increase). In the 2004/5 vaccination season, only 29.3% of patients aged less than 65 who were in a risk group were vaccinated. In a multivariate analysis, males had a 9.6% (95% CI 9.4 to 9.7) lower vaccination rate overall and patients from deprived areas had a 3.3% (95% CI 3.0 to 3.6) lower rate.

Conclusion: This general practice based study suggests that substantial increases in influenza vaccination rates have occurred across all risk groups but that increased focus should be given to immunising high-risk patients below the age of 65.

The environment and health

136 PM_{2.5} AS INDICATOR OF THE AIR POLLUTION INFLUENCE OVER DAILY HOSPITAL ADMISSIONS IN MADRID, SPAIN (2001–2005)

J. Díaz, C. Linares. Adviser to the Autónoma University General Foundation of Madrid, on behalf of the Department of Education for Sustainable Development, Madrid City Council, Madrid, Spain

Background: The last report of WHO Air Quality Guidelines for particulate matter, ozone, nitrogen dioxide and sulphur dioxide of 2005 assessed about the use of PM_{2.5} guideline value is preferred instead of the PM₁₀ values. The aim of this paper is to analyse if concentrations of PM_{2.5} are the best indicator of the air pollution quality and quantify its influences over daily hospital admissions.

Methods: As dependent variable has been used the daily number of emergency hospital admissions to the Hospital General Universitario Gregorio Marañón since 2001 to 2005. The causes analysed were all causes (ICD-9: 1–799), respiratory (ICD-9: 460–519) and circulatory causes (ICD-9: 390–459), traumas and births were excluded. The independent variables were daily records of PM_{2.5}, PM₁₀, NO₂, NO_x, SO₂ and O₃ mean concentrations in Madrid. Seasonalities and trend were used as control variables, also, flu epidemics, noise and pollen concentration were used. Poisson Regression Models were performed to calculate the relative risk (RR) and the attributable risk (AR).

Results: PM_{2.5} concentrations were the one primary pollutant that resulted statically significant in the models. The function relationship with hospital admissions was lineal and without threshold. The RR for an increase of 25 µg/m³ in PM_{2.5} concentrations was 1.07 (95% CI 1.05 to 1.09) for all causes; for circulatory causes was 1.08 (95% CI 1.03 to 1.13) and for respiratory causes was 1.07 (95% CI 1.02 to 1.11). The ARs were 6.7%, 7.5% and 6.3% respectively. These values were significantly higher than the results obtained for PM₁₀ concentrations.

Conclusions: PM_{2.5} concentrations were the one primary pollutant that showed statically association with hospital admissions in Madrid during the period studied. The RR obtained shows the need to implement the measurements to reduce the concentrations of PM_{2.5} in Madrid.

137 CAN A CHANGE IN TRAFFIC POLICY IMPROVE CHILDREN'S RESPIRATORY HEALTH? THE OXFORD EXPERIENCE

S. J. MacNeill¹, F. Goddard¹, R. Pitman², S. Tharme³, P. Cullinan¹. ¹Department of Occupational and Environmental Medicine, NHLI, Imperial College, London; ²Department of Environmental Health, Oxford City Council, Oxford; ³Department of Environment and Health, Oxford County Council, Oxford, UK

Objective: To assess the impact of a change in transport policy on the peak expiratory flow and respiratory symptoms of children.

Design: Dynamic cohort study of children before and after a traffic intervention.

Setting: Seven first schools in Oxford, UK.

Participants: 1389 children aged 6–10.

Interventions: The Oxford Transport Strategy (OTS) is a major traffic intervention implemented in Oxford in June 1999.

Main Outcome Measures: The main outcome measures were daily peak expiratory flow and self-reported symptoms of wheeze, runny nose and cough. Data were collected at the schools 2–3 times a year for five-day periods between 1998 and 2000.

