

## 9 Have We Changed?

Data from the 2008/09 NZANS have been compared to data from the 1997 National Nutrition Survey. These surveys were similar in many respects: they had the same target population, similar sample sizes and response rates; they collected data via face-to-face interviews in the participants' homes; they used the same electronic multiple-pass 24-hour diet recall and protocols for anthropometric measurements; and they included some of the same questions. However, caution is still advised when comparing data across surveys because there were some differences in survey design and data collection methods (see Table 9.1), and these may influence the comparability of the results.

All data have been analysed using the same definitions and cut-offs. Where definitions or cut-offs used in the original survey analyses differed to those used in the 2008/09 NZANS, earlier data have been re-analysed to ensure comparability. For example, data from the 1997 National Nutrition Survey were re-analysed using the BMI cut-offs for overweight and obesity used in the 2008/09 NZANS.

Crude data are presented in this chapter for indicators considered comparable between surveys. For some indicators included in both surveys, data were not considered to be comparable due to differences in instruments (eg, blood pressure) or question wording (eg, dietary supplements). A comment is made in the text if there was a statistically significant increase or decrease from 1997 to 2008/09, as determined by non-overlapping 95% confidence intervals.

Because the age and ethnic structure of the New Zealand population changed between 1997 and 2008/09, time trends have also been examined for all indicators after adjusting for age and ethnicity. For most indicators this adjustment did not affect the direction of changes (ie, increase or decrease) and so no further comment is made in the text. However, for a few indicators, adjusting for age and ethnicity meant time trends were no longer statistically significant, or became statistically significant. When this occurred it is indicated by a footnote in the table and an additional comment is made in the text.

Further analysis of selected time trends for Māori and non-Māori will be included in a supplementary report published in late 2011. Time trends for Pacific people are unavailable due to the small sample of Pacific people in the 1997 National Nutrition Survey.

**Table 9.1:** Summary of design and methods of the adult nutrition surveys

	<b>1997 National Nutrition Survey</b>	<b>2008/09 NZANS</b>
Target population	Usually resident, non-institutionalised, civilian adult population (15+ years) living in permanent private dwellings	Usually resident, non-institutionalised, civilian adult population (15+ years) living in permanent private dwellings
Sampling frame	Area-based frame	Area-based frame
Design	Linked to the 1996/97 New Zealand Health Survey, which had a complex, cluster sampling design	Multi-stage, stratified, probability-proportional-to-size (PPS) sampling design
Oversampling	New Zealand Māori and Pacific people	New Zealand Māori and Pacific people; some age groups (15–18, 70+ years)
Recruitment agency	Statistics New Zealand	CBG Health Research Ltd
Data collection agency	University of Otago	University of Otago
Data collection period	December 1996 to November 1997	October 2008 to October 2009
Location of data collection	Participant's home	Participant's home (local clinic for blood)
Day of primary interview	Monday 14.5%, Tuesday 17.5% , Wednesday 17.7%, Thursday 17.0%, Friday 12.9%, Saturday 11.4%, Sunday 9.0%	Monday 16.0%, Tuesday 17.2% , Wednesday 19.1%, Thursday 16.7%, Friday 13.5%, Saturday 9.3%, Sunday 8.2%
Sample size	24-hour recall: 4636 Repeat 24-hour recall: 695 Anthropometry: 4420 Blood: 3369	24-hour recall: 4721 Repeat 24-hour recall: 1180 Anthropometry: 4503 Blood: 3348
Response rate	50% (taking into account response rate of 1996/97 New Zealand Health Survey)	61%
24-hour diet recall	Computer based Three pass Detailed probe questions Repeat on subsample (15%)	Computer based Three pass Detailed probe questions Repeat on subsample (25%)
Questionnaires	Self-administered qualitative Food Frequency Questionnaire, checked with participant by interviewer and electronically scanned. Interviewer-administered (CAPI) questionnaire, including modules on dietary supplements and food security.	Interviewer-administered (CAPI) questionnaire, including modules on dietary habits, nutrition-related health and food security.
Anthropometric measurements	Participant in light clothing, no shoes	Participant in light clothing, no shoes
Biochemical measures	Non-fasting blood sample	Non-fasting blood sample and spot urine

