Socioeconomic Position and BMI

Detailed analysis of the association between socioeconomic position (SEP) and BMI will be presented in a separate paper. Here we briefly describe levels and trends in this association over the study period, for all age and ethnic groups combined, using stratification methods. We present inequality (and trend in inequality) results for mean BMI (as a measure of central tendency) and for the prevalence of obesity (as a measure of the right-hand tail), rather than for the BMI distribution as a whole.

Socioeconomic position is examined at both the level of the individual or family (using household income as the marker) and the neighbourhood level (using small area deprivation as the marker).

Household income was available for all except the 1977 survey. Income was equivalised for household size and composition using a modified Jensen scale, converted to constant 2001 dollars, and categorised into tertiles. Less than 10 percent of respondents could not be attributed an equivalised household income in any of the surveys.

Deprivation level of small area of residence ('neighbourhood') was assigned to each respondent in the 1997 and 2003 surveys using the corresponding NZDep index (ie, NZDep96 and NZDep2001, respectively). NZDep is a census-based index of social and material deprivation derived by principal component analysis of nine socioeconomic variables from the respective censuses (Salmond and Crampton 2002). While there are slight differences in index structure and meshblock boundaries between these censuses, comparison is still possible because the index produces relative rankings rather than absolute values. However, this could not be extended to earlier surveys, restricting the neighbourhood deprivation analysis to the late 1990s–early 2000s only. For technical reasons, the NZDep scores were categorised into quartiles for the 1997 survey but quintiles for the 2003 survey. While this imposes further restrictions on the trend analysis, it allows us to maximise the cross-sectional information available from the most recent survey, which is perhaps of greatest interest.

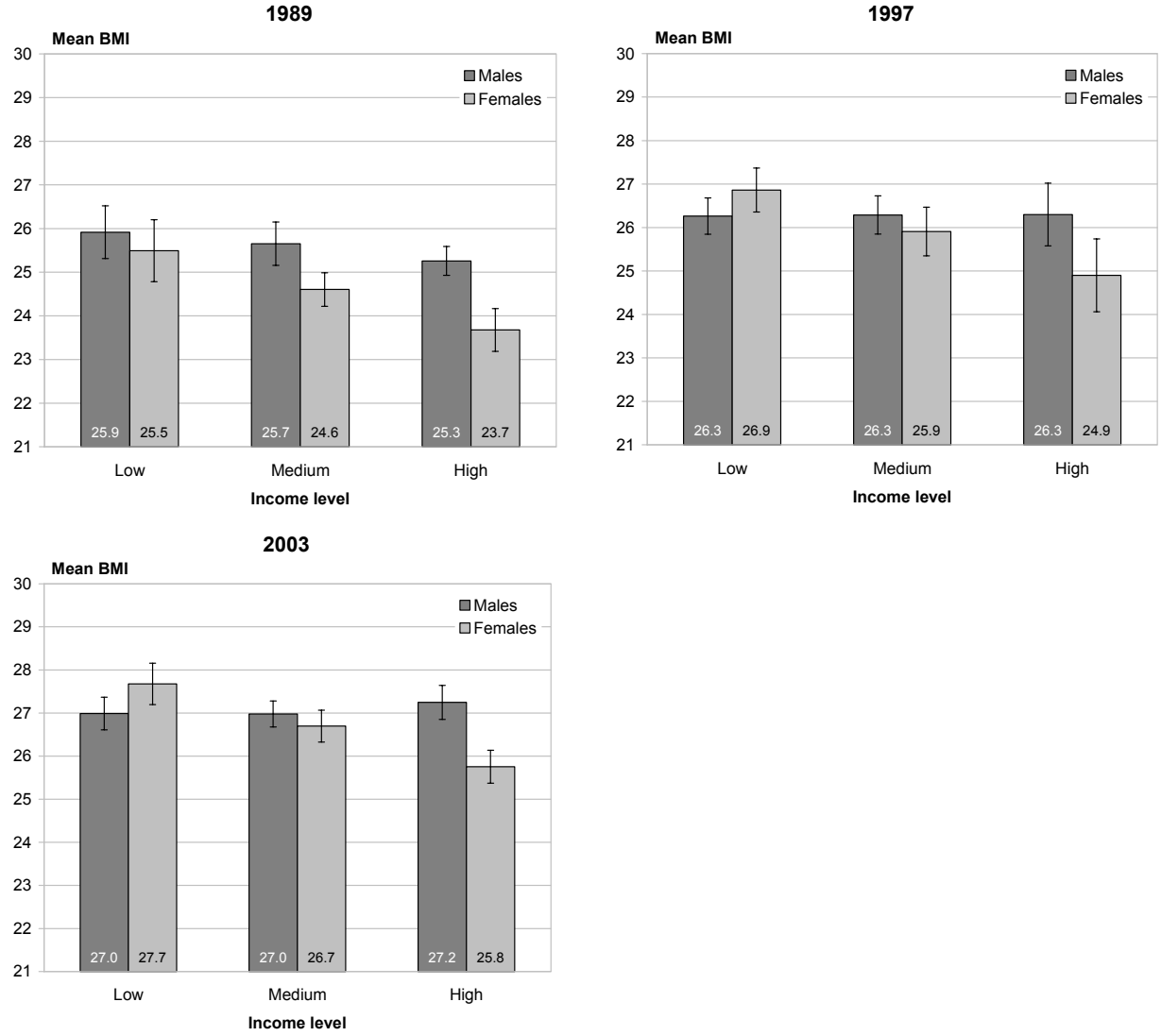
We first present the results for the association of BMI with household level socioeconomic position, followed by the results for the association between neighbourhood deprivation and BMI.

