

from a large prospective cohort, the Million Women Study (MWS), with the nationwide NHS Cervical Screening Programme records.

Methods Using linked NHS Cervical Screening Programme records for women before they were recruited into the MWS study, participants were classified as non-attenders or attenders for routine cervical screening. Logistic regression models were used to calculate odds ratios (OR) and 95% confidence intervals (CI) of non-attendance versus attendance by deprivation status, smoking history, body mass index (BMI), parity, age at first birth, oral contraceptive (OC) use and menopausal hormone therapy (MHT) use. All analyses were stratified by year of birth and year of recruitment into the MWS and adjusted for other factors, where appropriate.

Results Of 871,732 study participants who were eligible to have been invited for cervical cancer screening, 25,261 were non-attenders and 846,471 were attenders. The odds of being a non-attender were increased with deprivation (OR [95%CI] 1.46 [1.40–1.53] for most versus least deprived fifth), obesity (1.38 [1.33–1.43] for BMI ≥ 30 versus 20–25/kgm²) and smoking (1.25 [1.19–1.30] for heavy current smokers versus never smokers). Nulliparous women were much more likely to be non-attenders (5.80 [5.28–6.38]) and women who were younger at their first birth were also less likely to attend (1.24 [1.12–1.37] for <17 versus ≥ 25 years at first birth). By contrast, women who had used OCs or MHT were much less likely to be non-attenders (0.38 [0.37–0.40] for ≥ 10 years versus never OC use and 0.33 [0.32–0.35] for current versus never MHT use).

Conclusion In this large cohort of women in England, attendance for cervical screening varied considerably, not only by deprivation, as had been reported previously, but also by life-style, reproductive and hormonal factors. Non-attendance was associated with obesity, heavy current smoking, nulliparity, giving birth at younger ages, and non-use of OCs or MHT.

OP04

ANTIOXIDANT BIOMARKERS AND RISK OF PROSTATE CANCER DEATH: A COLLABORATIVE ANALYSIS OF INDIVIDUAL PARTICIPANT DATA FROM 13 PROSPECTIVE STUDIES

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10.1136/jech-2020-SSMabstracts.4

Background Antioxidant micronutrients may affect the development and progression of prostate cancer. We conducted a pooled analysis of the associations of the concentrations of several antioxidant biomarkers with risk of prostate cancer death in the Endogenous Hormones, Nutritional Biomarkers and Prostate Cancer Collaborative Group.

Methods Principal investigators of prospective studies provided individual participant data for prostate cancer cases and controls on circulating concentrations of carotenoids, retinol, and tocopherols, and blood and toenail selenium, including a total of 12 biomarkers. Data were available for up to 1196 prostate cancer deaths and 2441 controls from up to 13 studies. Risk by study-specific fifths of each biomarker was estimated using multivariable-adjusted conditional logistic regression in matched case-control sets.

Results Carotenoids, retinol and tocopherols were not significantly related to risk of prostate cancer death. The only statistically significant finding was an inverse association between toenail selenium concentrations and risk of prostate cancer death (OR for the highest compared with the lowest fifth 0.37, 95% CI 0.26–0.52, the median time of follow-up from blood collection to death from prostate cancer for cases was 11.8 years); however, circulating selenium concentrations were not associated with risk (OR for highest fifth 0.94, 0.64–1.38).

Conclusion Although we found that men with higher concentrations of toenail selenium had a lower risk of dying from prostate cancer, this should be interpreted cautiously due to the inconsistency between the results for toenail and blood measures of selenium.

Acknowledgements We thank the collaborating studies (ATBC, CARET, CLUE I, CLUE II, EPIC-Europe, EPIC-Norfolk, FMC, HPFS, MCCS, MEC, NLCS, PHS, and PLCO) and participants.

On behalf of the Endogenous Hormones, Nutritional Biomarkers and Prostate Cancer Collaborative Group (EHNBPCCG).

Wednesday 9 September

Food: Industry

OP05

UNHEALTHY COMMODITIES AND THE ENGLISH PREMIER LEAGUE. MARKETING GAMBLING, SUGARY DRINKS AND ALCOHOL TO A GLOBAL AUDIENCE

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10.1136/jech-2020-SSMabstracts.5

Background There is increasing awareness of the impact of corporate policies on health and how the consumption of unhealthy products contributes to the global burden of non-communicable disease. Public health academics are reviewing the activities of commercial actors that influence the disease burden and comparing the strategies of these unhealthy commodity industries which include the alcohol, food and beverage and gambling industries. The English Premier League (EPL) is considered to be the most viewed sports league internationally and is broadcast to 212 territories; a truly 'global football league'. The league's commodification and huge audience has enabled a rise in commercial activities and an increased income for clubs through their sponsorship and broadcasting arrangements.

Methods Five EPL matches in 2019 (in the 2018/19 and 2019/20 football seasons) were recorded as broadcast on BT Sport and Amazon Prime in the UK. This study quantified visual marketing references to unhealthy products in the broadcasting. All segments of broadcast (including commercial breaks) were manually coded using a content analysis for marketing references to unhealthy products. Coding variables included location (e.g. pitch border and shirt front) and format (e.g. electronic).