## 9.1 Energy and macronutrient intakes

There was a decrease in the reported mean daily energy intake in 2008/09 compared to that reported in 1997 (Table 9.2), although the decrease for females was not significant. This reported decrease in energy intake is inconsistent with trends in body size. The increase in mean body weight, BMI and obesity prevalence suggests that energy balance is unbalanced, with energy 'in' exceeding energy 'out'. This survey did not assess energy expenditure, so further research is required to explore the underlying reasons for the reported decrease in energy intake from 1997 to 2008/09.

From 1997 to 2008/09 the contribution of total fat to energy in the diet decreased for males (35.4% to 33.7%), with a small but not significant decrease for females (34.5% to 33.8%) (Table 9.2). The proportion of energy from saturated fat decreased for both males (15.1% to 13.1%) and females (14.7% to 13.1%), while the proportion of energy from monounsaturated fat increased for both males (11.8% to 12.4%) and females (11.4% to 12.3%). This decrease in total fat has been offset by an increased proportion of energy coming from protein for males and females.

**Table 9.2:** Energy intake and contribution from macronutrients, by sex, 1997 and 2008/09

Indicator	Sex	1997 NNS (95% CI)	2008/09 NZANS (95% CI)	Trend from 1997 to 2008/09
Mean energy (MJ) intake	Males	12.0 (11.7–12.2)	10.7 (10.4–11.1)	↓
	Females	8.0 (7.8–8.1)	7.6 (7.5–7.8)	nc
Percent energy from protein	Males	15.4 (15.1–15.7)	16.4 (16.2–16.7)	↑
	Females	15.8 (15.6–16.1)	16.5 (16.2–16.8)	↑
Percent energy from total fat	Males	35.4 (34.8–35.9)	33.7 (33.1–34.3)	↓
	Females	34.5 (34.0–35.0)	33.8 (33.2–34.3)	nc
Percent energy from saturated fat	Males	15.1 (14.7–15.4)	13.1 (12.8–13.4)	↓
	Females	14.7 (14.4–15.0)	13.1 (12.8–13.4)	↓
Percent energy from monounsaturated fat	Males	11.8 (11.6–12.0)	12.4 (12.2–12.7)	↑
	Females	11.4 (11.2–11.6)	12.3 (12.1–12.5)	↑
Percent energy from polyunsaturated fat	Males	5.0 (4.8–5.1)	4.8 (4.6–4.9)	nc
	Females	4.9 (4.8–5.0)	4.9 (4.8–5.1)	nc
Percent energy from carbohydrate	Males	45.0 (44.3–45.6)	46.0 (45.3–46.6)	nc
	Females	47.3 (46.8–47.8)	47.1 (46.6–47.7)	nc

**Notes:**

These figures are not adjusted for intra-individual variation. Percent energy from macronutrients was calculated using the following conversion factors: 16.7 kJ/g for carbohydrate, 16.7 kJ/g for protein, and 37.7 kJ/g for fat).

nc = No change

## 9.2 Selected nutrient intakes

The intake of many nutrients by the New Zealand population aged 15 years and over was similar in 1997 and 2008/09, but there were some differences (Table 9.3). Median intakes of vitamin B<sub>6</sub> and selenium increased in both males and females. For females, there was an increase in median intake of vitamin E. Median intakes of several nutrients also dropped for both males and females, including vitamin A, zinc and potassium. The drop in vitamin A is due to a decreased intake of both plant sources ( $\beta$ -carotene) and animal sources (retinol). For males, there was a decline in median intake of sucrose, vitamin C and iron. After adjusting for age and ethnicity, there was an increase in the median intake of riboflavin for males and females, and calcium for males, and a decrease in the median intake of thiamin for females.