Results: Compared to many major cities, traffic levels in Oxford were relatively low pre-OTS. Despite these low levels, adjusted regression analyses showed significant improvements in PEF and wheeze post-OTS (PEF: beta = 5.71 l/min, (95% CI 3.23 to 8.18); wheeze: OR 0.80, (95% CI 0.69 to 0.92)). Improvements in PEF were found to be greater among children living near roads where traffic decreased post-OTS compared to those living where there had been an increase. The association was limited to children currently receiving treatment for asthma and to those in SEC III-V.

Conclusions: These findings suggest that city-wide interventions can lead to improvements to children's respiratory health. The benefits of these interventions may be most relevant to children already experiencing respiratory problems or come from less affluent socioeconomic backgrounds.

138 NOISE EXPOSURE FROM WIND TURBINES: RESPONSE AND EFFECT

E. Pedersen. Department of Public Health and Community Medicine, Gothenburg University, Sweden

Background: The increasing number of wind turbines has led to a concern with possible adverse effects on people that are exposed to the noise. There is a need to estimate the prevalence of annoyance due to wind turbine noise, identify moderating factors and describe possible health effects.

Method: Two cross-sectional studies were carried out within 12 geographical areas in Sweden that differed with regard to terrain and degree of urbanisation (suburban vs rural), but that all comprised wind turbines of nominal power 600 kW or larger. Subjective responses were obtained by a questionnaire, which purpose was masked (response rate: 60%; $n=1095$). Doses of wind turbine noise were calculated as A-weighted sound pressure levels (SPLs) outside the dwellings of each respondent (range 25–45 dBA).

Results: A dose-response relationship was found both for perception of the noise (OR 1.4; 95% CI 1.30 to 1.43) and for noise annoyance (OR 1.2; 95% CI 1.13 to 1.29). The risk for annoyance was enhanced among respondents that could see at least one turbine from their dwelling and among those living in rural areas. Sound characteristics related to the amplitude modulation of the sound ('beating') were appraised as the most annoying (swishing, whistling and pulsating/throbbing). Being negative towards the visual impact of the wind turbines on the landscape scenery was strongly associated with annoyance (OR 5.2; 95% CI 3.85 to 7.09; adjusted for SPL). Self-reported health impairment was not directly correlated to SPL. Decreased well-being (being strained/stressed, irritable, unusually tired and feeling pain in neck, back or shoulders) was associated with noise annoyance (OR 1.2; 95% CI 1.0 to 1.6; adjusted for SPL). Indications of possible hindrance in psycho-physiological restoration were observed.

Conclusions: Wind turbines are placed in areas with low levels of background noise and the sound comprises an amplitude modulation which makes the noise easy to perceive and also annoying. Wind turbines are furthermore prominent objects, with a rotational movement that attracts the eye. Multimodal sensory effects or negative aesthetical response could enhance the risk for noise annoyance. No direct health effects could be linked to wind turbine noise. However, the exposure could possibly lead to stress-related symptoms due to prolonged physiological arousal and hindrance of restoration.

139 NEIGHBOURHOOD QUALITY AND HEALTH: A RECORD-LINKED CENSUS ANALYSIS

F. D. Dunstan, D. M. Farewell, D. L. Fone. Centre for Health Sciences Research, Cardiff University, UK

Background: The evidence for neighbourhood effects on health is mixed, partly because sample sizes from neighbourhoods are often small and because both the health outcome and the measurement of neighbourhood characteristics are based on responses to the same survey. We investigated the relationship between self-rated health and an objective measure of neighbourhood quality in a unique analysis of census records.

Methods: Data were available for 31 442 respondents to the 2001 Census in 777 postcodes in the boroughs of Neath Port Talbot and Caerphilly in south Wales. Self-rated health, as recorded in the census, was coded into a binary variable of poor/better than poor health. The quality of the built environment was measured at postcode level by the Residential Environment Assessment Tool (REAT), measured by an outside observer and previously developed and validated for this purpose, and these were linked to the census records. Areas were divided into tertiles based on the REAT score; tertile 1 has the best environment and tertile 3 the worst. A multilevel logistic model was fitted using individuals nested within postcodes, adjusting for the individual-level variables of age, gender, economic activity, housing tenure and marital status, and for area deprivation as measured at lower super output area level by the Welsh Index of Multiple Deprivation.