Household income and BMI

Mean BMI and income

Estimates of mean BMI by income tertile for the three surveys with household income data (1989, 1997 and 2003) are summarised in Figure 35.

Figure 35: Mean BMI, by income, 1989, 1997 and 2003



Among males, there is a slight inverse gradient in mean BMI across the income tertiles in 1989, but this pattern is not apparent in the latter two surveys (ie, 1997 and 2003). Mean BMI is approximately 25.5 in 1989, 26.3 in 1997 and 27.0 in 2003 for all income groups. Comparing the beginning with the end of the observation period, the increase in mean BMI was 1.1 units for the low-income tertile, 1.3 units for the medium-income tertile, and 1.9 units for the high-income tertile. Although not statistically significant, this pattern is certainly not suggestive of an emerging inverse gradient, at least when examining the centre of the BMI distribution.

Among females, the pattern is different. An inverse income gradient in mean BMI is already evident at the beginning of the observation period and persists throughout. However, the gradient does not become steeper over time in either absolute or relative terms. For example, the rate difference comparing low- with high-income tertiles was 1.8 units in 1989, 2.0 units in 1997, and 1.9 units in 2003. The corresponding rate ratios were 1.08, 1.08 and 1.07, respectively.

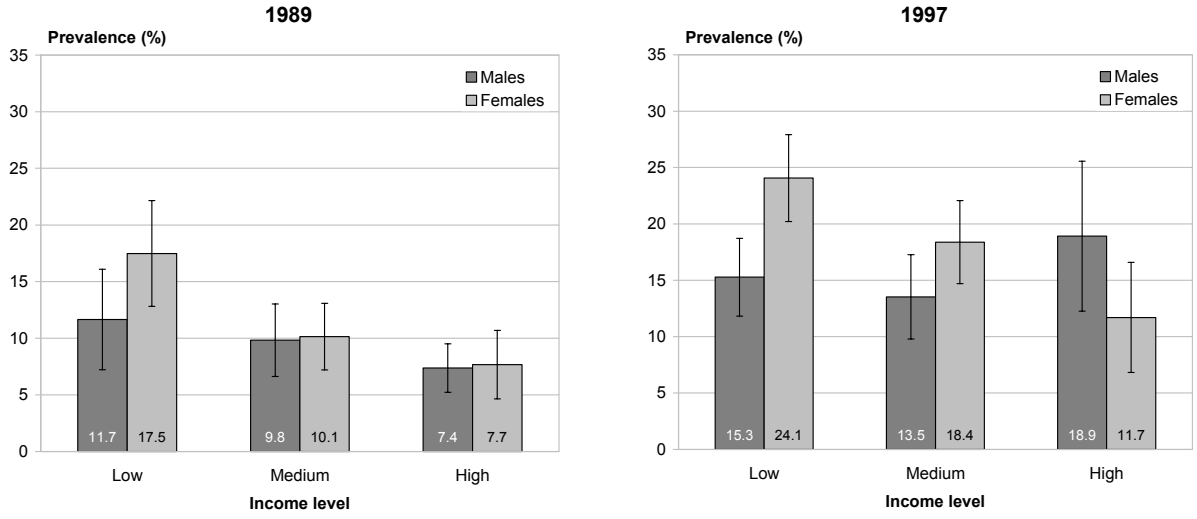
Obesity and income

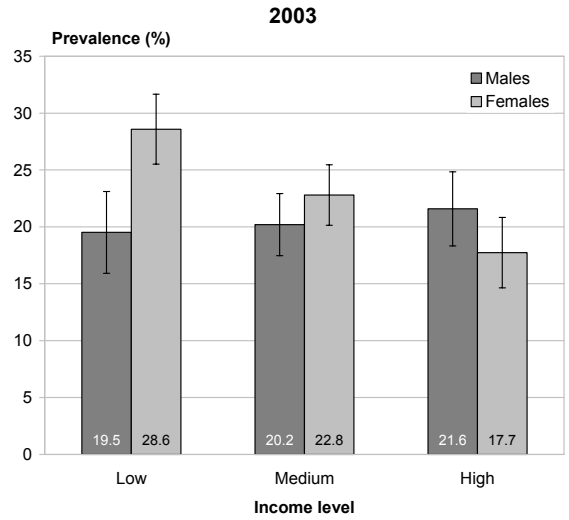
Estimates of the prevalence of obesity (as previously defined) by income for the three surveys with household income data are summarised in Figure 36.

