

## 044 POPULATION HETEROGENEITY IN MIDLIFE TRAJECTORIES OF BLOOD PRESSURE

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**Background** Age related changes in blood pressure (BP) show increases around midlife. Such increases may be an early indication of arterial aging or a disease process. We investigated the presence of subpopulations with different underlying trajectories (latent classes) of midlife systolic (SBP) and diastolic blood pressure (DBP) in men and women.

**Design** Prospective UK birth cohort study.

**Participants** 1840 males and 1819 females.

**Outcome** BP at age 36, 43 and 53 years.

**Analysis** Unconditional linear growth mixture models were fitted to SBP and DBP to obtain latent classes. To examine the relevance of the extracted classes, we compared the distribution of early life body size, midlife body mass index (BMI) and weight change, lifetime socio-economic position (SEP), antihypertensive medication (HypRx) use and self reported angina in each class.

**Results** In men, 2 class models for SBP and DBP had the best fit in terms of the Bayesian information criterion. For SBP, the majority were in the "Normal" class characterised by a lower BP at age 36 and a gentle midlife increase (+0.9 mmHg per year). The other class ("Increaser") had a higher increase (+3.1 mmHg per year). Similar classes were found for DBP. A "Normal" and "Increaser" class were also observed among women, together with an additional class ("High") with high BP at age 36 (SBP=170; DBP=100 mmHg) and no evidence of a change with age. In both sexes, a smaller proportion were in the "Normal" SBP class compared to the "Normal" DBP class—for example, 94.3% of men were in the "Normal" SBP class vs 97.6% in the "Normal" DBP class. Individuals in the "Normal" classes were heavier at birth, taller at age 7, had a lower midlife BMI and midlife weight change, and were less likely to be on HypRx compared with those in other classes. Manual childhood SEP was associated with the "Increaser" SBP class in men. Undiagnosed angina (Rose Questionnaire) was more prevalent in the male "Increaser" SBP class. GP diagnosed angina (self-reported) and HypRx use were most prevalent in the "High" female SBP and DBP classes. Women in this group also had the lowest midlife weight change suggesting this was an extant morbid group.

**Conclusion** There was heterogeneity in the progression of midlife BP. This analytical approach may be useful for exploring determinants of BP and for identifying individuals at a high risk of future hypertension/CVD.

045 PREDICTING RISK OF STROKE FOLLOWING TIA: A SYSTEMATIC REVIEW OF THE VALIDATION OF ABCD<sup>2</sup> CLINICAL PREDICTION RULE

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**Introduction** Stroke is a leading cause of death and acquired disability in every society in which it has been studied. Stroke and transient ischaemic attack (TIA) arise from identical aetiologies and a number of studies have demonstrated that TIAs carry a significant risk of stroke. Several independent predictors of stroke have been incorporated into models such as the ABCD<sup>2</sup> clinical prediction rule, which is used to predict risk of stroke following TIA. This systematic review assessed the predictive value of the ABCD<sup>2</sup> rule in relation to 7 and 90 day risk of stroke.

**Methods** A computerised systematic literature search was performed to retrieve articles that validated the ABCD<sup>2</sup> rule. The original

derivation study was used as a predictive model and applied to all validation studies, with observed and predicted number of strokes at 7 and 90 days stratified by risk group (0-3 low, 4-5 moderate, 6-7 high). Results from the studies were pooled and risk ratios (RR) with 95% CI produced. Forest plots were used to graphically display the data. A RR score of 1 represents correct prediction by the ABCD<sup>2</sup> rule, <1 represents under-prediction and >1 over-prediction.

**Results** Nine validation studies (n=5626) predicted 7 day stroke risk. The ABCD<sup>2</sup> rule correctly predicted occurrence of stroke at 7 days across all three risk strata: low risk (n=1933) — RR 1.12, 95% CI (0.61 to 2.05); moderate risk (n=2640)—RR 1.11, 95% CI (0.74 to 1.68); high risk (n=1053)—RR 0.98, 95% CI (0.69 to 1.41). There were 318 strokes predicted and 288 strokes observed at 7 days across all three risk strata. Data on five studies (n=4897) were pooled to predict 90 day stroke risk. The ABCD<sup>2</sup> rule over-predicted the occurrence of stroke across all three risk strata — low risk (n=1660), RR 1.50, 95% CI (0.86 to 2.62); moderate risk (n=2214), RR 2.24, 95% CI (1.29 to 3.91); high risk (n=1033), RR 2.00, 95% CI (0.90 to 4.45). There were 268 strokes observed at 90 days in contrast to 404 predicted strokes. The chi-squared trend for analysis indicated that as the trichotomised ABCD<sup>2</sup> score increased, the rate of stroke increased (p<0.0001).

