Traditional foods reported by a Māori community in 2004

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Abstract: This paper aimed to identify frequently consumed traditional foods at hui amongst Māori people living in the Waikato and Southern Lakes Districts, at the start of the Te Wai o Rona Diabetes Prevention Strategy. Responses from 2,669 self-identified Māori (90.5%) and members of the same household aged ≥28 years were analysed. "Boil-ups" were consumed at least annually by four out of five respondents and salad was the food most frequently consumed at hui (25.5%); followed by kaimoana (seafood, 19.6%) and meat (17.8%). When the marae was located within 5 km of the coast, kaimoana was more frequently eaten at hui and more often listed as a traditional food. Diverse tribal affiliations were also evident. Education in relation to the need to cut fat off meat, to skim fat off a boil-up and increase fruit consumption should be encouraged in any new community and environmental programmes designed to reduce the burden of chronic disease in Māori people.

Keywords: Contemporary food; Māori; Te Wai o Rona Diabetes Prevention Strategy; traditional foods

Introduction

Māori, the indigenous tangata whenua (people of the land) of Aotearoa, New Zealand are a genetically diverse group of people (Durie, 2004; New Zealand Guidelines Group & Ministry of Health, 2003), with a higher burden of chronic disease compared with non-Māori (Ministry of Health, 2008). Given that 40% of all chronic disease and deaths in New Zealand are attributable to both sub-optimal diet and physical activity levels (Stefanogiannis et al., 2005), the rise in Western diet and activity patterns that these indigenous peoples are adopting may be increasing their risk of these diseases (O'Dea, 1984, 1991, 1992; O'Dea, Spargo, & Akerman, 1980), yet insufficient literature describing Māori eating patterns exist to determine any such relationship. Traditional foods are considered part of a healthy lifestyle due to the hunting, cultivating and harvesting involved in obtaining these foods (O'Dea, 1984, 1991, 1992; O'Dea et al., 1980). In the journals of early explorers to New Zealand, Māori diets were described to have little variety and mainly consisted of, "firn roots, dogs, rats, fish and wild foul." Thus, before colonisation, the Māori traditional diet was high in protein and fibre and low in fat, compared with the current Western diets, which are high in fat and refined carbohydrate (Tseng, 2005; Uusitalo et al., 2005).

Alongside changes in food consumption, Westernisation also brings about changes in consumption of traditional meals. For example, 'boil-up' frequently eaten by Māori (Ferguson, 2002; Metcalf et al., 2008; Metcalf, Scragg, Tukuitonga, & Dryson, 1998), traditionally include a balanced combination of meat and bones (e.g. pork), greens such as puha, watercress or cabbage, and kumara or potatoes, boiled together. Due to the meat in today's society being readily available, current 'boil ups' may contain up to 65% of energy from fat, a high proportion of which is saturated. Such energy dense diets increase the risk of chronic diseases, such as type 2 diabetes.

Conversely, the labour-intensive hangi, usually consumed at large gatherings (Whiu, McKerchar, & Maxted, n.d.) known as hui, have been prepared in the same way for hundreds of years. These events may or may not take place on a marae and the food provided by the

host generally does not have an extensive menu. The hangi includes pork, mutton, lamb or chicken with kumara and other root vegetables in an earth oven with hot stones and large leaves or wet hessian sacks covered with earth. Cooking time is 3 to 4 hours and the food maintains its succulence and taste without added fat.

Robust information regarding current consumption of traditional (cultural) Māori foods at hui and prepared by the hangi method are not available. The best information of the contemporary Māori diet is available from the 1997 National Nutrition Survey (NNS97) (Ministry of Health, 1999) and the 2002 Children's nutrition survey, which surveyed 704 (268M, 436F) Māori adults and 1224 (M631, F593) Māori children (aged 5 to 14 years), respectively. For both these surveys the focus was on foods most frequently eaten as reported in a food frequency questionnaire and nutrient intake from 24 hour recalls. In both surveys, few traditional foods were reported. Questions in the NNS97 study about frequency of consumption of traditional foods (tītī (mutton bird) and tuna (eel)) had a minimal response, with only 1 to 2% of males and 0% females reporting consumption at least once a week. Older people (45 years and over) reported more of these traditional foods than younger people (15 to 45 years of age). The NNS97 (Ministry of Health, 1999) results also showed that Māori people ate more sheep meat: lamb, hogget (yearling sheep) or mutton either alone or as part of mixed dishes, and more shellfish and more fried fish in batter, kumara, watercress, puha (sowthistle) and kamo kamo, compared with their European counterparts.