Results In these five EPL matches, a mean of 24.46% of all footage included at least one reference to an unhealthy commodity. However, this varied considerably between matches with a high of 38.97% at the Newcastle United v

Burnley match on BT Sport on 26th February where both football clubs had shirt sponsorship by gambling brands. FUN88, Newcastle's principal sponsor and a China-based online gaming firm, received 109 exposures at this single match whilst bet365, another sponsor, received 190. Whilst gambling companies were the most referenced (921) across the five matches analysed, there were also a combined 217 references to alcohol and food and beverages. Across all five games, there was a mean of 1.3 exposures to unhealthy products each minute (2.1 during Newcastle United v Burnley).

Conclusion Results show that watching men's football on television exposes the global audience, including many young people, to a significant level of advertising of unhealthy commodities. Given contemporary challenges to public health, such as obesity and non-communicable diseases (including mental health), and that marketing is intended to influence purchasing behaviour, the UK government, the EPL and its membership clubs should consider regulating EPL clubs' commercial relationships where these have the potential to damage fans' and viewers' health.

OP06

QUANTIFYING THE POTENTIAL HEALTH IMPACT OF RESTRICTING LESS-HEALTHY FOOD ADVERTISING ON UK TELEVISION BETWEEN 0530 AND 2100: A MULTI-STATE LIFETABLE MODELLING STUDY

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10.1136/jech-2020-SSMabstracts.6

Background To tackle childhood obesity, the UK Government is consulting on prohibiting the advertising of high fat sugar salt foods (HFSS) on television between 0530 and 2100. We sought to estimate the health impact of this policy in the UK. **Methods** Informed by a literature review, we adapted an existing multi-state lifetable model (PRIMETime) to model the impact of television advertising exposure on children's caloric intake, and the subsequent impact on body mass index and health.

We used data from AC Nielsen and Broadcasters' Audience Research Board data (2015) on children's exposure to HFSS advertising (adopting the FSA-Ofcom definition of HFSS); published meta-analysis quantifying the effect of less-healthy food advertising on caloric intake in children; the Human Mortality Database for the UK (2015) on population numbers and all-cause mortality rates; the Health Survey for England (2016) on body mass index; the Global Burden of Disease Study for disability weights to estimate Disability Adjusted Life Years (DALYs).

We simulated a closed cohort of the UK population aged 0–17 years in 2015 (n=13,729,000), following the cohort to death. We assumed HFSS advertising had no effect on adults, and that changes in mean BMI observed at age 17 years persisted throughout adult life.

The main outcome measures were change in percentage of the children (aged 5–17 years) with obesity defined using International Obesity Task Force cut-points, and change in

health status (DALYs). Monte Carlo analysis was used to estimate 95% uncertainty intervals.

We compared three scenarios:

- A. All HFSS advertising between 0530 and 2100 is withdrawn
- B. All HFSS advertising between 0530 and 2100 is displaced to 2100 to 0530
- C. No intervention

Results If all HFSS advertising between 0530 and 2100 was withdrawn, we estimate that UK children would decrease caloric intake by 9.1kcal (95 CI: 0.5kcal–17.7kcal), which would reduce the number of children with obesity by 40,000 (12,000–81,000) or 4.6% (1.4%–9.5%) compared to no intervention. This would avert 240,000 (65,000–530,000) DALYs across the cohort's lifetime. Under a scenario where all HFSS advertising is displaced to 2100 to 0530, we estimate that the benefits would be reduced by around two-thirds.

Conclusion Measures that reduce exposure to less-healthy food advertising on television, such as restricting HFSS advertising between 0530 and 2100, could make a meaningful contribution to reducing childhood obesity. The impact of this policy may be reduced if adverts are displaced to after 2100 rather than being withdrawn.

OP07

FACTORS INFLUENCING WOMEN'S FOOD CHOICES AND SUPPORT THEY REQUIRE TO MAKE HEALTHIER FOOD CHOICES IN SUPERMARKETS – A QUALITATIVE STUDY

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10.1136/jech-2020-SSMabstracts.7

Background Supermarkets are a major source of food for families and women remain primarily responsible for food shopping tasks. The factors women perceive to influence their food shopping choices are poorly understood, particularly in relation to in-store layout. We aimed to examine women's perceptions of factors that influence their food shopping choices, including product placement in-store, and identify ways that supermarkets could support healthier food shopping choices.

Methods In this qualitative cross-sectional study, semi-structured telephone interviews were conducted with a random sample of 20 women customers aged 18–45 years. Women were recruited from six supermarkets across England. Participants were asked to describe the reasons for their choice of supermarket and factors in-store that prompted their food selections. The actions supermarkets', governments' and customers' can take to encourage healthier food shopping choices were explored. Thematic analysis was conducted using QSR NVIVO software 11 to identify key themes. Four researchers were involved in developing the initial coding framework, double coding of six interview transcripts and refining the coding framework.

Results Participants had a median age of 39.5 years (IQR: 35.1, 42.3), median weekly grocery spend of £70 (IQR: 50, 88), and 44% had left school aged 16 years. Six key themes were identified: 1) Physical Environment, 2) Value for Money, 3) Influence of Family, 4) Physiological/Psychological State, 5) Healthy Eating Priorities and 6) Level of Awareness of Food Decisions. Women reported that achieving value for money,