

# Characteristics of fast-food/takeaway-food and restaurant/café-food consumers among New Zealand adults

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## Abstract

**Objective:** To investigate: (i) the percentage of the New Zealand (NZ) population reporting fast food/takeaway food and restaurant/café food per day; (ii) examine demographic factors associated with their use; (iii) quantify their contribution to energy intake; and (iv) describe the specific types of foods reported from both sources.

**Design:** Twenty-four hour diet recalls from the cross-sectional 2008/09 NZ Adult Nutrition Survey were used to identify fast-food and restaurant-food consumers.

**Setting:** NZ households.

**Subjects:** Adults aged 15 years and older ( $n$  4721).

**Results:** Overall 28% reported consuming at least one fast food and 14% a restaurant food within the 24 h diet recall. Fast-food consumption was not associated with level of education or an area-based measure of socio-economic status, but a higher education was positively associated with restaurant-food consumption. Individual factors such as ethnicity, household size, age, sex and marital status were found to be important influences on the use of fast food and restaurant food. Fast-food consumption was more prevalent among participants living in urban areas, young adults (19–30 years) and Māori compared with NZ European and Others. The most frequently reported fast foods were bread-based dishes, potatoes (including fries) and non-alcoholic beverages.

**Conclusions:** Given the high reported consumption of fast food by young adults, health promotion initiatives both to improve the nutritional quality of fast-food menus and to encourage healthier food choices would likely make a large impact on the overall diet quality of this group.

**Keywords**  
Fast food  
Takeaway food  
Restaurant  
Café  
National survey  
Energy intake  
New Zealand

International research documents the increasing importance of food prepared outside the home to the modern diet. Included in this are foods purchased from fast-food outlets, takeaway outlets, restaurants and cafés. A higher density of fast-food and takeaway outlets has been documented in more socio-economically deprived areas overseas<sup>(1–4)</sup> and in New Zealand (NZ)<sup>(2)</sup>. Fast foods in particular have been described as a contributing factor to the increase in obesity rates; however, the evidence is inconsistent with some studies reporting a positive association<sup>(5–7)</sup> and others reporting no association<sup>(8–10)</sup>. Fast food is only one type of food prepared outside the home and research in the USA has shown the demographic profile of restaurant- and café-food consumers differs from that of fast-food consumers<sup>(11)</sup>.

In 2009, one-quarter of estimated household food expenditure in NZ was for restaurant, café, takeaway and fast food<sup>(12)</sup>. Furthermore, the 2012 NZ Health and Lifestyle Survey reported that one-third of the population

purchased ‘takeaways’ and 14% used ‘dine-in venues’ at least weekly<sup>(13)</sup>. To our knowledge there is no published research in NZ that has documented individual, household and socio-economic factors associated with the consumption of fast food/takeaway food and restaurant/café food. Understanding both who consumes these foods and also what is consumed is important to tailor the development of appropriate public health strategies. The 24 h diet recall of the cross-sectional 2008/09 New Zealand Adult Nutrition Survey (2008/09 NZANS) provides information on where participants sourced their food<sup>(14)</sup>.

Given the potential contribution of fast food and restaurant food to the NZ diet, the objectives of the current research were to: (i) document the percentage of the population reporting fast food/takeaway food and restaurant/café food per day; (ii) examine demographic factors associated with their use; (iii) quantify their contribution to energy intake; and (iv) describe the specific types of foods reported from both sources.

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## Methods

### **Study design and sample**

The 2008/09 NZANS was a cross-sectional survey using a national sample of adults (aged 15 years and older)<sup>(14)</sup>. A three-stage, stratified, probability-proportional-to-size sample design was used with an overall response rate of 61% ( $n$  4721). Māori and Pacific ethnic groups and the age groups 15–18 years and 71 years and above were over-sampled. All participants gave informed consent. A full description of the methods has been documented elsewhere<sup>(14)</sup>.

### **Classification of the fast-food and restaurant-food consumer**

Participants completed a four-stage 24 h diet recall administered by trained interviewers using LINZ24 (a computer software system)<sup>(14)</sup>. A randomly selected sub-sample (25%) completed a second 24 h diet recall; however, we have only reported on the first day of recall. Although the aim was for all days of the week to be equally represented this was not achieved, with a lower number of interviews completed on weekend days<sup>(14)</sup>. In the initial stage of the diet recall, a 'quicklist' of all foods, drinks and dietary supplements was collected. Interviewers asked where each item was sourced, using the following options: (i) store/shop/market; (ii) restaurant/café; (iii) fast-food/takeaway outlet; (iv) workplace (cafeteria, catering); (v) vending machine; (vi) other (community food programme, gift, online purchases); and (vii) home/domestic (home-grown produce). Participants who reported at least one food or beverage sourced from a fast-food/takeaway outlet on their day's recall were classified as a 'fast-food consumer', and those reporting at least one food or beverage from a restaurant/café were classified as a 'restaurant-food consumer'. In the second and third stages of the recall a detailed description of all foods and beverages was collected with information on the amounts consumed. In the fourth stage the foods were reviewed in chronological order. For the calculation of energy and nutrient intakes, foods were matched to the NZ Food Composition Database<sup>(14)</sup>.

