

disease, however considerable inequalities remained. Other possible explanations for this vulnerability to disability among Indian Asian people will be discussed. Such inequalities are likely to have a detrimental impact on quality of life and morbidity in later years, and therefore, more research is urgently needed to understand these large ethnic inequalities in disability.

**OP32 HEALTH INEQUALITIES IN JAPAN 1986 TO 2007 BASED ON SELF-RATED HEALTH, HOUSEHOLD INCOME AND A NOVEL OCCUPATIONAL CLASSIFICATION**

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**Background** While widening or stable inequalities have often been found in relation to economic stagnation in the west, time trends in health inequalities in Japan over the past two decades of economic stagnation are unclear. Comprehensive examination of temporal trends and factors contributing health inequalities in Japan are imperative to population health.

**Methods** We analysed a series of eight nationally-representative samples (Comprehensive Survey of the Living Conditions of People on Health and Welfare) between 1986 and 2007 (n=398,303). We used household income and a novel theory-driven occupational social class classification to calculate temporal trends in relative and slope indices of inequality [RII and SII, respectively] in self-rated fair or poor health. Multiple imputation was conducted to account for missing income data. Effects of living conditions, behavioural and psychosocial factors were tested using 1998 and 2001 samples.

**Results** Overall, age-standardised self-rated fair or poor health showed U-shaped time trends in both sexes (quadratic term: men  $p < 0.001$ , women  $p = 0.005$ ), with the lowest prevalence in early/mid 1990s. In men, income RII and SII narrowed significantly over the period (RII declined 1.4% per year,  $p = 0.001$ ; SII declined 0.1% per year,  $p = 0.031$ ). Inequalities in women's income were stable (RII and SII). The two indices showed constant inequalities across occupational social class in both sexes. After multiple imputation, point estimates became smaller, and narrowing of income inequality over time was significant for RII and SII in both sexes ( $p < 0.05$ ,  $n = 490,632$ ). The annual declines were 1.4% and 1.0% for RII in men and women, respectively, and 0.1% for SII in both sexes. Living conditions, behavioural and psychosocial factors accounted for 28% of men's and 51% of women's health inequalities in Japan.

**Conclusion** Health inequalities in Japan either narrowed or remained stable from 1986 to 2007, in contrast to studies in western countries. The evidence provided by these analyses suggests that the prolonged economic stagnation in Japan had adverse effects at both ends of socioeconomic hierarchy. Potential explanations include effects of decreased income and increased stress in relation to job insecurity and workload across socioeconomic groups.

## Public Health Interventions: Transport

**OP33 EXPOSURE-BASED ASSESSMENT OF MODAL TRAVEL RISK IN ENGLAND USING ROUTINE HEALTH DATA**

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**Background** Cycling can make large contributions to population health but perceived road danger is a strong disincentive to cycling. Research on cycling safety is distorted by not making like-for-like comparisons. We examined age- and sex-specific deaths and injuries

in England by travel mode, considering both the ICD external codes included in official travel risk data and those excluded but required for accurate comparative assessment, to provide more precise comparisons of travel risks by mode.

**Methods** ICD-10 external codes were grouped by type of incident for pedestrians, cyclists, and car/van drivers; the fourth digit was used to exclude non-transport casualties. Numbers of hospital admissions, from Hospital Episodes Statistics data, and deaths in England 2007–2009 were obtained for these ICD codes, by age-group and sex. Aggregated per capita distance travelled by age-group, sex and mode in England from National Travel Survey for each year 2007–2009, weighted to be nationally-representative, was multiplied by the estimated mid-year population. Time spent travelling was estimated using mean trip speeds by mode. We calculated fatal injury and hospital admission rates by distance travelled and by time spent travelling by age-group, sex, and travel mode. 95% confidence intervals for Poisson parameters were calculated using the formulae for weighted sums.