Results: The odds ratios for poor health in tertiles 2 and 3 compared with tertile 1 were 1.49 (95% CI 1.32 to 1.70) and 1.59 (95% CI 1.40 to 1.80). After adjusting for individual level covariates these became 1.42 (95% CI 1.29 to 1.57) and 1.47 (95% CI 1.32 to 1.63), while after adjusting for area deprivation they were 1.45 (95% CI 1.30 to 1.61) and 1.40 (95% CI 1.26 to 1.56). There was no evidence of cross-level interactions between REAT scores and individual level variables.

Conclusions: This is further evidence that the environmental quality of the neighbourhood in which people live has an influence on the risk of them reporting poor health, even when adjusted for individual socioeconomic status and area deprivation. It strengthens the case for targeting interventions at area level, as well as at individuals.

Lifestyle: drug use and health

140 COHORT STUDY OF RISK FACTORS ASSOCIATED WITH METHADONE-RELATED DEATHS

C. McCowan¹, B. Kidd², T. Fahey³. ¹Division of Community Health Sciences, University of Dundee, Scotland; ²Department of Psychiatry, University of Dundee, UK; ³Department of General Practice, RCSI Medical School, Dublin, Ireland

Introduction: Drug misusers have an annual mortality rate six times higher than the general population, with over two thirds being due to drug overdose. This represents a significant public health problem. Community treatment with methadone has been described as a "double-edged sword" because methadone itself is associated with drug-related death. Risk of death may be due to an interaction of risk factors—drug dosing, concurrent use of other drugs and deficiencies in the organisation and delivery of methadone care programmes. The aim of this study was to examine factors associated with methadone-related deaths using individual patient data in a geographically defined population in Tayside, Scotland.

Methods: A cohort of patients aged 16–60 who all encashed a prescription for methadone between 1993 and February 2004 were identified in Tayside, Scotland comprising 400 000 individuals in 74 general practices. All prescribing records, hospital admission records and General Registrars Office death certificates were extracted and anonymised. A Cox proportional hazard models was used to assess the impact of sex, socioeconomic status, comorbidity, age at first prescription, methadone use, co-prescribing of psychotics, hypnotics, opiates and antidepressants on time from first prescription to death.

Results: There were a total of 2169 patients in the cohort with 169 (7.8%) reported dead during the follow-up period. Univariable analysis show that increasing age, increasing comorbidity, overuse of methadone (completing prescriptions quicker than the recommended coverage) and increasing number of three-month breaks from methadone were all associated with increased risk of death. Increasing duration of methadone use was associated with a decreased risk of death. Multivariable regression analysis controlling for potential confounding factors show an independent association with risk of death for use of hypnotics, hazard ratio (HR) 2.01, 95% CI 1.15 to 3.51, increased co-morbidity, HR 8.58, 95% CI 5.79 to 12.70 and overuse of methadone, HR 1.93, 95% CI 1.10 to 3.38. Increased duration of methadone use remained independently protective in relation to risk of death, HR 0.79, 95% CI 0.73 to 0.83.

Conclusions: This study confirms that risk of death in methadone users remains high. Increased risk of death is associated with comorbidity, co-prescribing of hypnotic drugs, overuse of methadone and breaks from methadone use. We will propose quality prescribing standards to minimise methadone-related deaths and discuss health policy implications for methadone programmes.

141 LIFE COURSE ANTECEDENTS AND POSSIBLE CONSEQUENCES OF INJECTION DRUG USE: FOLLOW-UP OF A COHORT OF INJECTION OPIATE USERS RECRUITED IN PRIMARY CARE

R. Robertson¹, J. Macleod², M. Hickman³, L. Copeland¹, J. McKenzie¹. ¹Section of General Practice, Department of Community Health Sciences, University of Edinburgh; ²Department of Primary Care and General Practice, University of Birmingham; ³Department of Social Medicine, University of Bristol, UK

Background: Injection drug use is a common and important public health problem whose epidemiology is poorly understood. In particular, there is currently very little evidence from community-based longitudinal samples of drug injectors.