### **Demographic predictors of fast-food and restaurant-food consumption**

Demographic variables were selected *a priori*, after a review of the literature, and included: age, sex, ethnicity, level of education, marital status, household size (one, two, three, and four or more persons), area-based socio-economic status and area of residence (rural *v.* urban). Participants were categorised into one of three ethnic groups based on self-identification. If participants reported belonging to two or more groups then they were assigned to a single group using the following order: (i) Māori; (ii) Pacific; and (iii) NZ European and Others (NZEO). Marital status was defined as single (not currently

living with a partner or spouse) or married/*de facto* (living with a partner or spouse).

Participants reported their highest school-level qualification, and if applicable their highest post-school qualification (greater than 3 months' study or training). Four groups were derived: (i) no school or post-school qualifications; (ii) school qualifications only; (iii) trade or technical qualification; and (iv) post-school qualification (professional or tertiary).

Area-based socio-economic status was measured using the 2006 NZ Index of Deprivation (NZDep06). This measure of deprivation combines nine variables from the NZ census that reflect eight dimensions of material and social deprivation<sup>(15)</sup>. It provides a score from 1 to 10 for each meshblock in NZ<sup>(16)</sup>. A meshblock is a geographical location in NZ defined by Statistics NZ, each containing around sixty households in rural areas and 110 households in urban areas<sup>(16)</sup>. For the 2008/09 NZANS, these scores were divided into quintiles. Participants living in quintile I resided in the least deprived areas and those in quintile V resided in the most deprived areas.

To classify participants as living in either a rural or an urban location, each participant was categorised into one of seven groups based on the location of the meshblock where they resided. The rural classification takes into account both proximity to urban areas and also dependence (in terms of employment) on urban areas<sup>(17)</sup>. The seven groups were collapsed into three groups: (i) urban; (ii) rural with some urban influence; and (iii) rural with low/no urban influence.

### **Types of fast foods and restaurant foods**

Each food item reported in the 24 h diet recall was assigned to one of 540 subgroups which were collapsed into thirty-two main food groups<sup>(14)</sup>. The top ten food groups contributing to daily total energy that were sourced from fast-food/takeaway outlets and restaurants/café were identified and are listed in Table 1. As the food group 'bread-based dishes' included a wide variety of dishes (e.g. pizza, sandwiches and burgers) frequently noted as being sourced from a fast-food/takeaway outlet, foods within this food group were examined at the subgroup level.

### **Statistical methods**

Survey commands were used to allow for the complex survey design, including sampling weights and primary sampling units. Results reported have been weighted to reflect population estimates.

As fast-food consumption has been found to be higher on Friday<sup>(18)</sup> and Saturday<sup>(11)</sup>, and as the number of interviews conducted on weekend days was lower than for other days<sup>(14)</sup>, the prevalence of fast-food and restaurant-food consumption was estimated with and without adjustment for day of the week. Energy intake from fast food and restaurant food was calculated for the population and for consumers only.

**Table 1** Examples of food items included in the most frequently reported fast foods and restaurant foods

Food group*	Examples of food items included
Grains and pasta	Rice (fried/risotto), flour, pasta, bran, cereal-based products and dishes (lasagne)
Bread	All types bread (rolls, pita, focaccia, garlic), bagels, crumpets, sweet buns
Cakes and muffins	All cakes and muffins, slices, scones, pancakes, doughnuts, pastry, cake bars
Bread-based dishes	Sandwiches, filled rolls, hamburgers, hotdogs, pizza, nachos, doner kebabs, wontons, spring rolls
Pies and pasties	All pies including potato top, pasties, savouries, sausage rolls, quiche with pastry
Fish and seafood	All fish (canned, battered, fingers, etc.), shellfish, squid, crab, fish/seafood dishes (pies, casseroles, fritters), fish/seafood products
Vegetables	All vegetables including mixes, coleslaw, tomatoes, green salads, legumes and pulses, legume products and dishes, vegetable dishes
Potatoes, kumara and taro	Mashed, boiled, baked, scalloped potatoes and kumara, hot chips, crisps, hash browns, taro roots and stalks
Poultry	All chicken, duck, turkey and muttonbird muscle meats (breast, leg, wing, etc.) and processed meat, stews and stir-fries
Non-alcoholic beverages	All teas, coffee and substitutes, hot chocolate, juices, cordial, soft drinks, water, powdered drinks, sports and energy drinks
Alcoholic beverages	Beer, wine, spirits

\*Table adapted from the Methodology Report for the 2008/09 New Zealand Adult Nutrition Survey, which also provides a full list of all food groups<sup>(14)</sup>.

