J. Paediatr. Child Health (2004) **40**, 33–37

Changes in body mass index in 11–12-year-old children in Hawkes Bay, New Zealand (1989–2000)

A Turnbull,[1] D Barry,[1] K Wickens[2] and J Crane[2]

[1]*Healthcare Hawke's Bay, Hastings,* [2]*Wellington Asthma Research Group, Wellington School of Medicine and Health Sciences, University of Otago, Wellington, New Zealand*

Objective: To describe and compare the body mass index (BMI; weight/height^2) profile of 11–12-year-old children in Hawkes Bay, New Zealand in 1989 and 2000. To subsequently determine the prevalence of overweight and obesity at the two time points using international definitions.

Methodology: As part of asthma prevalence studies in Hawkes Bay data on height, weight and ethnicity were collected from 871 school children in 1989, and 894 children in 2000 who reached 12 years of age during the year of testing.

Results: In the total study population the geometric mean BMI increased from 18.1 kg/m^2 (95% CI 17.9; 18.3) in 1989 to 19.8 kg/m^2 (95% CI 19.6; 20.0) in 2000, a relative increase of 9.2% (95% CI 7.6; 10.9), $P < 0.001$. Significant relative increases were found for males (9.0%: 95% CI 6.8; 11.3), females (9.3%: 95% CI 6.8; 11.8), Maori (7.6%: 95% CI 4.3; 11.1), European (9.1%: 95% CI 7.3; 11.0) and Pacific Island children (11.0%: 95% CI 2.2; 20.5). In 2000 20.9% of Hawkes Bay children were classified as overweight and 9.1% as obese. The risk of being overweight in 2000 was 2.2 times greater than the risk in 1989, and the risk of being obese was 3.8 times greater, with these problems more pronounced among Maori (overweight 24.7%, obese 15.3%) and Pacific Island (overweight 35.0%, obese 15.0%) than European (overweight: 18.2%, obese 5.7%) children. However, the risk of being overweight (RR = 3.0, 95% CI 2.2–4.0) or obese (RR = 8.3, 95% CI 3.0–23.3) in 2000 compared to 1989 was greater among European children.

Conclusion: Higher percentages of Maori and Pacific Island children are overweight or obese compared to European, but in all ethnic groups there has been a statistically significant increase in mean BMI over an 11-year period. This increase reflects the trend observed in other developed countries and underlines childhood obesity as a major health problem in New Zealand.

Key words: body mass index; children; New Zealand; obesity; secular change.

Childhood obesity is increasing in prevalence in developed countries and effective management is an acknowledged priority for public health action.[1] Obesity in childhood is an independent risk factor for obesity in adulthood and it is also associated with many of the known risk factors for heart disease and other chronic diseases including type 2 diabetes mellitus, hyperlipidaemia, hepatic steatosis and gallbladder disease.[2,3] There are also negative psychosocial implications to being obese. Children who are overweight are ranked lowest as preferred friends and are also stereotyped as lazy or sloppy.[4] As children become adolescents these perceptions impact on self-esteem ratings.[5]

Recent studies showing an increased prevalence of obesity, with higher body mass index (BMI; weight/height^2) measurements over time in developed countries such as Australia,[6,7] the United States of America,[8,9] the Netherlands,[10] and Britain[11] stimulated us to examine data from asthma prevalence studies[12] conducted in 1989 and 2000 to determine whether the BMI profile of a group of New Zealand children aged 11–12, years living in the Hawkes Bay region showed a similar rising trend. We also compared the prevalence of overweight and obesity between years, and explored sex and ethnicity differences within the study population. Other studies have shown higher BMI profiles for New Zealand children of Polynesian descent and for females.[13,14]

METHODS

As part of two cross-sectional studies on asthma prevalence rates,[11] a defined population of children who reached 12 years of age during the years of testing (1989 and 2000) were identified. The Hawkes Bay Ethics Committee granted ethical approval. These studies were conducted between February and March in 1989, and February and April in 2000. The population was defined geographically in 1989 by including all appropriately aged children attending school in the city of Hastings and borough of Havelock North in Hawkes Bay. In 2000 a new local body named the Hastings District Council was formed and this included Hastings and Havelock North. Therefore, in 2000 the study included all of those schools still existing from the previous study together with new schools opened in the area since 1989. The same geographic area was covered in 2000 as in 1989.