**Conclusion** The ABCD<sup>2</sup> score correctly predicts 7 day risk of stroke across all risk strata but over-predicts 90 day risk of stroke in all groups. The variation in the study setting and design needs to be considered in the interpretation of these findings. ABCD<sup>2</sup> is a useful CPR, particularly in relation to 7 day risk of stroke.

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## Obesity

## 046 ASSOCIATION BETWEEN BIRTHWEIGHT AND OBESITY IN ADULT FEMALES

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**Objective** Adult obesity is associated with a variety of acute and chronic illnesses. Although high birthweight is known to predict obesity in middle age, the relationship between low birthweight and obesity is less clear. This study examines the association between birthweight and obesity in middle-aged women, and investigates whether the association is modified by other factors.

**Methods** The Million Women Study is a large population-based prospective cohort study of middle-aged UK women. This analysis is based on 372 542 women who reported their birthweight, current body size, and other information in a follow-up survey administered approximately 3 years after recruitment (mean age 58 years at follow-up). Logistic regression was used to estimate relative risk for being obese in adulthood (body mass index >30 kg/m<sup>2</sup>) by birthweight, both unadjusted and adjusted for reported adult height, parental heights, and a range of social and lifestyle factors, including socio-economic status, parental smoking at birth, being breast fed, reproductive history and health behaviours.

**Results** There was a U-shaped relationship between birthweight and adult obesity. Compared to women of intermediate birthweight (3.0–3.5 kg), the relative risk of being obese was 1.26 (95% CI 1.23 to 1.29) for women with low birthweight (<2.5 kg), and 1.33 (1.30 to 1.37) for women with high birthweight (>4.0 kg). After adjustment for height, the relative risk of being obese associated with low birthweight was attenuated (from 1.26 to 1.15), while the relative risk associated with high birthweight was increased (from 1.33 to 1.44). Other health and lifestyle characteristics did not substantially change the obesity-related relative risks at different birthweight.

**Conclusion** Birthweight has a U-shaped relationship with obesity in middle age. This relationship tends towards being J-shaped after adjustment for adult height.

**047 IS THE RECENT RISE IN TYPE 2 DIABETES MELLITUS INCIDENCE FROM 1984 TO 2007 EXPLAINED BY THE TREND IN INCREASING BODY MASS INDEX? EVIDENCE FROM A PROSPECTIVE STUDY OF BRITISH MEN**

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**Objective** Incidence of type 2 diabetes mellitus (T2DM) in the UK has increased by two-thirds in the last decade. Understanding the reasons for the unfavourable trend may help inform efforts to curb future increases. The association between T2DM and adiposity has been established. However, few attempts have been made to quantify the contribution of adiposity changes to the observed time trend in T2DM. We estimated the proportion of the time trend in T2DM incidence in British men over 24 years that may be explained by increasing population body mass index (BMI) levels.

**Design** Longitudinal study.

**Setting** 24 British towns.

**Participants** 6460 men from a socially and geographically representative cohort of older British men, followed up for doctor-diagnosed T2DM incidence between 1984 (aged 45 to 65 years) and 2007 (aged 67 to 89 years) inclusive. Men with a diagnosis of diabetes before 1984 were excluded.

**Main outcome measures** The age-adjusted increase in the hazard of T2DM between 1984 and 2007 and the contribution of changing BMI to this increase, derived from Cox proportional hazards modelling with time-updated covariates.

**Results** Between the periods 1984–1992 and 1999–2007, the age-adjusted hazard of T2DM more than doubled (hazard ratio 2.33, 95% CI 1.75 to 3.10). An estimated 26% (95% CI 17 to 38) of this hazard increase could be statistically explained by a population-averaged age-adjusted increase in BMI from 1984 to 1999 of 1.42 kg/m<sup>2</sup> (95% CI 1.10 to 1.74). Earlier and later portions of the follow-up were examined separately. Between 1984–1992 and 1992–1999, T2DM incidence increased by half (hazard ratio 1.59, 95% CI 1.23 to 2.05). 22% (95% CI 12 to 48) of this increase could be explained by rising BMI. Between 1992–1999 and 1999–2007, a similar increase in T2DM incidence was observed (hazard ratio 1.47, 95% CI 1.17 to 1.84). 31% (95% CI 17 to 81) of this increase was explained by BMI.

