Trends in Extreme Obesity

Here we present a brief summary of trends in the prevalence of extreme obesity, defined as a BMI of 40 kg/m^2 or more, for both the total New Zealand and the Māori populations. BMI in this range imposes a high risk of premature death and disability.

First, however, we briefly summarise data on trends in the average BMI of the obese subpopulation (total and Māori), which provides another indicator of the impact of the increasing skewness of the BMI distribution on people at the higher end of the BMI distribution.

Another perspective on trends at the heavy end of the distribution can be obtained by examining changes in BMI of the 90th percentile of the distribution for each subgroup of the population at each period. This has already been presented in Figure 26 and will not be repeated here.

Trends in mean BMI of the obese

Figures 41 and 42 show the trend in mean BMI of the obese subpopulation, for both total and Māori populations. As described earlier, the higher percentiles of the obese subpopulation's BMI distribution have become heavier as the skewness of the whole population BMI distribution has increased. However, the obese subpopulation is itself very *left* skewed (ie, most obese people have BMI values close to 30 (or 32 for Māori)), partly because this subpopulation represents the rapidly narrowing tail of a larger distribution, and partly because of a mortality selection effect. Thus the shift in the average BMI of this subpopulation has in fact been quite small, with increases of less than one BMI unit for all age–gender–ethnic cells (comparing the start with the end of the observation period). Very similar results are obtained if we examine the median rather than the mean of the BMI distribution of the obese subpopulation. It is only at the 90th percentile of this distribution that larger shifts are seen, a similar pattern of shifting to that seen in the BMI distribution of the population as a whole.

Figure 41: Mean BMI of the obese subpopulation, by gender, total population, 1977–2003

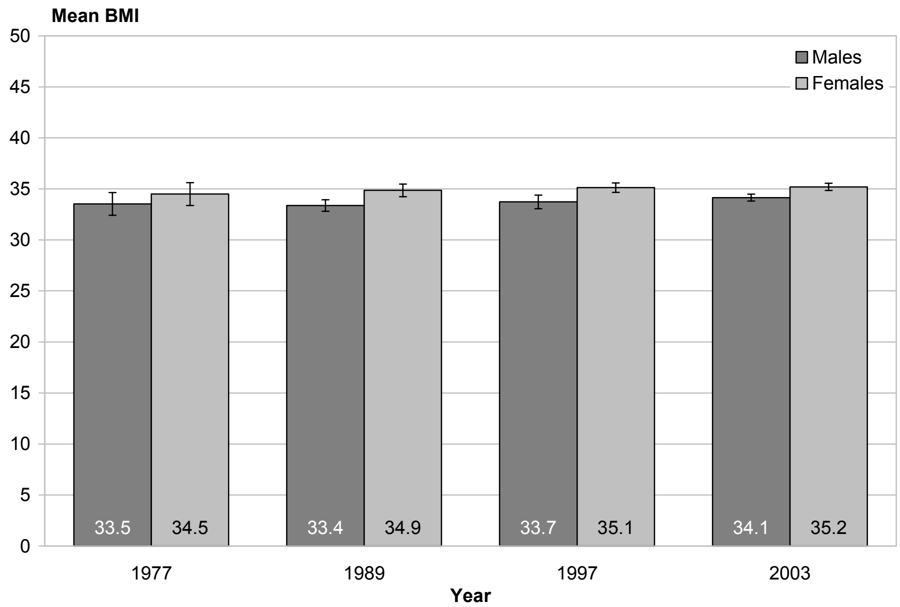
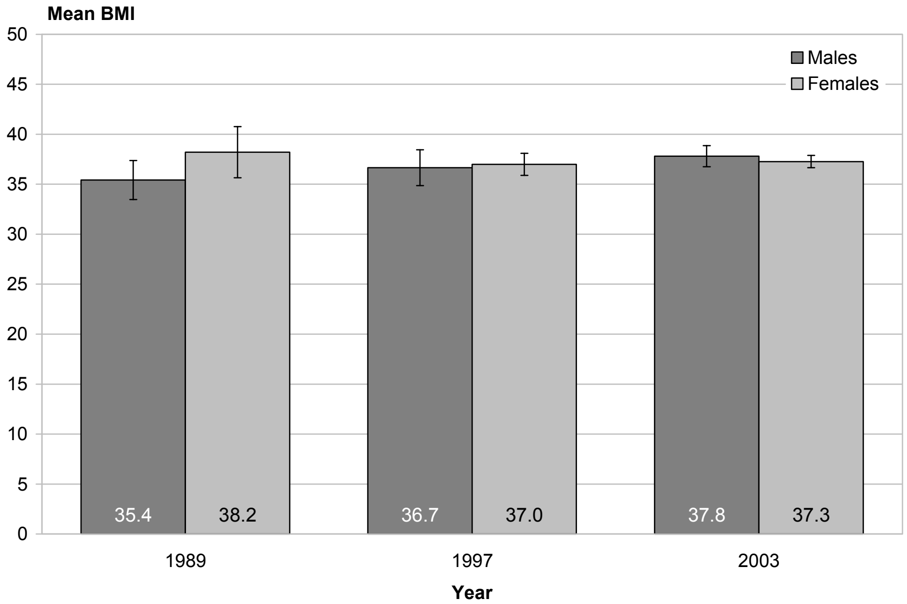


