free legislation, the persisting relative inequalities in SHS exposure by SES highlight the need for continued investment in tobacco control policies.

OP16   **DEVELOPING A SMOKE-FREE HOME INTERVENTION FOR NEONATAL INTENSIVE CARE UNITS – A QUALITATIVE STUDY**

[1]CJ Notley*, [1]TJ Brown, [2]A Nichols, [3]L Bauld, [4]W Hardeman, [5]E Boyle, [5]M Hubbard, [4]F Naughton, [6]M Ussher, [1,2]P Clarke, [7]R Holland, [8]S Orton. [1]Norwich Medical School, University of East Anglia, Norwich, UK; [2]Norfolk and Norwich University Hospitals NHS Foundation Trust, Norwich, UK; [3]Edinburgh University, Edinburgh, UK; [4]School Of Health Sciences, University of East Anglia, Norwich, UK; [5]University Hospitals of Leicester NHS Trust, Leicester, UK; [6]St Georges, University of London and University of Stirling, London and Stirling, UK; [7]Leicester Medical School, Leicester, UK; [8]University of Nottingham, Nottingham, UK

Background Babies born to smokers weigh on average 200 g less than those born to non-smokers and are at 40% higher risk of being born preterm. The relative risk of admission to Neonatal Intensive Care units (NICU) for infants of smokers is increased by at least 20%. Parents of infants admitted to NICU may feel helpless and overwhelmed at a time when their baby is critically ill. Stopping smoking, or remaining abstinent, is one of the few things that parents can do to significantly improve the longer-term recovery and health of their offspring, yet stressed parents are at increased risk of smoking relapse. NICU admission may represent a 'teachable moment' where parents are receptive to smoking cessation.

Methods Qualitative focus groups and interviews with parents and family members of babies admitted to NICUs. Participants were purposively sampled (n=60) from NICUs across two large UK teaching hospitals, seeking maximum variation in smoking status, parental/familial status, ethnicity and socioeconomic status. Qualitative topic guides sought feedback on potential intervention approaches, considering 'who' might introduce, 'what' might be the content, and 'when' an intervention might be delivered. Data were collected face to face by dedicated neonatal research nurses. All data were audio recorded and transcribed verbatim. Inductive thematic analysis of data was conducted by two members of the research team, independently reviewing coding to reach consensus on emergent themes.

Results Parents appear amenable to smoking cessation and express surprise that the subject is not addressed. Immediate addressing of smoking status would not be appropriate on acute admission to NICU due to stress and concerns regarding the newborn, but timely support is needed to reach those willing to quit, and those who had quit during pregnancy but were at high risk of relapse. Support might best be delivered by a NICU nurse with specialist training. Support with cessation and relapse prevention through information about smoke-free homes, nicotine replacement therapy and/or support to use nicotine in significantly less harmful ways (e.g. vaping) were identified as promising routes for intervention. Parents welcomed ongoing support following discharge from NICU and were amenable to digital options.

Conclusion There is presently little dedicated support for smoking cessation, relapse prevention or smoke-free homes for families of NICU babies. Parents are amenable to support and consider a focus on smoke-free homes as a less stigmatising way in which smoking may be discussed and cessation promoted to improve the health of premature babies.

OP17   **EXAMINING INEQUALITY IN TRIALS OF SMOKING CESSATION INTERVENTIONS DELIVERED IN PRIMARY CARE: CRITIQUE AND REANALYSIS OF COCHRANE REVIEWS**

[1,2]JM Birch*, [2]H Dambha-Miller, [1,2]SJ Griffin, [2]GB Hutton, [2]MP Kelly, [2]AL Kinmonth. [1]MRC Epidemiology Unit, University of Cambridge, Cambridge, UK; [2]Department of Public Health and Primary Care, University of Cambridge, Cambridge, UK

Background Tobacco smoking is a major cause of chronic disease and premature mortality. Its effects are socially patterned. Observational studies show that low socioeconomic status [SES] is associated with higher smoking prevalence and lower cessation rates. Interventions in primary care may improve or exacerbate health inequalities depending on socioeconomic patterning of access and uptake. Data on the impact of trials of smoking cessation interventions delivered in primary care on health inequalities by SES have not been synthesised. We examined the impact of smoking cessation interventions delivered in primary care on inequalities in health by socioeconomic status.