Logistic regression was performed to estimate unadjusted odds ratios and 95% confidence intervals for fast-food and restaurant-food consumption for each demographic variable. Multiple logistic regression was used to produce adjusted odds ratios and 95% confidence intervals with all variables entered into the model. Interactions were tested for age group-by-sex, sex-by-marital status and ethnicity-by-age group.

Logistic regression (unadjusted) was also used to examine sex, ethnicity and age group differences in the types of fast foods and restaurant foods reported among consumers.

The statistical software package Stata 12 was used for all statistical analyses. All statistical tests were two-sided and  $P < 0.05$  was considered statistically significant in all cases.

## Results

Table 2 describes the characteristics of the 2008/09 NZANS population. Adjustment for day of the week did not alter the prevalence estimates for fast-food or restaurant-food consumption, therefore unadjusted values are presented. On the day of the first recall, 28% reported a fast food and 14% a restaurant food. After excluding those reporting only beverages, the percentage of the population who reported fast food and restaurant food decreased to 26% and 12%, respectively.

The percentage contribution to daily energy from fast food (8.7%) was higher than from restaurant food (4.1%; Table 3). For fast-food consumers on their recall day 31% of daily energy intake was from fast food, and this was similar for restaurant-food consumers (Table 3).

### **Predictors of fast-food and restaurant-food consumption**

There was no evidence of interactions for age group-by-sex, sex-by-marital status and ethnicity-by-age group and therefore interaction terms were excluded from the

final model. In Table 4, from the full model, females were less likely than males to report fast food (OR = 0.77; 95% CI 0.63, 0.95;  $P = 0.015$ ). The relationship between fast-food consumption and age showed an inverse J shape, peaking in the 19–30 year age group. There was evidence of a difference between ethnicities ( $P = 0.003$ ) and Māori were more likely to report fast food compared with both NZEO (OR = 1.47; 95% CI 1.15, 1.89;  $P = 0.002$ ) and Pacific (OR = 1.58; 95% CI 1.17, 2.10;  $P = 0.002$ ), but there was no evidence of a difference between NZEO and Pacific ( $P = 0.594$ ).

There was also evidence of a difference between household sizes ( $P = 0.010$ ). Participants living in households with four or more people had higher odds of reporting fast food compared with both participants living by themselves (OR = 1.56, 95% CI 1.03, 2.35;  $P = 0.035$ ) and those living in two-person households (OR = 1.58; 95% CI 1.18, 2.11;  $P = 0.002$ ). Area of residence was statistically significant ( $P = 0.008$ ) with those living in an urban area twice as likely to report fast food compared with both those in a rural area with some urban influence (OR = 0.50; 95% CI 0.30, 0.83;  $P = 0.008$ ) and those in a rural area with low/no urban influence (OR = 0.51; 95% CI 0.30, 0.80;  $P < 0.001$ ). The socio-economic variables NZDep06 quintile and level of education were not associated with fast-food consumption.

For restaurant foods, in the full model, there was again evidence of ethnicity effects ( $P < 0.001$ ) where Pacific were less likely to report restaurant foods compared with both NZEO (OR = 0.36; 95% CI 0.21, 0.60;  $P < 0.001$ ) and Māori (OR = 0.43; 95% CI 0.24, 0.77;  $P = 0.005$ ). There was evidence of an association with education ( $P < 0.001$ ) where participants with post-school qualifications were more likely to report restaurant food compared with both those with no school qualifications (OR = 1.88; 95% CI 1.23, 2.88;  $P = 0.004$ ) and those with trade qualifications (OR = 2.09; 95% CI 1.41, 3.11;  $P < 0.001$ ). In the opposite direction to fast-food consumption, participants living in a

**Table 2** Participant characteristics and the percentage of fast-food/takeaway-food consumers and restaurant/café-food consumers, 2008/09 New Zealand Adult Nutrition Survey