Figure 42: Mean BMI of the obese subpopulation, by gender, Māori population, 1989–2003



Trends in the prevalence of extreme obesity

Unlike the mean BMI of the obese subpopulation, which has increased relatively little (because of its left skewness), the prevalence of extreme obesity (BMI ≥ 40) has increased sharply over the observation period, at least for the New Zealand population as a whole (Figures 43 and 44). Age-standardised prevalence rates, which adjust for the changing age structure of the population over time, are also shown (Tables 15 and 16). Results are presented below for the total and the Māori populations; non-Māori results are not shown but are very similar to those for the total population.

Figure 43: Prevalence of extreme obesity, by gender, total population, 1977–2003

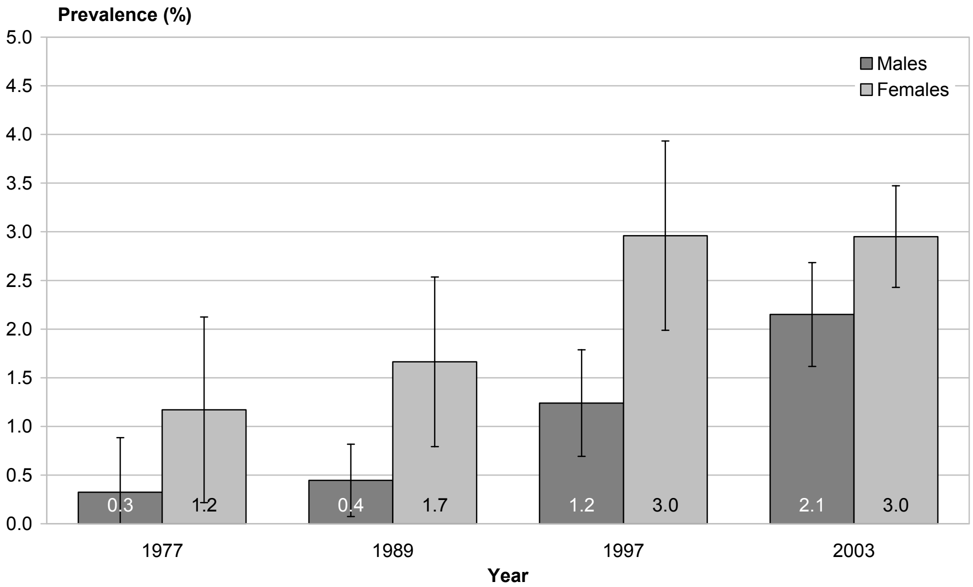


Figure 44: Prevalence of extreme obesity, by gender, Māori population, 1989–2003

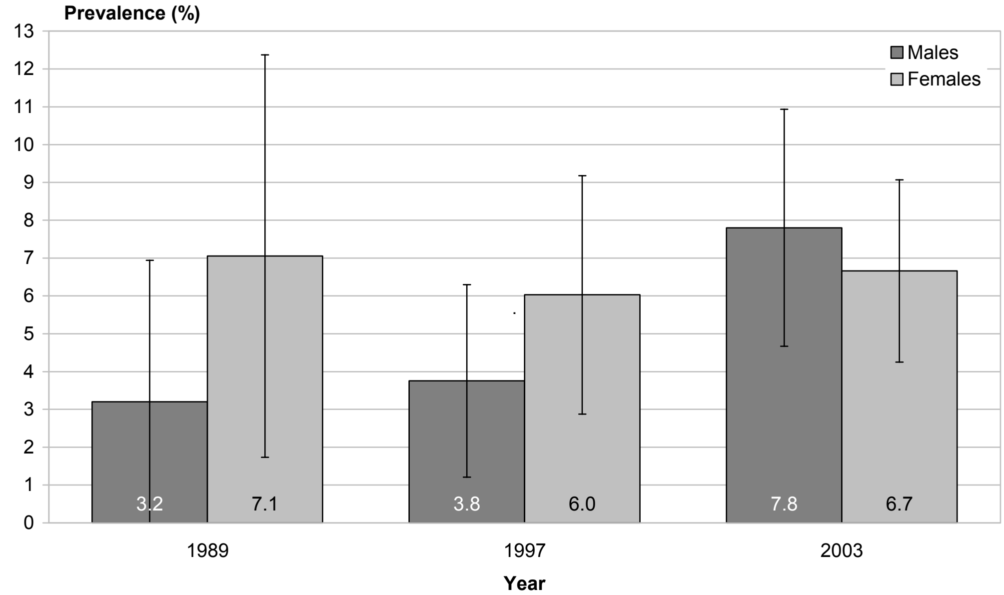


Table 13: Prevalence of extreme obesity, crude and age standardised,* total population

	1977	1989	1997	2003
Males	0.32 (0.50)	0.45 (0.58)	1.24 (1.33)	2.15 (2.68)
Females	1.17 (1.42)	1.66 (2.10)	2.96 (3.26)	2.95 (3.54)

* Age-standardised rates in parentheses.

Table 14: Prevalence of extreme obesity, crude and age standardised,* Māori population

	1989	1997	2003
Males	3.20 (3.70)	3.75 (4.78)	7.80 (7.95)
Females	7.05 (7.18)	6.03 (8.31)	6.66 (8.07)

* Age-standardised rates in parentheses.

Total population

In 1977, pooling all adult ages, the (crude) prevalence of extreme obesity was only 0.32 percent among males but almost fourfold higher among females (although note that the confidence intervals are quite wide). This finding is consistent with the hypothesis that the epidemic began earlier among females. The prevalence of extreme obesity grew slowly among both genders from 1977 to 1989. Rapid growth then occurred (both genders) from 1989 to 1997, when the crude prevalence had reached 1.2 percent and 3.0 percent, respectively. From 1997 to 2003, relatively rapid growth continued among males but virtually ceased among females, so that current prevalence is 2.2 percent among males and still 3.0 percent among females. This corresponds to an estimated 58,000 (± 8000) extremely obese people in the population today, of whom almost 60 percent are female.

Māori population

