CVH trajectory from middle age to older age and subsequent HF risk.

Methods In 1998–2000, 20 years after the initial screening of 7735 men aged 40–59 years (The British Regional Heart Study), 4252 men were re-examined when aged 60–79 years, with collection of all LS7 components and follow-up for a median period of 15.8 years. Men with previous history of cardiovascular disease were excluded leaving 3698 men. The composite LS7 score ranges from 0–14 and men were classified as having poor (1–4), intermediate (5–10) and ideal (11–14) CVH score. Four CVH trajectory groups were created based on transition between low and high CVH score from middle to older age: (1) Low-Low, (2) Low-High, (3), High-Low, and (4) High-High. Cox models were used to estimate the risk of HF adjusted for age, alcohol consumption, socioeconomic class and incident myocardial infarction.

Results Of the 3698 men 14% (n=522) had ideal CVH score. Ideal CVH was associated with a significant decrease in risk of HF compared to those with a poor CVH score (HR 0.52, 95% 0.31 to 0.88, $p<0.016$); intermediate CVH was associated with reduced but non-significant HF risk (HR 0.79, 95% CI 0.51 to 1.24, $p=0.310$). Compared to the Low-Low CVH trajectory group, those who maintained a healthy CVH score (High-High) showed the lowest risk of HF (HR 0.67, 95% CI 0.51 to 0.87, $p<0.003$); those who moved from high to low showed lower but non-significant risk (HR 0.78 95% CI 0.55 to 1.11, $p=0.17$); those who moved from low to high showed no benefit (HR 1.01 95% CI 0.76 to 1.33).

Discussion Our findings suggest that having ideal CVH reduces the risk of developing HF in older age. LS7 is a simple way to identify high risk individuals however the prevalence of older men with ideal CVH is low. Adopting and maintaining healthy cardiovascular health from middle age to older age confers the most benefit in preventing HF in later life.

OP08

SOCIOECONOMIC POSITION AND SEX-SPECIFIC TRAJECTORIES OF METABOLITES FROM CHILDHOOD TO EARLY ADULTHOOD: A PROSPECTIVE COHORT STUDY

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10.1136/jech-2021-SSMabstracts.8

Background Socioeconomic inequalities in cardiovascular disease are stronger and more consistent in females compared with males. However, mechanisms underlying these inequalities and whether they emerge in early life are unclear.

Methods Trajectories of 148 metabolic trait concentrations from age 7y to 25y in a contemporary English birth cohort, The Avon Longitudinal Study of Parents and Children (ALSPAC), were analysed. Outcomes included concentrations of metabolic traits quantified using nuclear magnetic resonance spectroscopy measured at 7y, 15y, 18y and 25y. Maternal education was used as an indicator of socioeconomic position (SEP), reported by mothers at 32-weeks gestation. Using linear spline multilevel models, sex-specific associations of SEP and trajectories of each metabolic trait concentration were examined. Sex-specific associations were converted to standard deviation (SD) units by dividing the predicted total absolute difference from 7y to 25y by SEP in original units by the

sex-specific SD of the trait in the reference SEP category (degree level maternal education).

Results Total participants included ranged from 5,980–6,212 with 10,023–11,945 repeated measures. SEP was associated with numerous metabolic traits trajectories in females, some which developed or strengthened by age 25y with evidence of an emerging SEP gradient. Associations were strongest for large HDL and VLDL cholesterol, apolipoprotein B/A-1 and glycoprotein acetyls. For instance, by age 25y less than O-level education was associated with 0.37 SD (95% CI: 0.21, 0.53), O-level with 0.28 SD (95% CI: 0.14, 0.42) and A-level with 0.08 SD (95% CI: -0.6, 0.22) higher concentrations of glycoprotein acetyls compared to degree level education. In males, associations between SEP and metabolic traits were weaker and less consistent with little evidence of an SEP gradient.

