

the spatial isolation of poor people in cities (the “spatial poverty trap”) as one of the major challenges in developing countries. As people and cities in the developing world get richer, the worry is that the spatial socioeconomic segregation of poor people increases, which in turn may increase their risks of mortality and poor health.

**Methods** Data from 15 major Brazilian cities were analysed, with spatial measures of socioeconomic segregation (“isolation of the poor”) estimated for Brazilian districts within cities. The association of the spatial isolation of the poor with district level mortality rates was examined using multiple membership multilevel Poisson regression models to take account of the multilevel (districts within cities) and spatial nature of the data.

**Results** Increasing spatial isolation of the poor tends to be associated with higher mortality rates, with an interaction between income and spatial isolation. There is not much difference in mortality rates among the poorest districts in terms of spatial isolation. However in the richest districts, districts where the poor are spatially isolated have the highest mortality rates, whereas districts where the poor are not isolated have the lowest mortality rates.

**Conclusion** As cities in the developing world get richer, there is a risk that this leads to increasing spatial socioeconomic segregation of the poor within those cities. The results from this study suggests that the spatial dimension of poverty within cities may be just as important to health as poverty levels.

#### OP04 THE ENGLISH NORTH-SOUTH DIVIDE: RISK FACTORS FOR CARDIOVASCULAR DISEASE ACCOUNTING FOR CROSS-SECTIONAL SOCIOECONOMIC-POSITION

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R Kumar, ARH Dalton. *Primary Care & Public Health, Imperial College London, London, UK*

**Background** Geographic inequalities in health are widely discussed, with an English North-South divide a popular notion. Data indicate the North-South divide in all cause mortality has persisted, even widening in recent years. Given the impact of cardiovascular disease (CVD) mortality on health inequalities, we aimed to assess the extent of a salient North-South divide in risk factors for CVD, controlling for markers of socioeconomic-position (SEP).

**Methods** We conducted a cross-sectional analysis using the 2006 Health Survey for England using respondents aged 16 years and over. We assessed the population means of systolic blood pressure, total cholesterol, body mass index (BMI) and smoking prevalence. We built nested regression models (all linear regression except for logistic for smoking) adding; demographic (age /sex /ethnicity), SEP indicators (individual income, education attainment, housing tenure, car ownership, occupational classification and area level IMD), behavioural risk factors and vascular disease status. We tested variables for multi-collinearity, assumptions of normality for linear outcomes and use valid survey weights. We finally examine interactions between the North-South divide and age and sex on the risk factors.

**Results** The North of England showed more deprived characteristics across markers of SEP; except for greater home-ownership. Controlling for demographic variables, we found a significant North-South difference (excess in North) in systolic blood pressure (1.94 [se=0.38]), BMI (0.47 [0.11]) and smoking prevalence (2.93% [0.50]). The difference in smoking prevalence was entirely abolished by markers of SEP; both systolic blood pressure and BMI differences were attenuated by SEP, behavioural and vascular disease indicators (1.52 [0.38] & 0.31 [0.11] respectively), but remained significant. The North-South divide in systolic blood pressure was attributed to differences in men (2.18 [0.54]), being non-significant in women; and in middle age groups (2.70 [0.76] aged 40- 59, compared with 2.29 [0.78] aged 16-39) and was non-significant aged 60 and over.

**Conclusion** Smoking is a major factor behind morbidity and mortality. In line with work from different settings, patterns in smoking can be explained through adverse, cross-sectional patterns of SEP. Addressing underlying poverty and disadvantage may be required to fully tackle smoking inequalities. Using a suite of measures designed to address different constructs of SEP, although cross-sectional, we find excesses in blood pressure and BMI in the North of England. These differences may, in part, explain previously found differences in mortality. If we are to understand, and therefore reduce, geographic inequalities, current measures of SEP may require improvement, for example accounting for aspects of the life-course.

## Public Health Interventions: Area and Weight Management

### OP05 FROM TRIAL TO POPULATION: EFFECT OF A WEIGHT MANAGEMENT INTERVENTION ON BODY MASS INDEX WHEN SCALED UP

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<sup>1</sup>J Fagg, <sup>1</sup>T Cole, <sup>2</sup>S Cummins, <sup>1</sup>H Goldstein, <sup>3</sup>H Roberts, <sup>1</sup>C Law. <sup>1</sup>MRC Centre of Epidemiology for Child Health, UCL Institute of Child Health, London, UK; <sup>2</sup>Department of Geography, Queen Mary, University of London, London, UK; <sup>3</sup>General and Adolescent Paediatrics Unit, UCL Institute of Child Health, London, UK

**Background** The evidence base for effective interventions to manage childhood overweight and obesity is growing. However, results from research may not generalise to service delivery settings, and scaled-up interventions may not reduce health inequalities. We examine a scaled-up childhood weight management intervention, examining variations in body mass index by person, family, place and programme.

**Methods** MEND 7-13 (Mind, Exercise, Nutrition, Do It!) is a multi-component family-based community weight management intervention shown to be effective in a randomised controlled trial (RCT). We used MEND service data from 10,080 children attending MEND programmes from 2007-10. Outcomes were: Change in Body Mass Index (BMI) change over the programme (10 weeks). Anthropometry is measured by trained staff following standardised procedures. We estimated associations between BMI change and participant, family, neighbourhood and programme factors – including pre-specified interactions and random slopes. Multilevel multivariate regression models were used with multiple imputation for missing values. We described participants by BMI at programme start (pre-BMI), age, sex and ethnicity; families by parent-reported employment, lone parent and housing tenure status; places by residential neighbourhood income deprivation, urbanicity, food and built environments; and programmes by the percentage of sessions attended and variables describing programme composition (e.g. group size).

**Results** BMI was reduced by similar amounts in the RCT and service delivery (RCT BMI change = -0.91 [95%CI: -1.13 to -0.68]), service BMI change = -0.75 [-0.78 to -0.73]. Service BMI reductions were clinically significant in all socio-demographic groups analysed. However, in multilevel models, pre-BMI, age, ethnicity, unemployment status and programme attendance were independently associated with BMI change. For example, in comparison to white children, reductions in BMI were statistically significantly smaller for black and minority ethnic group children (Asian  $b=0.29$ ,  $p<0.001$ , Black  $b=0.20$ ,  $p<0.001$ , (positive coefficients indicate smaller BMI reduction)). Similarly, BMI fell less in children whose parents were unemployed ( $b=0.14$ ,  $p<0.001$ , baseline employed parent). There were no significant differences by sex or neighbourhood factors. Tests of interactions and random slopes were non-significant.