The pattern for Māori is slightly different. The crude prevalences of extreme obesity in 1989 (3.2 percent for males and 7.1 percent for females) was much higher than those for non-Māori, although arguably a higher cut-off than 40 BMI units should be used to define 'extreme obesity' in iso-risk terms for this ethnic group. Unlike non-Māori, the prevalence did not increase particularly rapidly from 1989 to 1997 among males, reaching 3.8 percent, while among females the point estimate actually declined to 6.0 percent. Finally, from 1997 to 2003, prevalence increased sharply once more for males (reaching 7.8 percent), while increasing again but only slightly for females (to 6.7 percent). This is consistent with the increase observed in the BMI of the 90th percentile from 1997 to 2003 for Māori males, in contrast to the decrease in this parameter seen for females. However, note that the confidence intervals for the prevalence of extreme obesity in Māori are so wide that the trends do not meet conventional criteria for statistical significance.

Even if a higher cut-off (than BMI > 40) might have been more appropriate for Māori and Pacific peoples (and a lower cut-off for Asian ethnic groups), the startling fact remains that today almost 3 percent of the total adult population (and approximately 8 percent of the Māori population) have a BMI ≥ 40 units, placing these approximately 58,000 individuals at very high risk of serious health outcomes in the near future. Of course, at the individual level, absolute cardiovascular (and cancer) risk also depends on other factors, such as the level of physical fitness, whether the person is a smoker, presence of co-morbidities such as type 2 diabetes, high blood pressure, dyslipidaemia, and personal and family medical history.

Trends in Stature

The secular trend in stature can be estimated from a single cross-sectional survey, in this case using the 2003 NZHS. This is because full adult height is attained by age 25 years, and generally remains stable until late middle age.[8] So each 10 years age group in the 2003 survey corresponds to a distinct birth cohort – ranging from the birth cohort of the 1940s (survey respondents currently 55–64 years of age) to that of the 1970s (survey respondents currently 25–34 years of age).

Below we summarise the age-specific mean statures from the NZHS 2003 data set (Table 15). As indicated, each 10-year age group represents a different cohort, so if there has been an increase in stature over the last 30 years, then the younger age groups should, on average, be taller than their older counterparts.