Objective: To trace injection opiate users presenting to a single community health facility over a 20-year period. To assess early social environment and associated exposures prior to the onset of injecting along with health and social outcomes subsequent to the onset of injecting.

Design: Community-based cohort study; assessment of participants was by a combination of interview based on the "life grid" approach and linkage to primary medical care records, death certificates, the Scottish Morbidity Registers 1 and 4 (general and psychiatric hospital discharge diagnoses) and police and prison records

Setting: South East Scotland.

Participants: 554 men and 260 women who presented at Muirhouse Medical Group, Edinburgh with problems related to injection opiate use between 1981 and 2002.

Main Outcome Measures: Cause specific mortality; hospitalisation; other significant morbidity and use of primary care services, experience of adversity and victimisation in early life, injection and non-injection drug use, substitute prescriptions, contact with the criminal justice system.

Results: 222 (27%) cohort members have died and the mean age of surviving cohort members is 37 years. The commonest cause of death was HIV/AIDS (103, 46%) followed by overdose (52, 23%). Of the living 252 (43%) are still registered at the practice. By January 2007, 343 (58%) of living cohort members had been interviewed. Significant early life adversity was common among cohort members, 55% had a carer with alcohol problems, 20% reported sexual abuse. 55% had been excluded from school and 52% experienced police contact while still of school age. 66% had been imprisoned as adults. Currently, 29% continue to inject, 95% are current smokers, 36% have a current alcohol problem and 69% are receiving a substitute prescription.

Conclusions: Drug injection is associated with high risk of mortality and morbidity. The early life of injectors is characterised by substantial socio-environmental adversity and from adolescence into adulthood this group show high levels of criminal involvement and contact with the criminal justice system. Continued injection into middle adulthood is common as are high levels of non-injection drug use and associated morbidity. We plan to recruit non-injecting practice controls to clarify effects of adversity on injection risk and effects of injection on health and social outcomes after adjustment for shared area level deprivation.

142 2004 STUDY OF DRUG PREVALENCE IN CORK AND KERRY, IRELAND, SHOWED MARKEDLY HIGHER LEVELS OF DRUG USE COMPARED TO NATIONAL SURVEY ESTIMATES IN 2003. IS THIS DIFFERENCE DUE TO METHOD OF INTERVIEWING (SELF-REPORTING VS DIRECT)?

T. Jackson. Department of Public Health, Health Service Executive, Cork, Ireland

Objective and Methods: This survey repeated the main features of a baseline survey, carried out in 1996. It explored: (a) knowledge and attitudes towards drugs and services; (b) alcohol and tobacco consumption; (c) personal drug, and alcohol problem use. It was a multistaged, quota-controlled, household survey. 1508 were sampled from the three regions of Cork City, Cork County, and County Kerry, aged 15–44 years; with a younger 15–24-year-old subsample of 909 from urban deprived areas in each region, as determined by SARHU index.

Results: *Smoking use:* 38% currently smoked. This increased from 29% at 15 years, to 32% at 16–17 years, and 40% at 18–34 years. Smoking at 15 years almost trebled, from 10% to 29% ($p=0.01$) from 1996 to 2004; Boys showing a 10-fold increase, from 3% to 32% ($p=0.005$). *Alcohol use:* 41% of those under 18 years were current drinkers. In current drinkers over 18 years, men showed no significant changes in their pattern of consumption, but women showed increases in more damaging patterns of excessive, problem, and dependent use, since 1996 ($p=0.001$). *Drug use:* 34% had ever used a drug, 15% in the last year, and 8% in the last month. Each of these categories had doubled since 1996 ($p<0.001$). Drugs used were mainly cannabis, hallucinogens, and stimulants. Only 2% had ever taken opiates. These findings were compared to a subset of the NACD 2003 national study, for ages 15–34 years. This used almost identical methodology, except for direct interviewing of clients for personal drug use. In contrast, the Cork and Kerry study used confidential self-completion sections for personal drug and problem alcohol use. The prevalence of current smoking (31%), and alcohol use (80%), were very similar in the two studies. However, last year drug use in the Cork and Kerry study was generally twice that of the NACD for any drug, cannabis, cocaine and ecstasy.