	All	Fast-food consumers	Restaurant-food consumers
Demographics	%*	%	%
Total sample		28	14
Sex			
Male	48	31	13
Female	52	26	15
Age group			
15–18 years	7	38	7
19–30 years	20	42	15
31–50 years	37	29	21
51–70 years	27	20	14
71+ years	10	9	16
Ethnicity			
NZEO	84	26	15
Māori	11	28	10
Pacific	5	32	6
Highest education completed†			
No school or post-school qualifications	18	22	10
School qualifications only	27	32	14
Trade or technical qualification	22	27	10
Post-school qualification (professional or tertiary)	33	29	19
NZDep06 quintile			
I	20	30	17
II	22	26	18
III	21	29	12
IV	19	27	12
V	18	29	10
Household size‡			
One person	12	20	15
Two persons	33	20	16
Three persons	18	29	17
Four or more persons	38	37	10
Marital status‡			
Single	38	32	12
Married/ <i>de facto</i>	62	26	15
Area			
Urban	87	30	14
Rural with some urban influence	6	18	13
Rural with low/no urban influence	7	18	14
Day of the week			
Monday and Tuesday	35	22	11
Wednesday and Thursday	29	26	15
Friday	11	44	16
Saturday and Sunday	25	31	16

NZEO, New Zealand European and Others; NZDep06, 2006 NZ Index of Deprivation.

\*All percentages adjusted for survey weightings to represent the New Zealand population.

†Missing data: highest level of education (*n* 34), household size (*n* 26), marital status (*n* 27).

household with four or more people were half as likely to report restaurant food compared with single-person households (OR = 0.48; 95% CI 0.27, 0.85;  $P = 0.011$ ) and two-person households (OR = 0.57; 95% CI 0.38, 0.84;  $P = 0.006$ ).

### Types of fast foods and restaurant foods

The types of foods sourced from fast-food outlets and restaurants are shown in Table 5. Bread-based dishes (41%), potatoes (including hot chips; 37%) and non-alcoholic beverages (36%) were the most commonly reported types of fast food. A higher percentage of females reported vegetables (excluding potatoes) compared with males ( $P = 0.042$ ). Māori (53%,  $P < 0.001$ ) and Pacific (49%,  $P < 0.001$ ) were more likely to report potatoes

compared with NZEO (33%). Pacific were also more likely to report poultry compared with NZEO (26% *v.* 14%,  $P = 0.001$ ). Māori fast-food consumers (18%) were more likely to report fish/seafood compared with Pacific (11%,  $P = 0.015$ ) and NZEO (11%,  $P = 0.014$ ). Pacific were more likely to report grains and pasta compared with Māori (18% *v.* 9%,  $P = 0.022$ ).

The percentage reporting bread-based dishes declined with age ( $P < 0.001$ ) but in contrast, the percentage reporting fish/seafood increased with age to 51–70 years ( $P = 0.007$ ). The majority of bread-based dishes sourced from fast-food outlets were sandwiches, burgers or hotdogs.

Nearly one-third of restaurant consumers reported vegetables compared with only 7% of fast-food consumers. Females were more likely to report cakes and

**Table 3** Contribution to daily energy from fast food and restaurant food overall and for consumers, 2008/09 New Zealand Adult Nutrition Survey

	<i>n</i>	Contribution to daily energy (%)	
		Mean	95% CI
<b>Fast food</b>			
Total sample	4721	8.7	7.9, 9.4
Consumers*	1256	31.0	29.4, 32.6
<b>Restaurant food</b>			
Total sample	4721	4.1	3.5, 4.7
Consumers	498	29.6	27.3, 31.9

\*Excludes non-reporters (zero values).

muffins compared with males (27% *v.* 12%,  $P < 0.001$ ). In addition, the percentage of participants who reported cakes and muffins increased with age ( $P = 0.001$ ). Vegetables were more likely to be reported by NZEO participants compared with Māori (32% *v.* 18%,  $P = 0.009$ ).

A higher percentage of male restaurant-food consumers reported alcoholic beverages compared with females (29% *v.* 16%,  $P = 0.016$ ). Over half of restaurant-food consumers and one-third of fast-food consumers reported a non-alcoholic beverage. Reporting only a beverage (with no food) was more common for restaurant-food consumers with 9% reporting only a non-alcoholic beverage and 9% reporting only an alcoholic beverage.

## Discussion

Overall, nearly one-third of the NZ population reported consuming a fast food (28%) and 14% reported consuming a restaurant food on any one day. Younger adults (19–30 years) were the highest consumers of fast foods and also reported a high consumption of restaurant foods. The contribution of fast food and restaurant food to the NZ diet was lower than in the USA. In NZ, daily energy from fast food was found to be less than 10%, and from restaurants less than 5%. In the National Health and Examination Survey (NHANES) 2003–2008, adults (20–50 years) were found to source 15.9% of their daily energy from ‘quick service restaurants’ and 10.4% from ‘full service restaurants’; this was lower for older adults (51 years and above) with 8.6% of daily energy from ‘quick service restaurants’ and 10.4% from ‘full service restaurants’<sup>(19)</sup>.