Conclusion Sex differences in socioeconomic inequalities in cardiometabolic risk appear to develop early in the life course and are evident by early adulthood with more adverse effects of SEP in females.

OP09

QUANTIFYING BENEFITS OF THE DANISH TRANSFAT BAN FOR CORONARY HEART DISEASE MORTALITY 1991–2007: SOCIOECONOMIC ANALYSIS USING THE IMPACT_{SEC} MODEL

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10.1136/jech-2021-SSMabstracts.9

Background In 2004, the Danish Transfat Ban was implemented (Order no. 160, 2003). To determine health and equity benefits of this regulation on industrially produced trans fatty acid (ITFA) content in Danish food, we quantified the changes in ITFA intake from 1991 to 2007. We then estimated the relative contributions of changes in ITFA consumption, other cardiovascular risk factors and treatments on Coronary Heart Disease (CHD) mortality, all stratified by socioeconomic group.

Methods Participants included adult Danes aged 25–84 years living in Denmark in 1991 and 2007, stratified by socioeconomic quintiles. Population counts were obtained from the Danish Central Office of Civil Registration, and financial income data from Statistics Denmark. ITFA intake data as grams/day and % total energy intake (%E) were obtained from dietary assessments from the *DanMonica 3 Study* (1991) and the *Danish National Surveys of Dietary Habits and Physical Activity* (DANSDA, 2005–2007) combined with estimated ITFA content in foods on the Danish market. We extended the previously validated Danish IMPACT_{SEC} model to quantify reductions in CHD mortality; the principal output being the number of CHD deaths prevented or postponed attributable to changes in ITFA (%E) intake between 1991 – 2007, all stratified by socioeconomic group. To quantify degrees of uncertainty, we conducted robust sensitivity analyses.

Results Between 1991 and 2007, mean ITFA intake in Denmark fell dramatically from 2.9 g/d to 0.3 g/d in men, and

from 2.2 g/d to 0.2 g/d in women. Mean energy intake from ITFA was likewise decimated, falling from 1.1%E to 0.1%E in both men and women. Eleven hundred and ninety-three fewer CHD deaths (BEST UI 1,149 – 1,688), were potentially attributable to the ITFA reduction, representing some 11% of the overall 11,100 CHD mortality fall in Denmark between 1991 and 2007. The greatest attributable mortality falls were seen in the most deprived quintiles (reflecting their bigger reductions in ITFA consumption). Adding ITFA data to the original IMPACTsec model improved the overall model fit from 64% to 73%. The major contributions to the fall in CHD mortality remained consistent across a wide range of sensitivity analyses.

Conclusion Denmark's mandatory elimination of ITFA was very effective. Furthermore, it may well have accounted for approximately 11% of the substantial reduction in CHD deaths achieved between 1991 and 2007. The most deprived groups benefited the most, thus reducing inequalities. Adopting the Danish ITFA regulatory approach elsewhere could substantially reduce CHD mortality while also improving health equity.

OP10

PREVALENCE AND SOCIO-DEMOGRAPHIC ASSOCIATIONS OF DIET AND EXERCISE RISK-FACTORS FOR NON-COMMUNICABLE DISEASES IN BO, SIERRA LEONE

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10.1136/jech-2021-SSMabstracts.10

Background Little is known about modifiable dietary and physical activity risk factors for non-communicable diseases (NCDs) in Sierra Leone. This information is critical to the development of health improvement interventions to reduce the prevalence of these diseases.

Methods Adults aged 40+ were recruited from 10 urban and 30 rural sub-districts in Bo. We examined risk factors including: <150 minutes of moderate and vigorous-intensity physical activity (MVPA) weekly, physical inactivity for >3 hours daily, <5 daily portions of fruit and vegetables, and salt consumption (during cooking, at the table, and in salty snacks). We used logistic regression to investigate the relationship between these outcomes and participants' socio-demographic characteristics.

