

of total (n=3,941) and site-specific fractures (arm, n=566; wrist, n=889; hip, n=945; leg, n=366; ankle, n=520; other main sites i.e. clavicle, rib and vertebra, n=467) by diet group over a mean of 17.6 years of follow-up.

Results Compared with regular meat-eaters, vegetarians had marginally higher risks of total fractures (hazard ratios 1.10; 95% confidence interval 1.00–1.20) and arm fractures (1.28; 1.01–1.63), while vegans had higher risks of total fractures (1.44; 1.21–1.72), arm fractures (1.60, 1.01–2.54) and leg fractures (2.06; 1.22–3.47). For hip fractures, the risks were significantly higher in fish-eaters (1.28; 1.03–1.59), vegetarians (1.27; 1.05–1.55) and vegans (2.35; 1.67–3.30) compared with regular meat-eaters. There were no significant differences in risks of wrist, ankle or other main site fractures by diet group. Overall, the significant associations appeared to be stronger before adjustment for BMI (e.g. 1.52; 1.27–1.81 in vegans for total fractures), and were slightly attenuated but remained significant with additional adjustment for dietary calcium and total protein.

Conclusion Overall, non-meat eaters, especially vegans, had higher risks of either total or some site-specific fractures, particularly hip fractures, than regular meat eaters. These differences may be partially related to lower BMI or lower dietary intakes of calcium and protein in the non-meat eaters. Further studies of non-European and contemporary populations are needed to determine the generality of these findings.

P17

BIOMARKER LEVELS IN WHITE AND BRITISH INDIAN VEGETARIANS AND NON-VEGETARIANS IN THE UK BIOBANK

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Background A comprehensive description of disease biomarker levels in people of different habitual diet groups is lacking. We conducted cross-sectional analyses of mean biomarker concentrations by diet group in a large cohort.

Methods The UK Biobank recruited around 500,000 middle aged participants throughout the United Kingdom in 2006–2010. Blood and urine samples were collected from the majority of participants, and assayed for a range of serum and urinary biomarkers related to disease status of six outcomes (cardiovascular diseases, bone and joint health, cancer, diabetes, renal disease, and liver). Using multivariable linear regression adjusted for age, sex, fasting status, body mass index and lifestyle confounders, we estimated geometric mean biomarkers concentrations by six diet groups (221,295 regular meat-eaters, 222,038 low meat-eaters, 5,053 poultry eaters, 10,470 fish eaters, 6,804 vegetarians, 416 vegans) in white British participants, and two diet groups in British Indian participants (4091 meat eaters, 1444 vegetarians).

Results We observed differences in the concentrations of many biomarkers by diet group. The biomarkers with the largest percentage difference by extreme diet groups (i.e. vegans versus regular meat-eaters) within each disease outcome group in the white British population are reported below. Compared

with white British regular meat-eaters, white British vegans had lower C-reactive protein (1.10, 1.00–1.21 versus 1.43, 1.43–1.44 mg/L) and low density lipoprotein cholesterol (3.12, 3.06–3.19 versus 3.65, 3.65–3.65 mmol/L); lower vitamin D (34.3, 33.0–35.8 versus 44.5, 44.4–44.5 nmol/L); higher sex hormone-binding globulin (51.1, 48.9–53.3 versus 45.0, 44.9–45.0 nmol/L); lower haemoglobin A1C (HbA1C, 33.8, 33.4–34.2 versus 35.2, 35.2–35.2 mmol/mol); lower urinary creatinine (5389, 5076–5723 versus 7289, 7269–7308 μ mol/L); and lower gamma glutamyltransferase (23.4, 22.1–24.7 versus 29.7, 29.6–29.8 U/L). Patterns were similar in British Indians, with the exception of HbA1C which was not significantly different between meat-eaters and vegetarians. In both ethnicities, the differences in biomarker levels by diet group were consistent between men and women.

Conclusion In this large population cohort, participants of different diet groups exhibited differences in many biomarkers. These biomarkers are associated with disease risk, and therefore the observed differences may be suggestive of differences in future disease risks by diet group, which should be further investigated.

P18

STRUCTURAL ASPECTS OF SOCIAL CONNECTEDNESS AND ADHERENCE TO A HEART-HEALTHY DIET IN 60–64 YEAR OLDS IN THE NATIONAL SURVEY OF HEALTH AND DEVELOPMENT (NSHD)

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Background Social connectedness has been shown to influence mortality to the same extent as other well-established risk factors such as smoking. Structural aspects of social connectedness include marital, cohabitation and employment status which are the focus of the present study. Dietary behaviour is a possible pathway through which social relationships exert their influence on health outcomes. Among those above 65 years, research has indicated that living alone and being socially isolated is a risk factor for poor diet variety. The association between retirement and diet quality is not well established, and at 60–64 years, the present study group represent an interesting time of transition in the life course. Moreover, evidence suggests social influences on dietary behaviour are sex-specific. This study aims to examine the association of structural aspects of social networks and diet quality in the 60–64 years age group.