Among males, there is a suggestion of an inverse relationship between income tertile and obesity prevalence in 1989, but this is clearly absent in 1997 and, if anything, a possible (but not statistically significant) *positive* relationship emerges in 2003.

In summary, there is no statistically significant relationship between income and BMI – whether measured as mean BMI or as obesity prevalence – among males.

Figure 36: Obesity prevalence, by income, 1989, 1997 and 2003





Among females, the pattern is again different. A statistically significant and continuous gradient in obesity prevalence exists across the income tertiles at all three time points. There is no evidence that the gradient has become steeper over time. In absolute terms, the rate difference (comparing low- to high-income groups) was 9.8 per 100 in 1989, 12.4 per 100 in 1997, and 10.9 per 100 in 2003. The corresponding rate ratios were 2.3, 2.1 and 1.6, respectively. While the latter trend does not meet conventional levels for statistical significance, if anything it suggests a reducing rather than an increasing relative inequality.

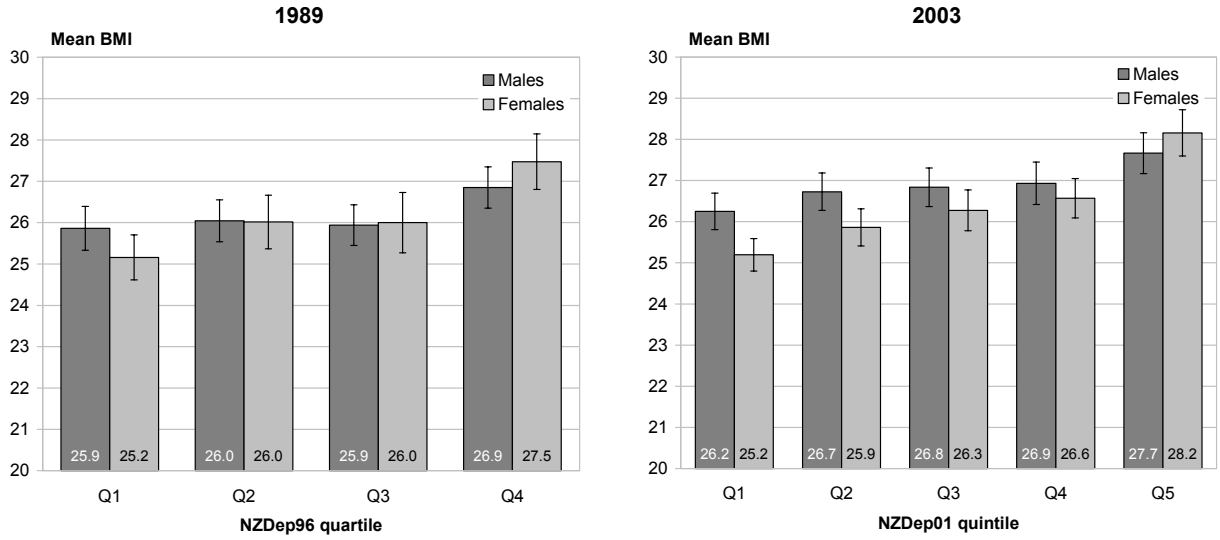
In summary, a clear inverse income gradient exists for BMI (both mean and obesity prevalence) among females but not males. The female gradient has remained stable over the 1989–2003 period in absolute terms, but may be *declining* in relative terms.

Neighbourhood deprivation and BMI

Mean BMI and NZDep

Estimates of mean BMI by NZDep category are summarised in Figure 37, for the two surveys for which such estimates can be calculated.