Schools are given decile ratings by the Ministry of Education. These are socio-economic indicators of the catchment area for the school. The lower socio-economic groups are deciles 1–3, and the highest 8–10. The mean decile rating for the schools studied was 4.4 and the median 4.0.

The principals of schools qualifying for the study (including state and private schools) distributed a parental/care-giver questionnaire and consent form. The questionnaire included questions about personal and demographic details of the child.

Correspondence: Dr A Turnbull, Department of Paediatrics, PO Box 4710, Christchurch, New Zealand. Fax: +64 3 364 1240; email: amandat1@cdhb.govt.nz

Accepted for publication 26 May 2003.

In 1989 ethnicity was determined by parent/care-giver self-report as Maori, European or other. Space was available to give more information about the child's ethnic group. In 2000 a Pacific Island category was also available.

Height was measured to the nearest 0.1 cm using a portable field instrument, the accuracy of which has been checked by comparison with a standard rule. Measurements of height and weight were made in school gymnasia. Children were weighed in light clothing on step scales that were zeroed prior to each measurement and weight was rounded to the nearest kilogram. No adjustment was made for clothing, as it is customary to weigh children in light clothing in clinical practice. The same instruments were used in both study years and children were measured over the period of February–April in both years. The BMI was calculated by dividing the weight (kg) by the square of the height (m). Other measurements of body fat were not taken as BMI is an accepted measure of adiposity in international studies and Tyrell *et al.*[14] have shown no clinically relevant difference between BMI and percentage body fat in New Zealand school children.

Statistical analysis was conducted using SAS version 8 (SAS Institute, Cary, NC, USA). Since BMI was not normally distributed, but was close to a log normal distribution, analysis was conducted using geometric means and 95% confidence intervals. The ratio of the geometric means was used to estimate the percentage increase. Analysis of variance on the logged BMI was used to test for differences between the years adjusting for differences in gender and ethnicity. Within each quartile, BMI was not normally or log normally distributed and thus, for analysis by quartile, median values were calculated with the Wilcoxon Rank Sum Test used to test the significance of the differences in BMI between 1989 and 2000. The between year equality of variances was tested with a *F*-test on the ratio of the variances. BMI was also classified dichotomously according to an international age-related standard for determining cut-off values to define overweight (cut-off 1) and obesity (cut-off 2)[15] for each individual age and assuming a straight-line distribution between the ages of 11 and 12. Relative risk estimates of overweight (greater than cut-off 1) and obesity (less than cut-off 2) between years were calculated. The prevalence of overweight individuals was calculated after excluding obese individuals. Decimal age was calculated as the questionnaire completion date minus the date of birth.

RESULTS

In the Hastings district of Hawkes Bay 12 of the 13 school principals in the study area agreed to their school participating in the research in 1989. In 2000 all school principals agreed to participate. The non-participating school in 1989 had five children of the defined age group included in the study. With these children included in the total target population and the school rolls compared with the questionnaire returns in all other schools, the response rate was 94%. In 2000 the response rate was 84%.

Gender was unavailable on one child in 2000. Ethnicity was unavailable on 28 children in 1989 and on five children in 2000. In 1989 Maori made up 25.8% of the study population, Europeans 66.8%, Pacific Island 3.1% and other 0.5%. In 2000 the ethnic distribution was Maori 30.8%, European 62.7%, Pacific Island 4.5% and other 0.4%. In both 1989 and 2000 the mean age of respondents was 11.7 years (standard deviation 0.3).

Table 1 shows that there were significant increases in BMI between 1989 and 2000 across all gender and ethnic groups, except for children in the 'other' ethnicity group. After adjusting for gender and ethnicity, the differences in BMI between the years remained statistically significant (data not shown).

