particularly driven by changes in beverages and desserts, and the trends were similar in all restaurant types. The average reduction in sugar was smaller in common items compared to all items (0.30 g/year vs. 0.43 g/year). Changes for energy and other nutrients were sporadic and inconsistent across different restaurant types and food categories.

Conclusion From 2018 to 2020, sugar per serving declined in restaurant menu items, which could help to reduce sugar intake in the UK population. This may reflect a response to Public Health England's Sugar Reduction Strategy. In contrast, there was little change in other nutrients. Future policies addressing the overall nutritional quality of restaurant foods, rather than single nutrients, may help the restaurant sector to move towards offering healthier foods.

OP80

SOCIODEMOGRAPHIC DIFFERENCES IN SELF-REPORTED EXPOSURE TO HIGH FAT, SALT AND SUGAR FOOD AND DRINK ADVERTISING: A CROSS-SECTIONAL ANALYSIS OF 2019 UK PANEL DATA

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Background Obesity disproportionately affects socially disadvantaged groups. Differential exposure to advertising of high fat, salt and sugar (HFSS) foods and drinks has been proposed as one factor which may explain these social inequalities. This study explores sociodemographic differences in exposure to HFSS advertising and whether exposure is associated with body mass index.

Methods Adults recruited to the Kantar Fast Moving Consumer Goods panel for London and the North of England completed an online survey on their exposure to HFSS advertising in February 2019 (n=1552). We used logistic regression models to assess the association between self-reported exposure to HFSS advertising and sociodemographic characteristics: sex (male or female), age group (18–34 years, 35–44 years, 45–54 years, 55–64 years or ≥65 years), socioeconomic position (high, middle or low), children in the household (yes or no) and working status (full-time employee, part-time employee, self-employed, retired or not looking for work/unable to work). We further assessed associations stratified by product advertised (processed HFSS foods, sugary drinks, sugary cereals, sweet snacks, fast food or digital food delivery services) and advertising setting (traditional, digital, recreational, functional or transport). Lastly, we examined the association between self-reported advertising exposure and weight status.

Results Overall, 84.7% of participants reported exposure to HFSS advertising in the past 7 days. Participants in the middle

(vs high) socioeconomic group had higher odds of overall self-reported exposure (OR 1.48; 95% CI 1.06–2.07). Participants in the low (vs high) socioeconomic group had higher odds of reporting exposure to advertising for four of six product categories (ORs ranging from 1.36 to 1.67), traditional advertising (OR 1.44; 95% CI 1.00–2.08) and digital advertising (OR 1.50; 95% CI 1.06–2.14). Younger adults (18–34 years vs ≥65 years) had higher odds of reporting exposure to digital food delivery service advertising (OR 2.08; 95% CI 1.20–3.59), digital advertising (OR 3.93; 95% CI 2.18–7.08) and advertising across transport networks (OR 1.96, 95% CI 1.11–3.48). Advertising exposure was associated with increased odds of obesity for digital food delivery services (OR 1.40; 95% CI 1.05–1.88), digital advertising (OR 1.80; 95% CI 1.33–2.44) and advertising in recreational environments (OR 1.46; 95% CI 1.02–2.09).

Conclusion Exposure to HFSS advertising was prevalent, with adults in lower socioeconomic groups and younger adults more likely to report exposure. Several types of HFSS advertising were associated with increased odds of obesity. Restricting HFSS food and drink advertising may help to reduce sociodemographic differences in obesity.

OP81

ADJUSTMENT FOR ENERGY INTAKE IN NUTRITIONAL RESEARCH: A CAUSAL INFERENCE PERSPECTIVE

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Background Four modelling approaches are commonly used to adjust for overall energy intake when seeking to estimate the causal effect of an individual dietary component on an outcome; (1) the 'standard model' adjusts for total energy intake, (2) the 'energy partition model' adjusts for remaining energy intake, (3) the 'nutrient density model' examines the exposure as a proportion of total energy, and (4) the 'residual model' indirectly adjusts for total energy by using the residual from regressing the exposure nutrient on total energy intake. Unfortunately, it remains underappreciated that each approach evaluates a different causal effect estimand and only partially accounts for confounding by common causes of dietary intake and composition.

Methods Semi-parametric directed acyclic graphs and Monte Carlo simulations were used to identify the estimand implied by each approach and the correct interpretation of the model results. The performance of each model for estimating the corresponding target estimand was explored both in the absence and presence of confounding that acts through diet. An alternative approach based on the energy partition model that simultaneously adjusts for all competing dietary components, termed the 'all-components model', was also explored and compared with the four traditional approaches. This model involves using the weighted coefficients of different dietary components to estimate any desired causal effect estimand.

Results The 'standard model' and the mathematically identical 'residual model' both estimate *the average relative causal effect* (i.e. a 'substitution' effect) but provide biased estimates even in the absence of any confounding. The 'energy partition model', that adjusts for remaining energy intake, estimates *the*