The current study did not show any association between fast-food consumption and socio-economic status despite the reported higher density of fast-food and takeaway outlets located within more deprived areas of NZ<sup>(2)</sup>. Similarly, Australian research found no association between an area-based measure of socio-economic status and the use of foods prepared outside the home<sup>(8)</sup>. These findings are important in light of suggestions to restrict the number of fast-food outlets within low socio-economic areas<sup>(20)</sup>. In the USA, Kim and Leigh reported

an inverted U-shaped curve for the relationship between income and fast-food use and suggest this indicates that for the ‘poor’, supermarket food, rather than fast food, contributes most to the obesity epidemic<sup>(11)</sup>.

There was also no evidence of an association between fast-food consumption and level of education. Fast-food consumption in relation to level of education is inconsistent in the literature, with some studies reporting a higher use of fast food among those with less education<sup>(21)</sup> and others reporting a lower use<sup>(22,23)</sup>. In contrast, we found that participants with higher levels of education were more likely to be consumers of restaurant foods. Research in NZ among families with children found that the frequency of fast-food and takeaway use was similar by household income level<sup>(24)</sup>. Furthermore, food from restaurants was more likely to be reported by households with a high income compared with a low income<sup>(24)</sup>. Thus, together with the current research, there is evidence that in NZ households of higher socio-economic status are better able to afford foods from restaurants and cafés. These findings are consistent with a recent international review which concluded higher socio-economic groups were more likely to consume foods prepared outside the home<sup>(25)</sup>.

The lower consumption of fast food by those living in rural areas suggests that in NZ physical proximity is a factor in the decision to consume these foods. Few studies have examined differences in fast-food consumption between people living in rural and urban areas. Contrary to our findings, in US 18- to 28-year-olds, fast-food consumption did not differ between people living in ‘non-urban’, ‘low urban’ or ‘high density urban’ areas. This was despite the lower availability of fast food in these areas<sup>(26)</sup>. This inconsistency may be due to a difference in the nature of ‘rural’ or ‘non-urban’ areas between the USA and NZ.

Males were higher consumers of fast food in NZ compared with females and this is consistent with international findings<sup>(11,23)</sup>. Females were also more likely to choose vegetables from fast-food sources; indicative of healthier choices compared with males. The higher intake of fast food in the younger age groups in NZ follows international trends<sup>(8,11,23,27–29)</sup>. The 15–18 year age group was less likely to report fast foods compared with the 19–30 year age group, probably as the younger age group is attending school and likely to be living within a family home where family meals are provided. Factors identified as facilitating fast-food consumption in Australian adults (20 to 45 years) include busy lifestyles, long working hours and not knowing how to cook<sup>(30)</sup>. Dave *et al.* also showed a dislike of cooking was negatively associated with age<sup>(31)</sup>. The higher consumption of fast food and restaurant food among young adults may be a life-course or a generational effect but along with Orfanos *et al.* we cannot discern this from cross-sectional data<sup>(9)</sup>. Possibly younger adults may continue to eat foods they have developed a taste for in later years<sup>(32)</sup>.

**Table 4** Odds ratios and 95 % confidence intervals for any fast-food and any restaurant-food consumption in the previous 24 h (*n* 4687)\*, 2008/09 New Zealand Adult Nutrition Survey