Additional analysis showed that the relative increase in BMI for Maori (9.6%: 95% CI 4.9; 14.6), Pacific Island (15.8%: 95% CI 1.9; 31.7) and other ethnic group (10.6%: 95% CI −8.8–34.0) female was greater than for Maori (5.6%: 95% CI 1.1; 10.4), Pacific Island (7.4%: 95% CI −2.9–18.9) and other ethnic group (2.0%; 95% CI −9.1; 14.5) male. The high relative increase in BMI for Pacific Island females in part reflects the presence of two females in the 2000 sample who had a BMI of greater than 30, disproportionately elevating the results. Excluding these children from the analysis gives a relative increase of 9.8% (95% CI −0.2; 22.7) among Pacific Island females. In contrast there were similar increases in BMI for European males (9.9%; 95% CI 7.5–12.4) and females (8.2%: 95% CI 5.4; 11.0).

The percentage of overweight children increased from 11.0% in 1989 to 20.9% in 2000, and the percentage of obese children increased from 2.4% in 1989 to 9.1% in 2000 (Fig. 1). Table 2 shows that the risk of being overweight or obese in 2000, compared to 1989, is particularly high for European children. On the other hand, the absolute percentages in 2000 (Fig. 1) are much higher for Maori (overweight 24.7%, obese 15.3%) and Pacific Island (overweight 35.0%, obese 15.0%) than European (overweight: 18.2%, obese 5.7%) children. Additional analysis showed that, in 2000, there were no significant differences in the risk of being overweight (RR = 0.75, 95% CI 0.51–1.11) or obese (RR = 1.08, 95% CI 0.63–1.88) for children attending private schools compared to children attending state funded schools. In 1989 only one child at a private school was classified as overweight and no children at private schools were obese.

Table 1 Body mass index (BMI) geometric mean (95% CI) and relative increase between years in total population and by gender and ethnicity in 1989 and 2000

	1989			2000			Relative increase (%)
	n	Geometric mean BMI	95% CI	*n*	Geometric mean BMI	95% CI	
All	871	18.1	(17.9 – 18.3)	894	19.8	(19.6–20.0)	9.2 (7.6 – 10.9)**
Male	454	17.9	(17.7 – 18.1)	444	19.5	(19.2–19.8)	9.0 (6.8 – 11.3)**
Female	417	18.3	(18.1 – 18.6)	449	20.0	(19.7–20.4)	9.3 (6.8 – 11.8)**
Maori	225	19.3	(18.9 – 19.7)	275	20.8	(20.3–21.2)	7.6 (4.3 – 11.1)**
European	582	17.6	(17.4 – 17.8)	561	19.2	(18.9–19.4)	9.1 (7.3 – 11.0)**
Pacific Island	27	19.2	(18.1 – 20.4)	40	21.3	(20.0–22.7)	11.0 (2.2 – 20.5)*
Other	9	18.7	(16.2 – 21.7)	13	20.0	(18.4–21.7)	6.6 (−0.8 – 23.2)

**$P < 0.001$; *$P < 0.05$ for differences in BMI geometric mean between years. One observation is missing gender information in year 2000.