Conclusions: The Cork and Kerry study findings were comparable to several other studies, which also used confidential self-reporting sections for drug use. The literature also suggests that yields from self-reporting, for sensitive problems, can be higher than direct interviewing.

143 RISK OF OPIATE OVERDOSE DEATH DURING AND FOLLOWING SPECIALIST DRUG TREATMENT: RESULTS FROM VEDETTE STUDY AND IMPLICATIONS FOR SHORT-TERM THERAPIES

M. Hickman¹, M. Davoli², A. M. Bargagli², P. Schifano², C. A. Perucci². ¹Social Medicine, University of Bristol, UK; ²Department of Epidemiology, Rome E Health Authority, Italy (for VEdeTTE Study Group)

Background: Government targets to reduce drug related overdose deaths by 20% in UK from 1999 to 2005 have not been met. The reduction was less than 1%. Specialist drug treatment is critical to overdose prevention.

We know the risk of overdose is increased following release from prison, and that methadone maintenance can be protective, but lack evidence for other modalities and risk of overdose immediately following treatment. The VEdeTTE Study is a prospective cohort of 10 454 heroin users recruited in Italy (1998–2002) which can evaluate the impact of a range of treatments (methadone maintenance, detox and psychosocial) on overdose mortality.

Methods: VEdeTTE cohort followed up heroin users for 10 208 person-years in treatment and 2914 person-years out of treatment. We compared overdose mortality for heroin users in and out of treatment using (age and sex) standardised overall mortality ratios (SMR) and hazard ratios (HR), and compared scenario of one month treatment and one month after treatment versus two months no treatment.

Findings: There were 41 overdose deaths, 10 during treatment and 31 out of treatment, giving annual mortality rates of 0.1% and 1.1% and SMR of 3.9 (95% CI 2.8 to 5.4) and 21.4 (16.7 to 27.4) compared to general population respectively. Retention in the range of treatments was protective against overdose mortality (HR 0.09, 95% CI 0.04 to 0.19) independent of treatment type and potential confounders. The month immediately after treatment was the greatest risk for fatal overdose with a mortality rate of 2.3% and HR of 26.6 (95% CI 11.6 to 61.1). After one month the mortality rate was approximately 0.8%. Most of the overdose deaths following detoxification had completed treatment, whereas most of the overdose deaths following methadone maintenance dropped out of treatment. We estimate excess mortality risk of short-term therapies (lasting less than one month) to be 8 per 10 000 or 1 in 1250 events.

Implications: Treatment for heroin dependence reduces overdose mortality risk. Overdose risk in the period immediately following treatment may be comparable to the risk following prison release. Long-term effectiveness of short-term therapies has been questioned. The study provides evidence that they also may also maybe clinically dangerous. Large scale observational follow-up studies are required in UK and other countries to corroborate and test the findings. Detoxification services should be reviewed, following our corroboration of the finding that risk of overdose is higher among treatment completers.

Psychosocial health

144 DETERMINANTS OF SUBJECTIVE SOCIAL POSITION AMONG RETIRED MEN AND WOMEN IN THE GAZEL COHORT

C. Ribet, A. Gueguen, A. Singh-Manoux, M. Zins, M. Goldberg. U687: INSERM-CNAMTS-IFR69, Saint-Maurice, France

Context: Recent studies have used a subjective measure of social position—subjective because it refers to the perception that an individual has of his/her place in the social hierarchy. In particular, it has been observed that subjective social position (SSP) was essentially determined by occupation, education, household income, satisfaction with standard of living, and feeling of financial security regarding the future.

Objective: To examine socioeconomic and health-related factors as determinants of SSP in a population of retired men and women.