	Fast-food consumption						Restaurant-food consumption					
	Unadjusted†		<i>P</i> ‡	Adjusted‡		<i>P</i> ‡	Unadjusted†		<i>P</i> ‡	Adjusted‡		<i>P</i> ‡
	OR	95 % CI		OR	95 % CI		OR	95 % CI		OR	95 % CI	
Gender												
Male	1.00	–	0.022	1.00	–	0.015	1.00	–	0.288	1.00	–	0.640
Female	0.79	0.65, 0.97		0.77	0.63, 0.95		1.15	0.89, 1.48		1.07	0.82, 1.39	
Age group (%)			<0.001			<0.001			<0.001			0.106
15–18 years	1.00	–		1.00	–		1.00	–	0.645	1.00	–	
19–30 years	1.19	0.89, 1.59		1.40 <sup>a</sup>	0.98, 1.98		2.53	1.57, 4.05		1.85	1.06, 3.23	
31–50 years	0.69	0.55, 0.87		0.87	0.62, 1.22		2.29	1.48, 3.56		1.50	0.87, 2.59	
51–70 years	0.42	0.31, 0.56		0.65	0.43, 0.98		2.79	1.82, 4.29		1.58	0.89, 2.79	
71+ years	0.17	0.12, 0.24		0.28 <sup>b</sup>	0.18, 0.44		2.09	1.33, 3.28		1.19	0.63, 2.25	
Ethnicity			<0.001			0.003			<0.001			<0.001
NZEO	1.00	–		1.00	–		1.00	–	0.645	1.00	–	
Māori	1.68	1.34, 2.09		1.47 <sup>a</sup>	1.15, 1.89		0.59	0.41, 0.87		0.83	0.56, 1.24	
Pacific	1.23	0.99, 1.52		0.93 <sup>b</sup>	0.72, 1.21		0.24	0.15, 0.39		0.36	0.21, 0.60	
Highest education completed			0.002			0.458			<0.001			<0.001
No school or post-school qualifications	1.00	–		1.00	–		1.00	–	0.645	1.00	–	
School qualifications only	1.67	1.28, 2.19		1.25	0.93, 1.69		1.58	1.05, 2.37		1.57	1.02, 2.42	
Trade or technical qualification	1.33	1.00, 1.75		1.16	0.84, 1.59		1.05	0.66, 1.69		0.90 <sup>a</sup>	0.54, 1.50	
Post-school qualification (professional or tertiary)	1.45	1.00, 1.88		1.23	0.90, 1.67		2.28	1.54, 3.36		1.88 <sup>b</sup>	1.23, 2.88	
NZDep06 quintile			0.737			0.479			<0.001			0.055
I	1.00	–		1.00	–		1.00	–	0.645	1.00	–	
II	0.83	0.61, 1.15		0.90	0.64, 1.27		1.06	0.69, 1.62		1.11	0.73, 1.69	
III	0.94	0.67, 1.32		0.88	0.62, 1.25		0.64	0.41, 1.02		0.69	0.44, 1.10	
IV	0.86	0.63, 1.18		0.76	0.55, 1.06		0.67	0.42, 1.06		0.71	0.45, 1.14	
V	0.97	0.72, 1.29		0.77	0.55, 1.07		0.52	0.32, 0.82		0.65	0.40, 1.06	
Household size			<0.001			0.010			0.005			0.010
One person	1.00	–		1.00	–		1.00	–	0.645	1.00	–	
Two persons	0.98	0.70, 1.36		0.99 <sup>a</sup>	0.66, 1.48		1.12	0.79, 1.60		0.85	0.53, 1.34	
Three persons	1.63	1.14, 2.33		1.13	0.73, 1.74		1.21	0.79, 1.87		0.91	0.50, 1.66	
Four or more persons	2.30	1.69, 3.13		1.56 <sup>b</sup>	1.03, 2.35		0.63	0.43, 0.93		0.48	0.27, 0.85	
Marital status												
Single	1.00	–	0.001	1.00	–	0.066	1.00	–	0.042	1.00	–	0.202
Married/ <i>de facto</i>	0.73	0.61, 0.88		0.78	0.60, 1.02		1.31	1.01, 1.70		1.27	0.88, 1.84	
Area			0.001			0.008			0.645			0.550
Urban	1.00	–		1.00	–		1.00	–	0.645	1.00	–	
Rural with some urban influence	0.53	0.30, 0.92		0.50	0.30, 0.83		0.89	0.47, 1.71		0.82	0.42, 1.59	
Rural with low/no urban influence	0.51	0.33, 0.80		0.51	0.32, 0.80		0.75	0.41, 1.40		0.63	0.33, 1.19	

NZEO, New Zealand European and Others; NZDep06, 2006 NZ Index of Deprivation.

<sup>a,b</sup>Post hoc tests comparing levels of categorical variable. Levels with unlike superscript letters were significantly different (*P* < 0.05).

\*Including participants with complete data for all covariates; missing data for education (*n* 34), household size (*n* 26) and marital status (*n* 26).

†Calculated using survey logistic regression.

‡Calculated using survey logistic regression and adjusted for all other covariates in the table. If the 95% confidence interval excludes 1.00, the group is considered significantly different from the referent group (OR = 1.00).

§Overall *P* value from the Wald test.

**Table 5** Percentage of fast-food and restaurant-food consumers reporting each type of food by sex, ethnic and age groups, 2008/09 New Zealand Adult Nutrition Survey