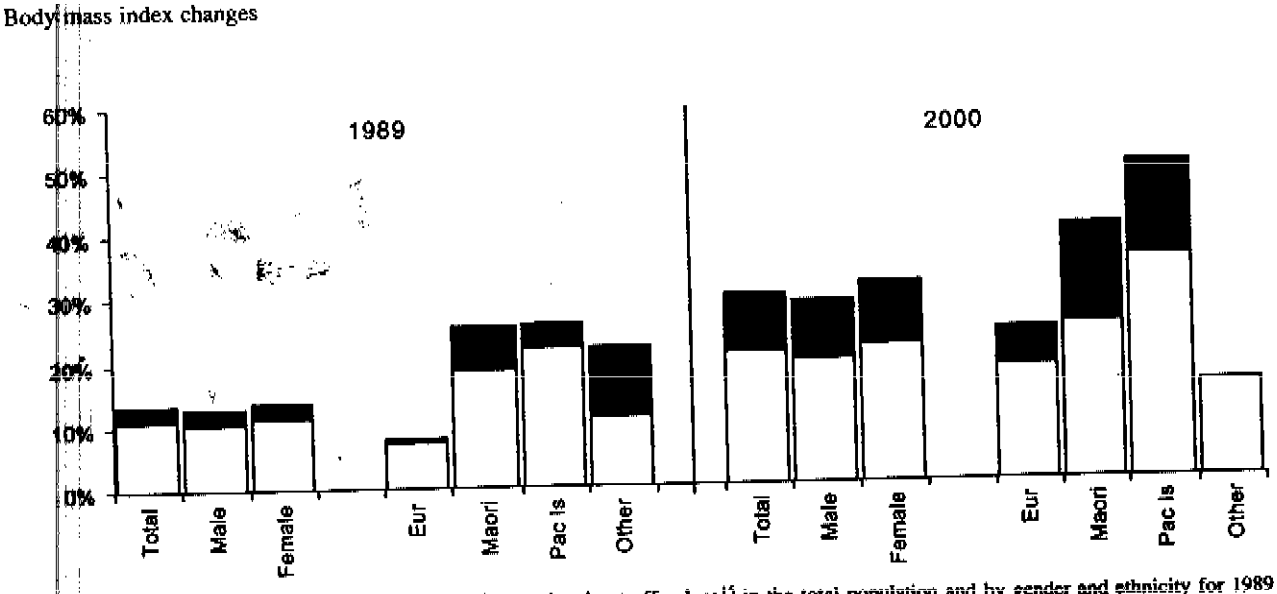

Fig. 1 Prevalence of overweight and obesity using international cut off values[15] in the total population and by gender and ethnicity for 1989 and 2000. ■, Obese; □, overweight.

Table 2 Relative risks (95% CI) for overweight and obesity for 2000 compared to 1989 using international cut off values[15] in the total population and by gender and ethnicity

	Overweight RR (95% CI)	Obese RR (95% CI)
Total	2.2 (1.8–2.7)***	3.8 (2.3–6.0)***
Gender		
Male	2.2 (1.7–2.9)***	3.6 (1.9–7.0)***
Female	2.3 (1.7–3.0)***	3.9 (2.0–7.7)***
Ethnicity		
Maori	1.6 (1.2–2.1)**	2.3 (1.3–4.0)**
European	3.0 (2.2–4.0)***	8.3 (3.0–23.3)***
Pacific Islander	1.9 (0.9–3.9)	4.1 (0.5–31.8)
Other	0.7 (0.1–4.0)	0.0
Maori male	1.4 (0.9–2.0)	2.0 (0.9–4.1)
European male	3.2 (2.1–5.0)***	9.3 (2.2–39.7)**
Maori female	1.8 (1.2–2.7)**	2.8 (1.2–6.6)*
European female	2.7 (1.8–4.2)***	7.4 (1.7–32.0)**

***$P < 0.0001$; **$P < 0.01$; *$P = < 0.05$.

Table 3 shows the median and range of BMI in 1989 and 2000 by quartile for the total population and for gender and ethnic subgroups. For each quartile, in the total study population and among male, female, Maori and European children, BMI was statistically significantly higher in 2000 than in 1989 ($P \leq 0.0001$, Wilcoxon Rank Sum Test). However the differences between median values are greater at the higher quartiles, indicating a greater increase in BMI among the heavier children than the lighter children. The between year equality of variance based on geometric mean BMI shows that the variability was significantly greater in 2000 than 1989 for the total population ($P \leq 0.0001$), males ($P = 0.002$), females ($P \leq 0.001$), Maori ($P \leq 0.09$) and European ($P = 0.0001$), supporting the notion that the increase in BMI has been disproportionately higher among children in the higher quartiles. Numbers were too small to do similar analyses for the Pacific Island and 'Other' groups.