**Results** Fatalities per million hours' use (£/mhu) varied little (0.15–0.45£/mhu by mode for men, 0.09–0.31£/mhu for women). Risks were similar for men aged 21–49 years for all three modes and for female pedestrians and drivers aged 21–69 years. The group most at risk for each mode were: male drivers aged 17–20 years (1.3£/mhu, 95% CI 1.2, 1.4); male cyclists aged 70 years or older (2.2 £/mhu, 1.6, 3.0) and female pedestrians aged 70 years or older (0.95 £/mhu, 0.86, 1.1). In general, fatality rates were substantially higher amongst males than females, except for drivers aged 60 years or older. Risks per hour for male drivers under 30 years were similar or higher than for male cyclists; for 17–20 year olds the risk was higher for drivers (33/Bn km, 95% CI 30, 36; 1.3£/mhu, 1.2, 1.4) than cyclists (20/Bn km, 10, 37; 0.24£/mhu, 0.12, 0.45) using distance or time.

**Conclusion** This is the first study in the UK to provide travel casualty rates by distance travelled and per hour, by mode, by age-group and sex, based on nationally-representative data, to enable unbiased intermodal comparisons for population sub-groups. Males aged 17–20 years old face higher risks as drivers than as cyclists, and do not achieve better safety as drivers until over 30 years. Not making like-for-like comparisons sustains the misleading stereotype that cycling is relatively hazardous.

**OP34 INEQUITIES IN BICYCLE USAGE: SOCIO-DEMOGRAPHIC PREDICTORS OF UPTAKE AND USAGE OF A PUBLIC BICYCLE SHARING SCHEME IN LONDON, UK**

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**Background** Cycling confers individual and population-level health benefits. Increasing numbers of cities are therefore introducing public bicycle sharing schemes, with London's Barclays Cycle Hire (BCH) scheme introduced in July 2010. Yet uptake of cycling is not equitable across socio-demographic groups. We sought to examine the characteristics of the BCH scheme's registered users, and to explore characteristics associated with usage.

**Methods** For users registering in the first seven months of the scheme, we obtained complete BCH registration and usage data, comprising: title (from which we inferred gender); home postcode; date of registration; access type; and number of trips made. We used postcodes to calculate distance to the nearest 'docking station' and to assign small-area-level data on ethnic composition, income deprivation, and the prevalence of commuter cycling. We compared characteristics of registered users with local residents and workers in the inner-London area served by the scheme. We used multi-level linear regression to examine correlates of 'mean number of trips', and logistic regression to examine correlates of 'ever use'.

**Results** 100,801 registered individuals made 2.5 million trips between July 2010 and March 2011. Compared with local residents and workers, registered individuals were more likely to be male and to live in areas of low deprivation and high cycling prevalence. Among those registered, females made 1.63 (95%CI 1.74, 1.53) fewer trips per month than males. In combination with the fact that fewer females registered in the first place, this meant that only 17.8% of the total number of BCH trips were made by females. Adjusting for the fact that deprived areas were less likely to be close to BCH docking stations, users in the most deprived areas made 0.85 (95%CI 0.63, 1.07) more trips per month than those in the least deprived areas.

**Conclusion** Females and residents in deprived areas are underrepresented among users of London's public bicycle sharing scheme. Indeed, the BCH scheme currently appears to be less gender-equal than cycling in general in London. Nevertheless, registered users in more deprived areas made more trips on average, suggesting there may be a greater latent demand for cycling in these areas. The scheme's expansion into more deprived areas from Spring 2012 has, therefore, the potential to create a more socio-economically equitable uptake of cycling.

### OP35 THE HEALTH IMPACTS OF FREE BUS TRAVEL FOR YOUNG PEOPLE IN LONDON

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**Background** Interventions in transport systems have potentially far-reaching impacts on public health, but can be challenging to evaluate. In 2005, young people in London gained access to free bus travel; an intervention that has a number of potential risks and benefits to health. As transport access is linked to well-being, we might expect the policy to benefit the health of young people by reducing transport exclusion. However, health effects might also include: young people doing less walking, thus reducing levels of physical activity, but also reducing exposure to pedestrian injury risk; or being more exposed to assault as they travel further.