Food group	Total (%)	Sex (%)		<i>P</i> *	Ethnicity (%)			<i>P</i> *	Age group (%)					<i>P</i> *
		Males	Females		NZEO+	Māori	Pacific		15–18 years	19–30 years	31–50 years	51–70 years	71+ years	
<b>Fast foods (<i>n</i> 1256)</b>														
Bread-based dishes	41	44	37	0.153	42	36	40	0.482	52 <sup>a</sup>	48 <sup>ab</sup>	40 <sup>b</sup>	27 <sup>c</sup>	30 <sup>c</sup>	<0.001
Sandwiches	18	18	17	0.910	18	14	13	0.171	18	21	15	17	18	0.741
Burgers and hotdogs	17	19	14	0.083	16	17	19	0.689	24 <sup>a</sup>	23 <sup>a</sup>	15	8 <sup>b</sup>	7 <sup>b</sup>	0.001
Pizza	6	7	6	0.847	7	5	8	0.347	13 <sup>a</sup>	5 <sup>b</sup>	8	3	5	0.009
Potatoes	37	38	35	0.331	33 <sup>a</sup>	53 <sup>b</sup>	49 <sup>b</sup>	<0.001	48	39	37	29	27	0.006
Non-alcoholic beverages	36	35	37	0.605	37	32	32	0.322	32 <sup>a</sup>	37	38	37	14 <sup>b</sup>	<0.001
Poultry	15	16	14	0.661	14 <sup>a</sup>	19	26 <sup>b</sup>	0.005	13	17	16	13	6	0.246
Grains and pasta	13	13	13	0.925	13	18	9	0.046	12	12	11	18	13	0.637
Fish/seafood‡	12	14	10	0.133	11 <sup>a</sup>	18 <sup>b</sup>	11 <sup>a</sup>	0.019	6 <sup>a</sup>	8 <sup>ac</sup>	13 <sup>b</sup>	18 <sup>bd</sup>	16 <sup>b</sup>	0.007
Cakes and muffins	10	9	11	0.576	11	7	5	0.085	3 <sup>a</sup>	8	12 <sup>b</sup>	12 <sup>b</sup>	13 <sup>b</sup>	0.009
Pies and pasties	7	9	5	0.096	7	10	9	0.320	4	8	7	10	9	0.279
Vegetables§	7	5	9	0.042	6	7	9	0.464	5	6	7	7	14	0.536
Bread	5	5	6	0.654	5	7	6	0.588	4 <sup>a</sup>	5	6	4	16 <sup>b</sup>	0.061
<b>Restaurant foods (<i>n</i> 498)</b>														
Grains and pasta	21	22	20	0.699	21	18	4	0.057	30	33	22	11	14	0.063
Bread-based dishes	21	21	21	0.990	21	13	14	0.158	33	12	19	29	21	0.095
Alcoholic beverages	22	29	16	0.016	21	23	50	0.078	22	27	20	19	26	0.798
Non-alcoholic beverages	50	46	53	0.246	50	49	40	0.765	55	43	48	57	46	0.488
Cakes and muffins	20	12	27	<0.001	20	27	14	0.520	7 <sup>a</sup>	9 <sup>a</sup>	16 <sup>a</sup>	30 <sup>b</sup>	31 <sup>b</sup>	0.001
Potatoes	22	23	22	0.839	23	21	20	0.914	25	30	18	21	26	0.439
Vegetables	30	30	30	0.978	32	18	18	0.021	26	26	31	32	33	0.867
Fish/seafood	10	9	12	0.652	11	10	2	0.403	11	10	2	13	10	0.834
Bread	12	16	10	0.146	12	14	19	0.581	25	21	9	10	12	0.091
Pies	6	6	5	0.714	5	11	2	0.117	5	4	6	6	9	0.633

<sup>a,b,c,d</sup>Values with within rows unlike superscript letters were significantly different ( $P < 0.05$ ).

\*Overall  $P$  value from unadjusted logistic regression.

†New Zealand European and Others.

‡Mainly battered fish.

§Includes salads, e.g. coleslaw.

Similar to our findings, in the USA Kim and Leigh found a positive association between household size and fast-food use, and a negative association between household size and restaurant use<sup>(11)</sup>. Qualitative research has indicated that time constraints and the use of convenience foods are interrelated, and are also influenced by family dynamics, such as the number of adults within the household and external stressors such as work commitments<sup>(33,34)</sup>. Perceived time pressures were noted as being important in the purchase of takeaway meals in Ireland<sup>(35)</sup>. We also found a tendency for participants not living with a partner or a spouse to be more likely to report fast food compared with those living with a partner or a spouse. This is consistent with two US studies<sup>(31,36)</sup> and a UK study<sup>(32)</sup>. It is possibly reflective of those living alone being less inclined to cook for themselves<sup>(35)</sup>.

Previous national nutrition surveys in NZ have not collected information on where food is sourced and we are therefore unable to examine time trends. Recent research from the USA indicates there has been a levelling off of energy from foods sourced from outside the home<sup>(37)</sup>. This is congruent with a stabilisation in the amount of time spent in food preparation and cooking between 1992 and 2008<sup>(37)</sup>. It is unclear whether in NZ use of fast food and restaurant food has peaked or will rise further. The need for convenience is unlikely to decrease, and therefore the challenge is to provide solutions that are both nutritious and quick.