Methods: Data used were based on the GAZEL cohort composed by 20 624 volunteers, employed at the French Electricity and Gas company and annually followed up since 1989. 9095 retired men and women aged 50–65 years in 2004 were included for this analysis. SSP was measured using a ladder at 10 levels on which individuals must themselves represent the place they think to have in the social hierarchy. Three categories of determinants were analysed: (1) current socioeconomic factors (occupational grade before retirement, spouse's occupational situation, household income, household wealth, feeling of financial security, marital status); (2) past socioeconomic factors (occupational grade at entry to the company, educational level, father's occupational grade, number of financial difficulties in childhood, height); (3) health-related factors (mental health (CESD), number of pathologies). Univariate and multivariate analysis (linear regression) had been used to study relationships between SSP and determinants (by using R^2 or "percentage of explained variance"). Results had been adjusted for age and gender.

Results: The univariate part indicated that all determinants analysed were significantly associated with SSP. Determinants explaining the greatest percentage of variance were: occupational grade before retirement (21.9%) and household income (19.4%), followed by educational level (13.7%), occupational grade at entry (13.6%), household wealth (12.7%) and feeling of financial security (11.1%). The global model including all socioeconomic and health-related factors led to 33.7% of explained variance in the ladder. All determinants, excepted marital status and

number of pathologies, remained significantly associated with SSP. Resulted also showed that the six strongest predictors of SSP were in decreasing order: occupational grade before retirement, feeling of financial security, household income, household wealth, occupational grade at entry to the company, number of financial difficulties in childhood. **Conclusion:** Our study showed that people use mainly current and past socioeconomic criteria to assign themselves SSP.

145 DOES FAMILY PROCESS EXPLAIN FAVOURABLE PSYCHOLOGICAL WELL-BEING SCORES IN ADOLESCENTS FROM MINORITY ETHNIC GROUPS IN THE MRC DASH STUDY?

M. J. Maynard, S. Harding. *Medical Research Council, Social and Public Health Sciences Unit, Glasgow, UK*

Background: Minority ethnic groups in the DASH study have better psychological well-being (measured by Goodman's strengths and difficulties questionnaire (SDQ)), compared to their White counterparts despite some groups having significantly poorer socioeconomic status (SES).

Objectives: To examine (a) the association between family process (how families function) and psychological well-being, taking into account family type and SES, among adolescents from a range of ethnic groups and (b) whether family process accounts for differences in psychological well-being between ethnic groups.

Design: The DASH (Determinants of Adolescent Social well-being and Health) study includes 6632 pupils in 51 London schools. This analysis uses baseline data collected at age 11–13 in 2003. Adolescent psychological well-being is based on the total difficulties score (TDS) obtained from the self-reported 25-item SDQ. Higher scores reflect more difficulties. Family process is based on frequency of time spent in six activities with family members: "watch TV", "play indoor games", "eat a meal", "go for a walk", "visit friends or relatives", "go other places". The sample includes 1224 White UK, 926 Black Caribbean, 1073 Black African, 494 Indian and 621 Pakistani/Bangladeshi pupils who completed the SDQ and questions on family type, family process and SES.

Results: Distributions of family activities varied between ethnic groups. For example South Asian participants were more likely, and those of Black Caribbean or African origin less likely, to eat a meal as a family compared to Whites. All minority groups were more likely to visit friends and go other places compared to Whites. In multivariate analyses based on the whole sample, all six activity variables were significant correlates of TDS, independent of family type and SES. The largest effect size was for eating a meal together where <weekly compared to everyday occurrence was associated with a significant increase in TDS (regression coefficient 1.65, 95% CI 1.20 to 2.08). In models stratified by ethnicity family activity-TDS associations varied across groups. For example, eating a meal together <weekly was associated with higher TDS for all groups except the Black Caribbeans. For Black Caribbeans only, weekly compared to daily visiting friends and going other places were associated with lower TDS. Adjusting for differences in family activity frequency did not explain the lower TDS in minority groups compared to Whites.

Conclusion: There was ethnic patterning in the frequency and impact of family activities but this did not account for the protective effect of minority ethnicity on self-reported psychological well-being.