**Conclusion** BMI changes can account for an appreciable portion of the increase in T2DM. Control and reversal of rising adiposity levels is therefore an important priority in controlling the diabetes epidemic. There remained a large “unexplained” portion of the T2DM increase. This may reflect imprecision of BMI as a measure of visceral fat or the independent contributions of changes in other determinants, such as physical activity and diet. The presence of other contributing factors would suggest the need for a more multifactorial approach to combat rising T2DM in the population.

**048 CHANGES IN WAIST CIRCUMFERENCE AND BMI IN ADOLESCENTS IN ENGLAND FROM 1977/1987 TO 2005–2007**

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**Objective** To compare changes in BMI and waist circumference in the past 30 years among English children aged 11–16 years.

**Design** Cross-sectional health examination surveys.

**Setting** The Health Survey for England (HSE) is a survey of a random sample of the general population living in private households in England.

**Participants** A new, nationally representative sample is selected each year. 1988 children aged 11–16 years had a nurse visit in the three HSE years 2005–2007, of whom 1770 had valid waist circumference measurements. HSE data were compared with age-specific centile charts for waist circumference for British children aged 5.0–16.9 years derived from baseline surveys of 3585 boys in 1977 and 4770 girls in 1987.

**Main outcome measures** BMI and waist circumference z-scores derived from the baseline data, as BMI and waist circumference vary by age and sex.

**Results** The mean z-scores for waist circumference for children aged 11–16 years in 2005–2007 was substantially higher than the mean z-score for BMI, for both sexes: WC 1.0 (95% CI 0.93 to 1.1), BMI 0.54 (0.44 to 0.63) for boys; WC 1.3 (1.2 to 1.4), BMI 0.48 (0.40 to 0.56) for girls (both  $p < 0.001$ ). There were no significant differences by sex in mean z-score for BMI, weight or height but the mean waist z-score for girls was significantly higher than that for boys ( $p < 0.001$ ). There were no significant differences by age in waist circumference or BMI. All children except for those in the lowest decile of waist circumference for girls had an increase in waist circumference of at least +1 SD since the 1977/87 baseline. BMI z-score increased across the top nine deciles of the BMI distribution by 0.4SD (2<sup>nd</sup> to 4<sup>th</sup> deciles) to 0.9SD (top decile). There were no significant differences by sex in the change over time except for the 10% of girls with the largest waist circumference for their age (1.6SD in girls vs 1.4SD in boys,  $p < 0.01$ ).

**Conclusion** Waist circumference in adolescents has increased more than BMI, which may result in greater obesity-related adverse health impacts in the future. The increase in waist circumference has been greater for girls than for boys. Increases in the mean z-score across the majority of the population suggests that the whole population is becoming more obese, although this effect is more pronounced at the upper end of the distribution.

**049 THE REVERSAL OF THE SOCIAL GRADIENT OF OBESITY AMONG WOMEN IN EGYPT: AN ANALYSIS OF TRENDS USING MULTIPLE CROSS SECTIONAL SURVEYS 1995–2008**

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**Background** The global obesity epidemic is spreading rapidly with a social distribution that varies according to the level of economic development: as countries develop, the burden of obesity appears to shift from the rich to the poor. Studying these changes as they occur can help shed further light on the social processes that fuel the obesity epidemic and determine its social distribution. Egypt provides a case in point for this research. Findings would be relevant to other low-and-middle income countries but may also be generalisable to an extent to poor communities in high income countries. **Objectives** To examine the social distribution of obesity among Egyptian women by socio-economic status and how it has changed over time.

**Design and methods** Retrospective analysis using four nationally representative cross-sectional surveys (Demographic and Health Surveys) conducted in Egypt between 1995 and 2008. Socio-economic status was defined as the highest reported educational level attained.

**Setting** Egypt.

**Participants** 64 605 women between 15 and 49 years excluding pregnant women.

**Main outcome measure** Obesity: defined as BMI (height/weight<sup>2</sup>) equal to or above 30.