**Table 9.3:** Median usual daily nutrient intakes, by sex, 1997 and 2008/09

Nutrient	Male			Female		
	1997 NNS (95% CI)	2008/09 NZANS (95% CI)	Trend from 1997 to 2008/09	1997 NNS (95% CI)	2008/09 NZANS (95% CI)	Trend from 1997 to 2008/09
Sucrose (g)	62 (60–64)	55 (51–59)	↓	45 (43–47)	42 (40–44)	nc
Fructose (g)	23 (22–24)	22 (20–23)	nc	19 (18–19)	18 (17–19)	nc
Lactose (g)	14 (13–15)	14 (14–15)	nc	12 (12–13)	12 (12–13)	nc
Total dietary fibre (mg)	23 (23–24)	22 (21–23)	nc	18 (17–18)	18 (17–18)	nc
Total vitamin A (µg RE)	1076 (1013–1138)	846 (802–890)	↓	842 (802–882)	727 (692–762)	↓
β-carotene (µg)	3177 (2901–3453)	2598 (2294–2902)	nc	2800 (2615–2985)	2564 (2362–2766)	nc
Retinol (µg)	485 (453–517)	393 (365–421)	↓	334 (323–345)	281 (265–297)	↓
Vitamin C (mg)	111 (106–116)	99 (93–105)	↓	95 (90–100)	99 (93–105)	nc
Vitamin E (mg)	11.2 (10.9–11.5)	11.5 (11.0–12.0)	nc	8.4 (8.1–8.7)	9.1 (8.8–9.4)	↑
Thiamin (mg)	1.7 (1.6–1.7)	1.6 (1.5–1.7)	nc	1.2 (1.2–1.2)	1.1 (1.0–1.2)	nc <sup>2</sup>
Riboflavin (mg)	2.0 (2.0–2.1)	2.2 (2.1–2.3)	nc <sup>1</sup>	1.5 (1.5–1.6)	1.7 (1.6–1.7)	nc <sup>1</sup>
Niacin (mg NE)	43 (41–44)	42 (40–44)	nc	29 (28–29)	29 (28–30)	nc
Vitamin B6 (mg)	1.7 (1.6–1.7)	2.2 (2.0–2.5)	↑	1.2 (1.2–1.3)	1.6 (1.4–1.7)	↑
Vitamin B12 (µg)	5.2 (4.7–5.7)	4.7 (4.3–5.1)	nc	3.4 (3.2–3.6)	3.3 (3.0–3.5)	nc
Calcium (mg)	857 (831–883)	919 (878–960)	nc <sup>1</sup>	691 (654–728)	745 (719–771)	nc
Iron (mg)	14.6 (14.2–15.0)	13.2 (12.8–13.6)	↓	9.9 (9.7–10.1)	9.9 (9.6–10.2)	nc
Zinc (mg)	14.5 (14.1–14.9)	12.9 (12.4–13.4)	↓	9.8 (9.5–10.1)	9.0 (8.7–9.3)	↓
Potassium (mg)	3922 (3831–4013)	3449 (3341–3557)	↓	2936 (2876–2996)	2757 (2681–2833)	↓
Selenium (µg)	56 (53–59)	67 (62–72)	↑	39 (35–43)	47 (44–50)	↑

Note: nc = No change.

- 1 Significant increase after adjusting for age and ethnicity.
- 2 Significant decrease after adjusting for age and ethnicity.

### 9.3 Vegetable and fruit intake

It is recommended that adults eat at least three servings of vegetables and at least two servings of fruit each day (Ministry of Health 2003b). Participants were asked how many servings of vegetables (excluding juice) they eat on average each day, and how many servings of fruit (excluding juice) they eat on average each day.