Methods Participants came from the Medical Research Council National Survey of Health and Development (NSHD). The cohort has been followed up 24 times from birth, including a follow-up in 2006–10 at ages 60–64 years when 1,869 participants completed 5-day prospective estimated diet diaries. Diet quality was assessed according to adherence of a Dietary Approaches to Stop Hypertension (DASH)-type diet score ranging from 0–40. Participants were asked, via questionnaire, to report their current marital status, the number of people living in their household and their current employment status.

Linear regression models were used to determine if marital status, the number of people living in the participant's household and employment status were associated with adherence to a DASH-type diet. Models were also stratified by sex.

Symptoms of depression, socioeconomic position and physical disability were adjusted for.

Results No associations were found between marital status or number of household occupants and DASH scores. Being fully retired compared to still being in main occupation was associated with a 0.73 (95% CI: 0.16 to 1.30) increase in DASH points when adjusting for sex, socioeconomic position, symptoms of depression and physical disability. When stratifying for sex, an increase in DASH points of 0.84 (95% CI: 0.041 to 1.63) was seen in females but not males fully retired.

Conclusion Results so far from this study suggest that being retired at 60–64 years, compared to still being in main employment, may be associated with improved diet quality, especially in females.

Next analyses will consider other social health exposures, including functional aspects of social relationships, and other indices of dietary intake.

P19 THE MODIFYING EFFECTS OF OBESITY ON THE ASSOCIATION BETWEEN AIR POLLUTION AND STROKE; A SYSTEMATIC REVIEW

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Background The impact of ambient air pollution on stroke is well-documented. However, the modifying effect of obesity on the association is unclear. Recent research has proposed that obese individuals are more susceptible to the effects of air pollution. The objective is to systematically screen, appraise and synthesise the evidence examining modifying effects of obesity status on the association between air pollution and stroke.

Methods Databases searched include Scopus, PubMed and Web of Science. All empirical studies published in English between January 1st 1990 – March 30th 2019 were included for review. Data items were extracted using a standardised data extraction table. A narrative synthesis of the study results was completed. Included studies were quality assessed using the Joanna Briggs Institute and modified case-crossover appraisal tools. All evidence sourced were graded according to the Scottish Intercollegiate Guidelines Network (SIGN) level of evidence criteria.

Results Of 668 titles were identified, 218 had their full-text reviewed and seven met eligibility criteria. Five cohort studies (including a nest case-crossover), one cross-sectional study and one ecological study were included in the review. Findings across studies were limited. In summary, three studies found some evidence consistent with obesity worsening the association between air pollution and stroke. Inconsistencies in exposure used and measurement, outcome assessment, and data linkage methodology existed across studies. While the overall level of evidence assigned by the SIGN criteria was good, and the review included mainly high quality cohort studies with a low risk of confounding or bias, misclassification of exposure may be present.

Conclusion Some evidence exists to suggest modifying effects of obesity on the association between air pollution and stroke. However, evidence is very weak and hampered by different

study designs and outcome assessments. Thus, further research using large, nationally representative studies with stringent outcomes and exposure measurement methods in addition to fixed linking methodology between air-pollution and health data are needed while continuing the appropriate adjustment for confounding factors.

P20 A SYSTEMATIC REVIEW OF THE BURDEN OF HYPERTENSION, ACCESS TO SERVICES AND PATIENT VIEWS OF HYPERTENSION IN HUMANITARIAN CRISIS SETTINGS

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Background Globally, the number of people affected by humanitarian crises, relating to both conflicts and natural disasters, remains at record levels. Many crisis affected populations live in settings where the epidemiological transition is underway. Even now, ischaemic heart disease and stroke combined contribute a similar proportion of deaths as conflict and terrorism in Syria, 33.83% and 36.13% respectively. Following the UN high level meeting on NCDs and the global commitment to Universal Health Coverage (UHC), there is increasing effort being invested in developing guidelines and processes for the management of NCDs, especially hypertension in humanitarian settings.

The objective of this study was to contribute to the discussion by answering the following points:

1. Prevalence and incidence of hypertension in populations directly affected by conflict or natural disasters.
2. Proportion diagnosed with hypertension who are aware of the diagnosis, are receiving treatment, and have achieved control.
3. Proportion with hypertension who sought treatment but did not receive it.
4. Patient knowledge of and attitude to hypertension.

Methods A literature search was carried out in five databases, looking for peer reviewed publications published since 1999. Grey literature was also searched using Google and non-governmental organisations' web pages. The population of interest was non-pregnant, non-military adults who were directly exposed to a crisis since 1999. All study types were included. Eligibility assessment, data extraction and quality appraisal were carried out in duplicate.

Results After deduplication, 11703 abstracts were screened resulting in 402 papers for full-text review. Sixty-three studies were included in the narrative synthesis. The studies reported on a wide range of crises including the wars in Syria and Iraq, the Great East Japan Earthquake, Hurricane Katrina and Palestinian refugees in the Middle East. There were few studies from Africa or central Asia. The studies predominantly assessed prevalence of hypertension and this varied with geography and age of the population. Access to care, patient understanding and patient views on hypertension were poorly examined. Most of the studies had a high risk of bias due to methods used in the diagnosis of hypertension and in the selection of representative populations.