DISCUSSION

Our study shows a marked increase in mean BMI, and the prevalence of both 'overweight' and 'obesity' in 11–12-year-old Hawkes Bay children over an 11-year period. Both sexes and the predominant ethnic groups are affected. The distribution of ethnicities and sex between the two populations of children studied did not vary markedly over the 11-year period.

Magarey *et al.* have published data reviewing the prevalence of overweight and obesity in Australian children in two national samples 10 years apart and their results are comparable to ours.[7] Their sample years were 1985 (children aged 7–15 years) and 1995 (children aged 2–18 years). Our prevalence rates, like the Australian data (1985: males; overweight 9.3%, obese 1.4%, females; overweight 10.6%, obese 1.2%, 1995: males; overweight 15%, obese 4.5%, females; overweight 15.8%, obese 5.3%) are high by international standards. Overweight prevalence figures for our data in 1989 lie at about the mid-point of the range of the overweight prevalence rates of the six countries used by Cole *et al.* to define cut offs for overweight and obesity.[15] For obesity however, the Hawkes Bay rate is considerably higher, especially for females. In 2000 our prevalence rates of overweight and obesity are much higher than the mid-point, with our overweight rate higher than all other national samples in the Cole *et al.* study.[15] Comparison with British trends[11] in overweight and obesity over a 10-year period (1984–1994) also shows that prevalence rates are higher in Hawkes Bay children. These differences may be explained by the collection of our initial data at an interval 5 years later than that of the British studies. It is however, interesting to note that the Australian data collected at an interval only one year later than the British also showed higher prevalence rates of overweight and obesity.

Using 1996 census data for persons aged 10–14 years the national profile was; Maori 12.8%, European 74.9%, Pacific Island 5.6% and Other 6.7%.[16] The distribution of ethnicities in our study when compared to the national profile overestimates the Maori population and under-represents Europeans. This was more pronounced in 2000 than 1989. Pacific Island percentages approximated the nationwide distribution. The

Table 3 Median and range of body mass index (BMI) for each quartile by gender and selected ethnic groups

	1989			2000		
	n	Median	Range	*n*	Median	Range
Top quartile						
Total	218	21.5	19.7–31.6	225	24.6	21.9–38.4
Gender						
Male	113	21.1	19.2–31.6	111	24.2	21.5–34.4
Female	104	21.5	20.2–30.6	112	25.1	22.1–38.4
Ethnicity						
Maori	57	23.8	21.2–31.6	68	26.3	22.8–36.2
European	143	20.6	19.2–27.3	140	23.6	21.0–34.0
3rd quartile						
Total	221	18.6	17.7–19.2	222	20.3	19.2–21.9
Gender						
Male	114	18.1	17.4–19.2	111	20.1	18.7–21.5
Female	104	19.1	18.1–20.2	112	20.7	19.6–22.0
Ethnicity						
Maori	56	19.6	18.7–21.2	69	21.4	20.1–22.8
European	151	18.0	17.3–19.2	143	19.7	18.6–21.0
2nd quartile						
Total	211	17.0	16.4–17.7	223	18.2	17.4–19.2
Gender						
Male	116	16.8	16.4–17.4	111	18.1	17.3–18.7
Female	105	17.3	16.4–18.0	111	18.4	17.6–19.6
Ethnicity						
Maori	56	17.8	17.0–18.6	69	18.9	18.2–20.0
European	145	16.6	16.0–17.3	137	17.9	17.1–18.6
Bottom quartile						
Total	221	15.5	12.6–16.4	224	16.6	12.9–17.4
Gender						
Male	111	15.5	13.2–16.3	111	16.6	14.1–17.3
Female	104	15.4	12.6–16.4	114	16.6	12.9–17.6
Ethnicity						
Maori	56	16.2	13.6–17.0	69	17.1	14.5–18.2
European	143	15.2	12.6–16.0	141	16.2	12.9–17.1

increases in BMI in our study are likely to be generalizable within ethnic groups but may not reflect the national situation. There are no published studies that have examined the prevalence of obesity in Maori children throughout New Zealand, but recent data show that Maori and Pacific Island school children in the Auckland region are more likely to be obese than European.[14] Indigenous populations in countries such as the United States[5,17] have also been shown to have higher prevalence's of overweight and obesity.