Results 1,966 eligible participants were included in the study. The prevalence of behavioural risk factors was 83.1% for <5 daily portions of fruit and vegetables; 40.8% and 91.9% for adding salt at the table or during cooking, respectively and 30.6% for eating salty snacks; 22.4% for MVPA <150 minutes weekly, and 43.9% for being physically inactive >3 hours daily. Multivariable analysis showed that urban individuals were more likely than rural individuals to consume <5 daily portions of fruit and vegetables (Odds Ratio (OR) 1.06, 95% Confidence Interval (1.00–1.11)), add salt at the table (OR 1.86 (1.80–1.92)), eat salty snacks (OR 2.03 (1.97–2.11)) and do MVPA <150 minutes weekly (OR 1.17 (1.13–1.22)). Male individuals were more likely to add salt at the table (OR 1.25 (1.21–1.29) and consume salty snacks (OR 1.36

(1.32–1.41)) than female individuals but were less likely to report the other behavioural risk-factors examined). Increasing age was associated with higher odds of eating <5 daily portions of fruit and vegetables daily; adding salt at the table; eating salty snacks; doing <150 minutes of MVPA per week and physical inactivity >3hours. Generally, people in lower wealth quintiles had higher odds of any of the risk factors than those in the highest wealth quintile.

Conclusion Dietary risk factors for NCDs are highly prevalent, particularly among urban residents in Sierra Leone. Our findings show that forthcoming policies in Sierra Leone need to consider modifiable risk factors for NCDs in the context of urbanisation.

This study used data from Cardiovascular Disease (CVD) Risk Factors in Sierra Leone, which was supported by a Small Grant from the Wellcome Trust, grant number 209921/Z/17/Z.

OP11

IMPLEMENTING A NATIONAL WEIGHT-REDUCTION LIFESTYLE INTERVENTION TO THE NHS HEALTH CHECKS POPULATION: LONG-TERM OUTCOMES MICRO-SIMULATION MODELLING OF THE NHS DIABETES PREVENTION PROGRAMME

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10.1136/jech-2021-SSMabstracts.11

Background Type 2 Diabetes Mellitus (T2DM) and obesity are highlighted as the main reasons for the increase in Non-communicable Disease (NCD) incidence in the last decades. The NHS Diabetes Prevention Programme (NHS-DPP) was rolled-out in 2016, intending to reduce or delay T2DM in the population, offering lifestyle advice to reduce weight and HbA1c levels in the at-risk population. In this study, we model long-term health, equity and cost-effectiveness outcomes of a weight-reduction lifestyle intervention when added as part of the NHS Health Checks (NHSHCs) programme.

Methods We used the WorkHORSE tool to model NHSHCs scenarios, powered by the IMPACT_{NCD} stochastic dynamic microsimulation. We used R v4.04. We defined the baseline as the current implementation of the NHSHCs programme. Invite and uptake percentages are based on NHS Digital reports; prescription (pharmacological and smoking cessation) and cost data are based on our work evaluating NHSHCs. We defined three policy scenarios for the weight-reduction lifestyle intervention, modelled using empirical data from the NHS-DPP first two years: 1) reported annual capacity, 2.5% mean weight loss as percentage weight in intention-to-treat population, cost per completer £435; 2) as Scenario 1) but annual capacity is doubled; 3) as Scenario 1) but mean weight loss is 4.0% (observed in completers population). The simulation period was 2020–2039, attrition rate 20% and standard UK Treasury discount rates were applied.

Results Preliminary results suggest that in Scenario 1) approximately 2,000 (95% Uncertainty Interval (UI): -370 to 4300) T2DM cases could be prevented or postponed. However, when assumed capacity doubled or a higher weight effect was used although in a smaller group, Scenarios 2) and 3) prevented or postponed 3,500 (95% UI: 1,300 to 6,200) and 2,000 (95% UI: -650, 4000) T2DM cases respectively. Case years prevented or postponed in each scenario are 16,000