Consistent with other NZ research<sup>(13)</sup>, Māori were more likely to consume fast food compared with NZEO, and they were less likely to report restaurant food. Information was not collected on where food was eaten (either at home or where it was purchased) but it may indicate a preference for Māori to consume food within their home.

Documenting the types of foods consumed is important in helping prioritise public health strategies, both at a national level and also initiatives targeting subgroups of the population. It appears the traditional NZ takeaway of fish and chips is being superseded by bread-based dishes, particularly in the younger age groups. Typical fast foods in NZ have been shown to be higher in sodium in comparison to the UK, where the food industry is actively reducing salt levels in response to the wider Food Standards Agency salt reduction campaign<sup>(38)</sup>. A successful example of efforts to reformulate in NZ is the partnership between the NZ Heart Foundation and the Ministry of Health with potato growers, chip manufacturers and oil suppliers (The Chip Group). The goal of this group is to reduce total fat, saturated fat and salt content of potato chips (French fries) served by the NZ food industry<sup>(39)</sup>. A similar initiative targeting the nutrient profile of bread-based dishes such as burgers and pizzas could also be an effective intervention.

Following an audit of the major fast-food chains in NZ, Chand *et al.* recommended an increase in the range of healthier options available to improve the overall

nutritional quality of fast-food menus<sup>(40)</sup>. Our data further support this recommendation. Vegetables were reported by a higher percentage of restaurant-food consumers compared with fast-food consumers, possibly because of the greater availability and variety of vegetables and dishes on offer at restaurants compared with fast-food outlets.

Overall one-third of fast-food consumers and one-half of restaurant food consumers reported a non-alcoholic beverage. Beverages are important to consider since they have the potential to contribute to energy intake. As only 10% of the soft drinks sourced from fast-food takeaway outlets were diet (data not presented), there is potential to encourage consumers towards this choice or water rather than regular soft drinks in order to reduce overall energy intake from these meals.

A major strength of the present study is that both fast food and restaurant food have been investigated and the source of the food has been investigated rather than the place of consumption. However, potential limitations should also be acknowledged. We have not captured all types of foods prepared outside the home as it is possible to purchase foods such as sandwiches, hot chips and pies from supermarkets and small local shops in NZ. This has also been highlighted as a limitation of the NHANES coding scheme for food sources<sup>(19)</sup>. Suggestions have been made that further research in this area disaggregates 'stores' (shops), which would provide further information on the source of food<sup>(19)</sup>. Furthermore, in the current study, foods purchased from workplace cafeteria or canteens were not included. This is because we were unable to discern whether the food was sourced from colleagues or purchased from cafeterias or canteens.

A single 24 h diet recall does not capture usual intake; however, means are adequate for making comparisons between large subgroups of the population<sup>(41)</sup>. As with other types of self-reported dietary assessment, under-reporting may be an issue<sup>(41)</sup>. There is evidence that less socially desirable foods, such as those higher in sugar and fat, are more likely to be under-reported<sup>(42)</sup>, which may have resulted in an underestimation of fast-food intake.

A final limitation is that although socio-economic status was assessed using both education as an individual measure and NZ Dep06 quintile as an area-based measure, they do not completely capture socio-economic position<sup>(43)</sup>. Some residual confounding may be present in the adjusted models, e.g. due to the effects of household income (not measured).

The demographic characteristics associated with consumption of foods prepared outside the home were different depending on where the food was sourced. This is important to consider for those investigating the impact of food prepared outside the home on health outcomes. Socio-economic confounders may differ depending on the source of food being investigated.



## Conclusion

In conclusion, the present study is the first one in NZ to quantify the energy contribution of fast food and restaurant foods, and it provides comprehensive detail on demographic associations with their use and information on the types of foods consumed. Individual factors such as ethnicity, household size, age, sex and marital status were found to be important influences on the use of fast food and restaurant food. For young adults, fast food and restaurant foods were a significant component of their overall diet. Further monitoring and longitudinal studies are required to investigate whether this cohort continues with current levels of consumption. In addition, further investigation is needed to establish specific factors contributing to the higher reported intake of fast food in Māori.

From this research several recommendations can be made. There is clearly a need for nutritious, cheap and fast options for time-poor families irrespective of socio-economic status. A greater incorporation of under-represented food groups, such as fruit and vegetables, into fast-food menus would help improve the overall nutritional quality of the food on offer. Further partnerships with industry, with a focus to reformulate the most commonly consumed fast foods, should also be considered. Health promotion initiatives should also encourage the selection of healthier choices, with targeting of subgroups of the population who are more likely to consume fast foods such as males and young adults.

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