146 SOCIOECONOMIC INEQUALITIES IN HEALTH: THE CONTRIBUTION OF PHYSICAL AND PSYCHOSOCIAL WORKING CONDITIONS

R. Kaikkonen¹, O. Rahkonen², T. Lallukka², E. Lahelma². ¹Department of Health and Functional Capacity, National Public Health Institute; ²Department of Public Health, University of Helsinki, Finland

Objectives: To examine physical and psychosocial working conditions as explanations for socioeconomic inequalities in health related functioning (SF-36, PCS).

Design: Cross-sectional survey data collected in 2000, 2001 and 2002 using logistic regression analysis.

Setting: City of Helsinki, Finland.

Participants: Municipal employees of the City of Helsinki, aged 40–60 years (n=8960, 7168 women and 1792 men, response rate 67%).

Main Outcome Measures: SF-36, Physical Component Summary (PCS).

Results: There was a clear occupational social class gradient in health-related functioning: poor physical functioning was much more prevalent in the lowest class as compared with the highest class both among women (OR 3.11; 95% CI 2.09 to 4.62) and men (OR 2.42; 95% CI 1.49 to 3.95). Heavy physical workload explained 44% of women's and half of men's, and exposure to harmful chemicals and different work environment related exposures explained 11% of women's and 64% of men's occupational class gradient in functioning. However, physical working conditions showed bidirectional effects: when computer aided work was taken into account, the class gap widened by 37% for women and by 33% for men. Psychosocial working conditions had only minor and also bidirectional effects: Karasek's job demands somewhat increased, whereas job control somewhat attenuated the gradient. When simultaneously adjusting for all three physical and seven psychosocial working conditions, women's inequalities in functioning decreased by 17% and men's by 31%.

Conclusions: Working conditions, especially physical working conditions, explain a large part of socioeconomic inequalities in SF-36 physical functioning. The bidirectional effects of working conditions on the gradient are also a notable finding. This study shows that in particular physical working conditions should be taken into account in health inequality research since they are likely to explain health inequalities markedly more than psychosocial working conditions.

147 WELL-BEING AND SOCIAL PRODUCTIVE ACTIVITIES IN THE YEARS BEFORE STATE PENSION AGE: RESULTS FROM THE ENGLISH LONGITUDINAL STUDY OF AGEING

P. Zaninotto¹, E. Breeze¹, A. McMunn¹, J. Nazroo². ¹Department of Epidemiology & Public Health, UCL, London; ²School of Social Sciences, University of Manchester, Manchester, UK

Objective: To explore the association between engagement in social productive activities, such as caring for someone, volunteering and membership in organisations and well-being (measured by quality of life and life satisfaction) for a pre-retirement population, and the extent to which these relationships vary according to rewards from these activities.

Setting: England 2003–4.

Design: Cross-sectional.

Participants: 3247 participants in the years leading up to State Pension Age (aged 52–64 for men or 59 for women) from the English Longitudinal Study of Ageing.

Measures: Main outcomes variables are CASP19 to measure quality of life (range 6–57) and SWLS for Life Satisfaction (range 5–35). The quality of exchange was measured in terms of experiencing social recognition for the effort spent into the activity. The variables were coded as "No activity", "Feeling rewarded", "Not feeling rewarded" for caring and volunteering respectively.

Results: Descriptive analyses showed that volunteering and being active members of an organisation were associated with better quality of life and life satisfaction in both sexes. Among women caring (compared to not caring) was associated with lower quality of life. Multivariate results showed that caring without perceived reward (compared to not caring) was associated with reduced quality of life among men (–2.66, 95% CI –4.90 to –0.41) and women (–5.21, 95% CI –7.58 to –2.84) and lower life satisfaction among women only (–2.98, 95% CI –4.68 to –1.28). Perceived reward in volunteering (compared to not volunteering) was associated with increased quality of life and life satisfaction for women (2.07, 95% CI 0.64 to 3.50 and 1.32, 95% CI 0.18 to 2.46 respectively) and increased quality of life score only for men (2.76, 95% CI 1.51 to 4.02). Active members of an organisation had higher scores of quality of life (men and women) and life satisfaction (men only) compared with others.

Conclusions: Engagement in socially productive activities is related with greater quality of life and life satisfaction. In addition, the quality of the activity—in terms of perceived reward—is also important.