**Methods** We utilized change-on-change analyses comparing pre (2001–2004) and post (2006–2009) changes in outcomes in 'younger people' (intervention group, 12–17 years) to 'adults' (control group, 25–59 years) in London, UK. Main outcome measures included changes in travel patterns (trips made by main travel mode and distances travelled), road traffic injuries and hospital admissions for assault.

**Results** Post-intervention, the total number of journeys to school or work made by younger people increased relative to adults (change-on-change ratio 1.19: 95% CI 1.13–1.25), and the proportion of short trips (<1km) by bus doubled (1.97: 1.07–3.84). There was some evidence that younger people made fewer trips where walking was the main mode of travel (0.76: 0.70–0.85), but no evidence for a change in overall distances walked by younger people post-intervention. Against background declines in road traffic injury, the decrease in road injury to young people was larger relative to adults (0.84; 0.82–0.87), however pedestrian injuries declined similarly in both groups. Rates of hospitalisation due to assaults increased in younger people relative to adults (1.20: 1.13–1.27).

**Conclusion** A change in the distribution of travel modes used by younger people (relative to adults who had not received free bus travel) was observed post-intervention. Younger people made fewer trips where walking was their main mode of travel, but there was little overall difference in distances walked, suggesting that the policy may have generated journeys but made little overall impact on

prevalence of active transport. Observed changes in road traffic injuries reflect the relative risks of changing travel modes. The intervention has been associated with a small relative increase in assaults to younger people. A change-on-change analysis has enabled us to use this 'natural experiment' to quantify some important health outcomes of a transport policy in the absence of evidence from a randomised trial.

### OP36 A CROSS-SECTIONAL ASSESSMENT OF THE EFFECT OF THE FREE OLDER PERSONS' BUS PASS ON ACTIVE TRAVEL AND REGULAR WALKING AMONG ADULTS ≥60 YEARS IN ENGLAND USING DATA FROM THE NATIONAL TRAVEL SURVEY 2005-2008

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**Background** The benefits of physical activity for all age groups is well-documented and there is increasing interest in the promotion of incidental physical activity, such as active transport, which includes walking, cycling and use of public transport. For older adults, even small increases in activity may have significant benefits: for example, the relative risk of disability is reduced by 7% for each additional hour of relatively gentle physical activity undertaken each week. Our study assessed the potential public health benefit of the *National Bus Pass*, introduced in 2006, which permits free local bus travel for older adults (≥60 years) in England.

**Methods** Data from the year prior to the pass being introduced (2005) to the most recently available (2008) were extracted from an annual cross-sectional survey, the National Transport Survey, resulting in a sample size of 15 175 older adults. Models assessed associations between possessing a bus pass and our main outcome measures: use of active transport (walking, cycling and use of public transport), use of buses and walking three or more times a week. Since participants were sampled by household, all models were adjusted for clustering at the household level, as well as a range of confounders, including: age, sex, and socio-economic status.

**Results** Preliminary results show that having a free pass is significantly associated with greater use of active travel among both disadvantaged and advantaged groups. It is also associated with increased use of buses and a greater likelihood of walking three or more times a week.

**Conclusion** Older people in England with a free bus pass are more likely to use active transport, buses and undertake regular walking than those without, regardless of their socio-economic status. This suggests public subsidies enabling free bus travel for older persons may confer significant population health benefits through increasing incidental physical activity levels.

## Prevention

### OP37 PSYCHOLOGICAL CONSEQUENCES OF FALSE-POSITIVE SCREENING MAMMOGRAMS IN THE UK: A SYSTEMATIC REVIEW

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**Background** In the UK women aged 47–73 are invited for screening by mammography every three years. In 2009–10 more than 2.24 million women in this age group in England were invited to take