Is the entire population becoming heavier or are the heavier individuals becoming even heavier while the remainder of the populations' weight remains static? Studies by Rosner *et al.*[8] and Lazarus[18] have shown that while there is a general upward shift in BMI for populations studied, the trend is disproportionately increased at higher BMIs. Analysis of our data by quartile (Table 3) shows a significant increase in BMI for each quartile, although the difference reduces at lower BMI quartiles. These findings support previous studies and are of particular concern for the Maori and Pacific Island population as their BMI is already on average higher than that of the European population. While adults of Polynesian descent have been recognized as having a muscular body build with significant differences between fat mass and calculated BMI[19] this does not appear to apply to Polynesian children.[13]

Although BMIs were lower among European children, the relative risk for being overweight or obese was much higher in 2000 compared to 1989 than in Maori or Pacific Islander (Table 2). These results indicate the cross-cultural nature of this child health problem.

As this and other studies illustrate, BMI values are showing dramatic increases over relatively short time periods. Environmental factors must be of great importance as the genetic composition of the population does not alter rapidly.

Our study confirms the international trend in developed countries of a rising mean BMI in children. It also shows the problem to be more common in New Zealand's Polynesian children with European children rapidly catching up. Why children in Hawkes Bay, should have higher prevalence rates of overweight and obesity than other countries is not clear. No data exist for comparative estimates of activity levels in New Zealand children over the past 11 years. A New Zealand study comparing weight, skin-fold thickness and leisure-time activities in 1976 and 1984[20] in 334 children aged 11–13 years, showed children to be playing more sport and more were walking or cycling to school in 1984 than in 1976. Evidence from other countries would suggest that this trend has not continued and that lifestyles have actually become more sedentary.[21,22] Factors contributing to this sedentary lifestyle and subsequent reduced energy expenditure include increased television viewing, and computer and video game use by children. There may also be an increased intake of high fat, energy dense foods[1] as a result of advertising seen during television viewing.[23]

The New Zealand Ministry of Health, recognizing childhood obesity as an area of public health concern is circulating a draft strategy focusing on physical activity, nutrition and healthy weight. Some programmes already underway include the Walking School Bus concept (where a 'driver', usually a

parent, walks children to/from school) and hikoi (walking programmes in Maori communities). Encouragement of less sedentary behaviour seems reasonable, but there are no studies to confirm its effectiveness.[24] Public health strategies need to be culturally acceptable as children of Maori and Pacific Island ethnicity are at particular risk of being overweight and obese. As well as community projects, national initiatives such as healthy school food policies (discouraging convenience food vending machines in school and offering healthy lunch options) and legislation to protect children from exposure to the marketing of high fat and sugar foods during children's television programmes, could be considered. Along with national and community programmes individual attention for those at risk is needed and one strategy that may be beneficial is reducing children's television viewing time.[25]

All those involved with the healthcare of children have a role to play in promoting an active lifestyle and a healthy diet, with the aim of reducing the prevalence of overweight and obesity and their health complications.

ACKNOWLEDGEMENTS

This research was assisted by grants from the Hawkes Bay Medical Research Foundation, The Health Research Council of New Zealand and the Asthma and Respiratory Foundation of New Zealand. A Senior Fellowship from the Health Research Council supports JC. Healthcare Hawkes Bay helped with material and human resources and Ngaire Bone coordinated the fieldwork. Annaleis Friesma and Robert Rhodius, medical students from Groningen University, the Netherlands helped with the fieldwork. We are particularly grateful to the children and families who participated in this study.