There was no change from 1997 to 2008/09 in the proportion of males and females who reported they consumed the recommended three or more servings of vegetables a day (Table 9.4). However, there was an increase in the proportion of both males and females who reported that they consumed the recommended two or more servings of fruit a day.

**Table 9.4:** Vegetable and fruit intake, by sex, 1997 and 2008/09

Indicator	Sex	1997 NNS	2008/09 NZANS	Trend from 1997 to 2008/09
3 or more servings of vegetables per day: percent (95% CI)	Males	61.8 (58.7–64.8)	59.3 (55.7–62.9)	nc
	Females	73.1 (70.9–75.3)	72.2 (69.5–74.8)	nc
2 or more servings of fruit per day: percent (95% CI)	Males	34.8 (31.6–37.9)	54.6 (51.4–57.8)	↑
	Females	56.1 (53.6–58.7)	65.8 (63.6–67.9)	↑

Note: nc = No change.

### 9.4 Body size

There was an increase in mean weight and BMI in both males and females from 1997 to 2008/09, but no change in mean height (Table 9.5). From 1997 to 2008/09 there was an increase in the prevalence of obesity in both males and females, but no change in the prevalence of overweight. Changes in the age and ethnic composition of the population had little impact on trends in obesity. After adjustment for age and ethnic group, the prevalence of obesity in 2008/09 compared to 1997 was 1.5 times higher for males and 1.3 times higher for females. Data from the 2002/03 and 2006/07 New Zealand Health Surveys have previously shown that the prevalence of obesity has increased since 1997 (Ministry of Health 2008).

**Table 9.5:** Body size, by sex, 1997 and 2008/09

Indicator	Sex	1997 NNS	2008/09 NZANS	Trend from 1997 to 2008/09
Weight (kg) <sup>1</sup> : mean (95% CI)	Males	80.4 (79.6–81.2)	85.1 (84.1–86.1)	↑
	Females	68.7 (67.9–69.5)	72.6 (71.6–73.5)	↑
Height (m): mean (95% CI)	Males	175.3 (174.8–175.7)	175.7 (175.3–176.1)	nc
	Females	162.2 (161.9–162.6)	162.2 (161.8–162.6)	nc
BMI (kg/m <sup>2</sup> ) <sup>1</sup> : mean (95% CI)	Males	26.2 (25.9–26.4)	27.6 (27.2–27.9)	↑
	Females	26.1 (25.8–26.4)	27.6 (27.2–27.9)	↑
Overweight <sup>1</sup> : percent (95% CI)	Males	40.3 (36.8–43.7)	41.3 (38.2–44.5)	nc
	Females	29.9 (27.4–32.5)	32.8 (29.8–35.9)	nc
Obese <sup>1</sup> : percent (95% CI)	Males	17.0 (14.9–19.1)	27.7 (24.9–30.6)	↑
	Females	20.6 (18.6–22.5)	27.8 (25.1–30.4)	↑

Notes:

WHO (2007) BMI cut-offs used to classify overweight and obesity among adults aged 19+ years, and the IOTF (Cole et al 2000, 2007) BMI cut-offs used to classify overweight and obesity in adults aged 15–18 years (see Chapter 8 for details).

nc = No change.

1 Data re-analysed so results differ to those published in NZ Food NZ People: Key Results of the 1997 National Nutrition Survey.

## 9.5 Total and HDL cholesterol

From 1997 to 2008/09 mean total cholesterol concentrations decreased by 0.61 mmol/L in males and by 0.56 mmol/L in females (Table 9.6). Mean HDL cholesterol concentrations increased in both males and females.

**Table 9.6:** Mean total and HDL cholesterol concentration, by sex, 1997 and 2008/09

Indicator	Sex	1997 NNS	2008/09 NZANS	Trend from 1997 to 2008/09
Total cholesterol (mmol/L): mean (95% CI)	Males	5.70 (5.63–5.78)	5.09 (5.01–5.16)	↓
	Females	5.73 (5.66–5.79)	5.17 (5.10–5.24)	↓
HDL cholesterol (mmol/L): mean (95% CI)	Males	1.18 (1.16–1.20)	1.23 (1.21–1.26)	↑
	Females	1.43 (1.40–1.45)	1.50 (1.47–1.52)	↑

Note: nc = No change.