Table 15: Mean height (cm), by age group and sex, 2003

Age group (years)	Male	Female
25–34	177.3 (176.6, 178.0)	163.7 (163.2, 164.2)
35–44	176.2 (175.6, 176.8)	163.2 (162.8, 163.6)
45–54	175.3 (174.7, 175.9)	162.0 (161.4, 162.6)
55–64	173.4 (172.7, 174.1)	161.2 (160.6, 161.8)

Inspection of Table 15 confirms that there has indeed been an increase in average stature over the last three decades: 25–34-year-old males are 3.9 cm (and females 2.5 cm) taller than their 55–64-year-old counterparts, with the intermediate 35–44 and 45–54 years age groups intermediate in mean stature. Comparing these age groups in 2003 is equivalent to establishing a cohort effect over (approximately) 30 years. Hence, we can say that over the last 30 years, males have grown in stature by (on average) 1.3 cm per decade, and females have grown 0.8 cm per decade.

Figures 45 and 46 show this same information graphically, clearly revealing that there has been an increase in average stature over the last three decades.[9] That is, males born in the 1970s (or current 25–34-year-olds) are 3.9 cm taller than the 1940s cohort (or current 55–64-year-olds). Similarly, females born in the 1970s are 2.5 cm taller than females belonging to the 1940s cohort. Furthermore, there is little evidence of any slowing in the secular trend in recent versus earlier decades.

This secular trend in stature may account for a small proportion of the BMI distributional shift seen over the past 26 years, as BMI does not fully adjust for changes in height.[10]

8 Apparent loss of height in middle age is mainly postural, rather than reflecting development of thoracic kyphosis or change to the trabecular structure of vertebrae (V Kippers, personal communication, September 2004).

9 Dated in terms of decade in which full adult height is attained, not decade of birth.

10 That is, the (small) residual effect of increasing stature that remains after dividing weight by the square of height could explain some of the shift in the population's BMI distribution over time. However, this effect could only be a very minor contributor to the observed trends.

Furthermore, should high rates of childhood obesity persist (or worsen), this may well contribute to further increases in mean stature (high insulin levels associated with childhood obesity also promote increases in linear growth, as insulin has growth hormone-like effects in children). So the magnitude of excess body fat in children may be progressively underestimated if reliance continues to be placed on BMI as the measure of body adipose tissue mass in this age group.

Figure 45: Trends in mean stature of males

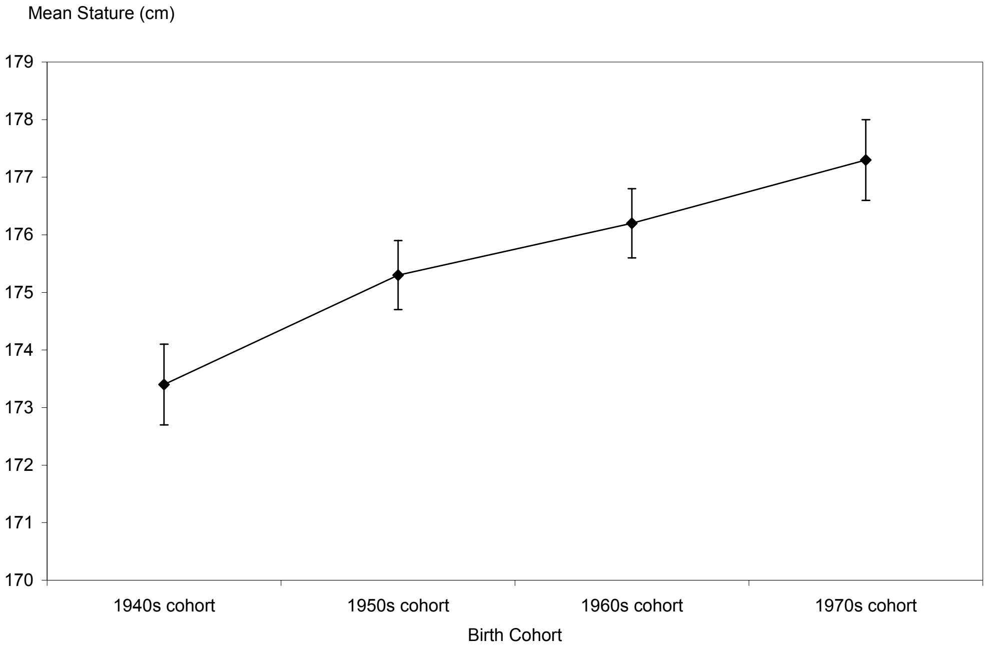


Figure 46: Trends in mean stature of females