REFERENCES

1 World Health Organisation. Obesity, preventing and managing the global epidemic: *Report of the WHO consultation of obesity*. Geneva: World Health Organisation, 1997.
2 Barlow S, Dietz W. Obesity evaluation and treatment: Expert Committee recommendations. The Maternal and Child Health Bureau. Health Resource and Services Administration and the Department of Health and Human Services. 1998; *Paediatrics* **102**: e29.
3 Dietz W. Health consequences of obesity in youth: Childhood predictors of adult disease. *Paediatrics* 1998; **101**: 518–25.
4 Krauss R, Winston M, Fletcher B, Grundy S. Obesity: impact on cardiovascular disease. *Circulation* 1998; **98**: 1472–6.
5 Stunkard A, Burt V. Obesity and body image II. Age at onset of disturbance in the body image *Am. J. Psychiatry* 1967; **123**: 1443–7.
6 Lynch J, Wang X, Wilcken D. Body mass index in Australian children: Recent changes and relevance of ethnicity. *Arch. Dis. Child* 2000; **82**: 16–20.
7 Magarey A, Daniels L, Boulton T. Prevalence of overweight and obesity in Australian children and adolescents: reassessment of 1985 and 1995 data against new standard international definitions. *Med. J. Aust.* 2001; **174**: 561–4.
8 Rosner B, Prineas R, Loggie J, Daniels S. Percentiles for body mass index in U.S. children 5–17 years of age. *J. Pediatr.* 1998; **132**: 211–22.
9 Flegal K, Ogden C, Wei R, Kuczmarski R, Johnson C. Prevalence of overweight in US children: comparison of US growth charts from the Centers for Disease Control and Prevention with other reference values for body mass index. *Am. J. Clin. Nutr.* 2001; **73**: 1086–93.
10 Fredriks A, van Buuren S, Wit J, Verloove-Vanhorick S. Body index measurements in 1996–7 compared with 1980. *Arch. Dis. Child* 2000; **82**: 107–12.
11 Chinn S, Rona R. Prevalence and trends in overweight and obesity in three cross sectional studies of British children, 1974–94. *BMJ* 2001; **322**: 24–6.
12 Barry D, Burr M, Limb E. Prevalence of asthma among 12 year old children in New Zealand and South Wales: a comparative study. *Thorax* 1991; **46**: 405–9.
13 Salesa J, Bell A, Swinburn B. Body size of New Zealand Pacific Islands children and teenagers. *NZMJ* 1997; **110**: 227–9.
14 Tyrell VJ, Richards GE, Cutfield WS, Hofman P, Gillies GF, Robinson E. Obesity rates in Auckland school children: a comparison of the BMI and percentage body fat as the diagnostic criterion. *Int. J. Obesity* 2001; **25**: 164–9.
15 Cole T, Bellizzi M, Flegal K, Dietz W. Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ* 2000; **320**: 1240–3.
16 Census 1996. Census of population and dwellings: Regional summary. *Statistics New Zealand*, Wellington: New Zealand, 1997.
17 Crawford P, Story M, Wang M, Ritchie L, Sabry Z. Ethnic issues in the epidemiology of childhood obesity. *Paed. Clin. NA* 2001; **48**: 855–73.
18 Lazarus R, Wake M, Hesketh K, Waters E. Change in body mass index in Australian primary school children, 1985–1997. *Int. J. Obesity* 2000; **24**: 679–84.
19 Swinburn B. Using the body mass index: weigh then weigh up. *NZMJ* 1998; **111**: 377–8.
20 Randolph P, Beck D, Thomsen M, Spears G. Anthropometry and leisure activities of some Dunedin children aged 11–13, 1976 and 1984. *NZMJ* 1987; **100**: 634–5.
21 Sallis J. Epidemiology of physical activity and fitness in children and adolescents. *Crit. Rev. Food Sci. Nutr.* 1993; **33**: 403–8.
22 Shepherd R. *Fitness of a nation. Lessons from the Canada Fitness Survey*. New York: Karger, 1996.
23 Taras H, Sallis J, Patterson T, Nader P. Television's influence on children's diet and physical activity. *Dev. Behav. Pediatr.* 1989; **10**: 176–80.
24 Campbell K, Waters E, O'Meara S, Summerbell C. Interventions for preventing obesity in children. *Cochrane Library* 2001.
25 Robinson T. Reducing children's television viewing to prevent obesity. A randomised control trial. *JAMA* 1999; **282**: 1561–7.