## 9.6 Iron status

From 1997 to 2008/09 the prevalence of iron deficiency in females increased from 2.9% to 7.2% (Table 9.7). After adjusting for age and ethnicity, there was an increase in the prevalence of low iron stores in females.

**Table 9.7:** Iron status, by sex, 1997 and 2008/09

Indicator	Sex	1997 NNS	2008/09 NZANS	Trend from 1997 to 2008/09
Serum ferritin (ug/L): mean (95% CI)	Males	185 (176–194)	177 (165–189)	nc
	Females	77 (72–81)	79 (75–84)	nc
Haemoglobin (g/L): mean (95% CI)	Males	151 (150–152)	149 (148–150)	nc
	Females	135 (135–136)	133 (132–133)	↓
Low iron stores: <sup>1</sup> percent (95% CI)	Males	0.5 (0.1–1.5) <sup>4</sup>	1.5 (0.7–2.5)	nc
	Females	5.5 (4.2–6.8)	8.4 (6.5–10.3)	nc <sup>5</sup>
Iron deficiency: <sup>2</sup> percent (95% CI)	Males	0.3 (0–1.3) <sup>4</sup>	1.1 (0.3–1.9)	nc
	Females	2.9 (1.9–3.9)	7.2 (5.4–9.0)	↑
Iron deficiency anaemia: <sup>3</sup> percent (95% CI)	Males	0.3 (0–1.3) <sup>4</sup>	0.6 (0.1–1.6) <sup>4</sup>	nc
	Females	2.3 (1.4–3.2)	3.5 (2.2–4.8)	nc

1 Serum ferritin < 12 µg/L.

2 Serum ferritin < 12 µg/L and zinc protoporphyrin > 60 µg/mol.

3 Serum ferritin < 12 µg/L and zinc protoporphyrin > 60 µg/mol and haemoglobin < 136 g/L males 15–19 years; < 137 g/L males 20–49 years; < 133 g/L males 50–69 years; < 124 g/L males 70+ years; < 120 g/L females 15–69 years; < 118 g/L females 70+ years.

4 Both point estimate and 95% CI are based on small number so interpret with caution.

5 Significant increase after adjusting for age and ethnicity.

nc = No change.

## 9.7 Food security

From 1997 to 2008/09 the proportion of households *fully/almost food secure* fell from 78.5% to 61.7% in males and from 73.0% to 56.6% in females (Table 9.8). The proportion of households in the category *moderately food secure* has risen by just over 10 percentage points. The prevalence of the total population aged 15 years and over experiencing *low food security* increased from 1997 to 2008/09 for both males (1.6% to 5.6%) and females (3.8% to 8.8%).

**Table 9.8:** Categories of food security, by sex, 1997 and 2008/09

Indicator	Sex	1997 NNS (95% CI)	2008/09 NZANS (95% CI)	Trend from 1997 to 2008/09
Fully/almost secure: percent	Males	78.5 (76.1–80.9)	61.7 (58.4–65.1)	↓
	Females	73.0 (70.9–75.0)	56.6 (53.7–59.5)	↓
Moderately food secure: percent	Males	19.9 (17.5–22.2)	32.6 (29.5–35.8)	↑
	Females	23.2 (21.3–25.2)	34.6 (31.9–37.3)	↑
Low food security: percent	Males	1.6 (1.1–2.2)	5.6 (4.3–6.9)	↑
	Females	3.8 (3.0–4.6)	8.8 (7.2–10.4)	↑

Note: Categories of food security were derived from eight variables using Rasch analysis (see Chapter 7.2).