Methods We searched the Cochrane database of systematic reviews from inception until June 2019. We included reviews of trials of smoking cessation interventions delivered in primary care and published in English.

Results We identified eight Cochrane reviews (413 studies). Eighty five studies included an intervention delivered in primary care. Interventions were: behavioural, (very) brief advice, and pharmacological (including nicotine replacement therapy). Full texts were accessed for 70 studies; 17 reported an SES measure. Two studies targeted low-SES groups. There was heterogeneity in SES measures used across the studies, which included household income, occupational level and social class. Three studies analysed SES as a predictor of effectiveness of the smoking cessation intervention; none found that effectiveness differed by SES.

Discussion This summary and critique of Cochrane reviews demonstrates that trials of smoking cessation interventions delivered in primary care are not designed to allow analysis of effects by measures of SES. Studies rarely reported SES of participants at baseline and hardly ever as a predictor of smoking cessation. Our work highlights the need for routine reporting of SES amongst trials and greater consensus in included measures. Consistent reporting of a core set of SES indicators will enable testing of similarities between trial groups and differential effects by SES.

OP18   **FROM SMOKING-PERMITTED TO SMOKEFREE PRISONS: A 3-YEAR EVALUATION OF THE CHANGES IN OCCUPATIONAL EXPOSURE TO SECOND-HAND SMOKE ACROSS A NATIONAL PRISON SYSTEM**

[1]S Semple*, [2]E Demou, [1]R Dobson, [2]H Sweeting, [3]S Sidwell, [1]A Brown, [1]R O'Donnell, [1]K Hunt. [1]Institute for Social Marketing and Health, University of Stirling, Stirling, UK; [2]MRC/CSO SPHSU, University of Glasgow, Glasgow, UK; [3]Scottish Prison Service, SPS, Edinburgh, UK

Background Prisons were one of the only workplaces where smoking continued to be permitted after the smoking ban in indoor public places in Scotland in 2006. Hence, the prison workforce remained potentially exposed to secondhand smoke

(SHS). In November 2018 comprehensive restrictions on smoking in Scottish prisons were introduced to protect staff and people in custody from SHS exposure. This study compares SHS exposure assessment results six months after implementation of smokefree policy with levels measured in 2016 before the policy was announced.

Methods Setting: Scotland's 15 prisons

In 2016, 128,431 minutes of $PM_{2.5}$ (as a marker of SHS) concentration data were collected from residential halls and 2,860 minutes for 'task-based' measures; equivalent figures for 2019 were 126,777 minutes (residential halls) and 3,073 minutes (task based).

Six days of fixed-site monitoring were conducted in residential halls in each prison over 6 days commencing 22.5.19. Task-based measurements were also conducted to assess SHS in specific locations (e.g. workshops) and during specific activities (e.g. cell searches). Utilising these monitoring data, typical daily $PM_{2.5}$ exposure profiles were constructed for the prison service and time-weighted average exposure concentrations were estimated for typical shift patterns for residential staff pre- and post-implementation of the smokefree policy. Staff self-reports of exposure to SHS were also gathered using online surveys.

Results Measured $PM_{2.5}$ in residential halls declined markedly; median fixed-site concentrations reduced by more than 91% compared to baseline. The changes in the task-based measurements (89% average decrease for high-exposure tasks) and time-weighted average concentrations across shifts (over 90% decrease across all shifts), provide evidence that prison staff exposure to SHS has significantly reduced. The percentage of staff reporting no exposure to SHS rose between from 19% to 74% among all staff in Phase 3.

Discussion To our knowledge, this study is the first comprehensive international study to objectively measure SHS levels before, during and after implementation of a smokefree policy across a country's prison system. The dramatic reduction in SHS exposures confirmed complementary qualitative data and stakeholder reports of the success of the smoking ban in removing tobacco.