Figure 37: Mean BMI, by NZDep category, 1997 and 2003



Unlike the pattern for income, there is a suggestion of an inverse gradient between mean BMI and deprivation of small area of residence among males in 1997. While there is no significant difference among the first three quartiles, their mean BMI (approximately 26.0 units) is significantly less than that of the fourth (most disadvantaged) quartile (26.9 units). This pattern is more pronounced in 2003, where there is more of a gradient, with the first (least disadvantaged) quintile having a mean BMI of 26.2 units, the middle three quintiles having similar mean BMIs of around 26.8 units, and the fifth (most disadvantaged) quintile having a mean BMI of 27.7 units.

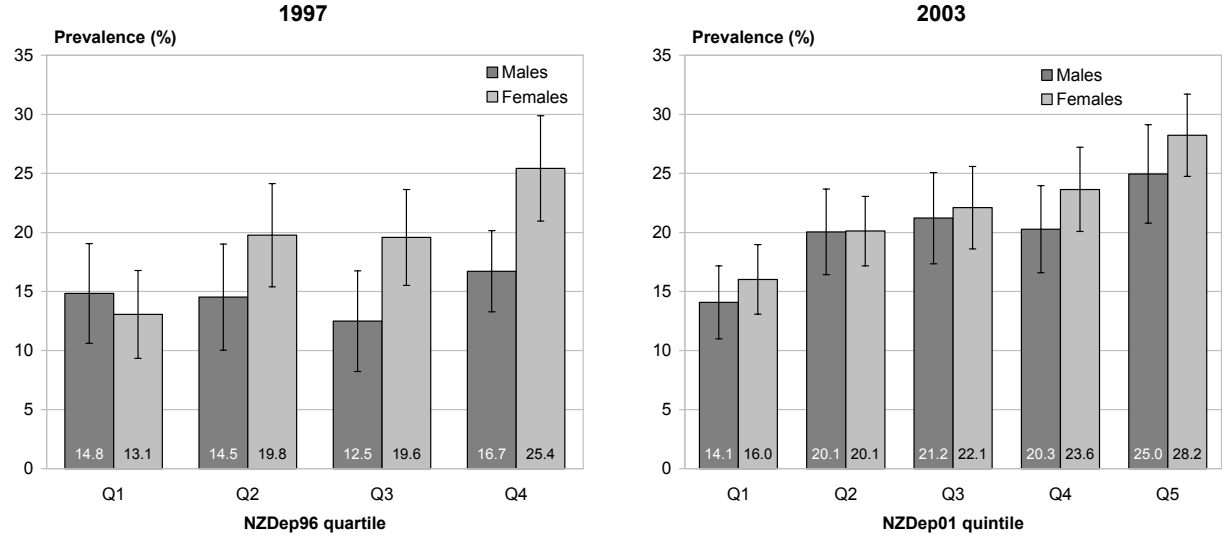
The pattern is similar but with a steeper and smoother gradient among females. Furthermore, the gradient in 2003 appears to be smoother and steeper than it was in 1997, although comparison of the two time points is difficult because of the differences in the deprivation measure.

Obesity and NZDep

Among males, there is little suggestion of a deprivation gradient in obesity prevalence in 1997, but by 2003 such a gradient has emerged (Figure 38). In 2003, only 14 percent of adult males living in quintile 1 small areas (the least disadvantaged fifth of small areas) were obese versus 25 percent of those living in quintile 5 (the most disadvantaged fifth of small areas). The middle quintiles were intermediate (at an obesity prevalence of around 20.5 percent), with no difference among these quintiles.

Among females, the pattern is similar to that for mean BMI. There is a clear gradient at both time points, but the gradient appears smoother and steeper in 2003. As with males, the ratio of obesity prevalence in the most to the least disadvantaged quintile in that year was just under twofold (1.8 for both genders).

Figure 38: Prevalence of obesity, by NZDep category, 1997 and 2003



In summary, an inverse socioeconomic gradient in BMI distribution (as measured both by mean BMI and by obesity prevalence) has existed among females at least since 1989. There is little evidence to suggest any substantial trend in this inequality over the observation period. As an indication of the steepness of the gradient, females living in the most deprived fifth of small areas in 2003 had almost twice the prevalence of obesity as those living in the least deprived fifth.

By contrast, any socioeconomic inequality in the male BMI distribution is less marked and has emerged only recently (ie, is not evident prior to the 2003 survey). Even today, the male gradient is visible only using small area deprivation as the socioeconomic measure, and is less smoothly graded than the female gradient. This gender difference in socioeconomic BMI gradients again supports the hypotheses that the obesity epidemic emerged earlier and so is more advanced among females. It seems reasonable to postulate that the gradient will become more pronounced in future among males, while possibly becoming *less* pronounced among females.