The findings demonstrate that SHS exposures can be effectively eliminated through a well-applied smoking ban in the challenging context of prisons; and are highly relevant for other jurisdictions considering changes to prison smoking legislation.

Wednesday 9 September

Health Inequalities

OP19 QUANTIFYING MULTI-MORBIDITY IN AN ETHNICALLY-DIVERSE INNER CITY POPULATION: EXPLORING THE HEALTH BURDEN OF HOUSEHOLDS USING A RETROSPECTIVE E-COHORT

[1]G Harper*, [2]J Lyons, [2]A Akbary, [2]R Fry, [1]Z Ahmed, [2]R Lyons, [1]C Dexateux, [1]J Robson. [1]*Clinical Effectiveness Group, Institute of Population Health Science, QMUL, London, UK*; [2]*Biomedical Sciences/Medicine, Swansea University, UK*

Background Multi-morbidity is a growing challenge globally. New insights and approaches into the patterns of, and contributing factors to, multi-morbidity, using large routinely-collected patient data resources, are current research priorities. There is evidence that individuals who live with people with a long-term condition are at increased risk of a long-term condition themselves, however to date there has been no assessment of multi-morbidity at a household level.

General practitioner (GP) Electronic Health Records (EHRs) contain rich demographic and clinical data for research to quantify and explore household multi-morbidity. We investigated this by creating and linking GP-EHRs to a unique household identifier based on the patient address.

Methods GP-EHRs for 1,164,736 patients registered with GP practices in four London boroughs at mid-2018 were extracted to create a retrospective e-cohort. Patient addresses were matched to Unique Property Reference Numbers (UPRNs) using a validated deterministic address-matching algorithm, and pseudonymised into Residential Anonymised Linking Fields (RALFs). GP-EHRs were linked to the RALF. Exclusion criteria were selected using sensitivity analyses as per STROBE guidelines, based on GP registration status and date, property type, and data quality.

The main outcome was multi-morbidity in patients aged ≥18 years in mid-2018 with two or more chronic long-term conditions identified from their GP-EHRs based on diagnostic criteria and their associated READ codesets developed in the Quality and Outcomes Framework. We assigned individuals to their households on the basis of shared RALFs. We calculated age-specific multi-morbidity prevalences and their ratios by individual-level factors, and estimated the number of adults with multi-morbidity in each household. We investigated the characteristics of households with ≥2 adults with multi-morbidity.

Results The e-cohort comprised 923,995 patients (48.6% female, 44.6% Black and Minority Ethnic [BAME] backgrounds, 68% aged 20–64 years) living in 332,661 households (median [IQR] occupancy: 2 [1–3]). Multi-morbidity was identified in 104,082 patients (14%) and was more prevalent in women (53%), those from BAME backgrounds (51%), or those of working age (58% 20–64 years). Overall, 87,889 (26%) households included at least one, and 14,563 (4%) two or more, adults with multi-morbidity. Age-specific prevalence and prevalence ratios will be presented.

Conclusion This is the first time multi-morbidity has been quantified at the household level. We have demonstrated a high burden of multi-morbidity in women, working-age adults and those from BAME backgrounds in a geographically-defined, ethnically diverse, urban population. Factors contributing to multi-morbidity at a household level will be explored and compared to findings from a harmonised dataset for Wales.

OP20 USING CROSS-SECTORAL ADMINISTRATIVE DATA LINKAGE TO UNDERSTAND THE HEALTH OF PEOPLE EXPERIENCING MULTIPLE EXCLUSION

[1]EJ Tweed*, [1]A Leyland, [2]DS Morrison, [1]SV Katikireddi. [1]*MRC/CSO Social and Public Health Sciences Unit, University of Glasgow, Glasgow, UK*; [2]*Information Services Division, NHS National Services Scotland, Edinburgh, UK*

Background People affected by the intersection of homelessness, drug use, and/or serious mental illness have high rates of mortality and morbidity. However, a recent systematic review found important limitations in the evidence base on this topic,