The aim of this analysis was to describe foods reported as consumed in 2006 across Māori participating in the Te Wai o Rona: Diabetes Prevention Strategy (Simmons, Rush & Crook, 2008) to provide insight that could support the development of nutritional strategies to help control the current epidemics of obesity and type 2 diabetes. Analysis included an exploration of any differences by gender or age, questions were asked about tribal affiliations and urban/rural location.

Methods

Te Wai o Rona: Diabetes Prevention Strategy was a 4 year randomised controlled trial among Māori communities in the Waikato District Health Board and the tribal area of Ngāti Tuwharetoa in the Lakes District Health Board. From an estimated total population of 337,290, 81,991 Māori people live in these defined areas (Statistics New Zealand, 2004). The study was registered with the Australasian Controlled Trials Registry (ACTRN012605000622606) and ethical approval was provided by both the Waikato and Bay of Plenty Ethics Committees (both of which include Māori representatives). All participants also gave signed informed consent. Recruitment criteria and measurements have been described previously (Simmons, Rush, & Crook, 2009). Briefly, all members of any household that included at least one Māori person and were aged $\geq$28 years on 30 September 2005 were eligible. Exclusion criteria included any known diabetes, the inability to sign a consent form, having a terminal disease or not permanently residing in the study area.

Age, gender, iwi and marae were reported. Marae were not necessarily located in the Waikato Lakes area, as location of marae is dependent on family history rather than where the participant lives. Those within 5 km of the sea were coded as "sea" marae and others coded as "inland" marae. A cut-off of 5 km was used based on the distance to the sea that would take less than an hour to walk.

Participants were asked the open questions "What kai do you choose at a hui?" and "What kinds of traditional kai Māori do you eat?" Closed questions were posed to record how many times boil-ups were eaten, if the fat was skimmed off the top, how many times a year hangi food was eaten and what meat was eaten with and without fat (mutton, chicken or pork).

Participants were also asked about any foods chosen at a hui and any traditional Māori food items eaten as part of their normal diet.

The names and ingredients of traditional Māori foods were checked against the Māori Language Dictionary (Williams, 1992), and then classified into seven food groups; vegetable, meat, kaimoana (seafood), dessert, bread, fruit and drink.

This "paper and pen" questionnaire was completed by the participant with assistance if requested. Entry of numerical data was automated, but the questions about Māori tribal affiliation and Māori traditional foods and those eaten at a hui were free form and were entered manually into the database. Due to unclear hand writing and/or spelling, iwi were checked against the database of Tuhono Trust (see Tuhono website). Where more than one iwi was identified, classification was by the first iwi stated. The results found were reported from the baseline questionnaire administered to the first 2,669 Te Wai o Rona: Diabetes Prevention Strategy participants included in the first round of recruitment. Those recruited later did not differ by gender, age or height.

Statistics

Data were analysed using SPSS, version 16.0 (SPSS Inc, Chicago, Ill, USA) and summarised by mean±SD and percentage. Chi-square test was used to compare frequency of categorical variables; for example, gender and the reporting of traditional food. Analysis of variance was used to determine differences among age groups by decade and categorical food patterns. Central tendency of responses were reported as the median, with the 25th and 75th centiles reported as the interquartile (IQ) range. All continuous data tests were two tailed, with a p of <0.05 taken as significant.

Results

Characteristics of participants

A total of 2,669 questionnaires were analysed; 1,739 females and 930 males, (90.5% self-identified as Māori, 4.8% as European, 4.7% as other or not identified) with an average age of 48±13 years. Among these, 1,099 females and 583 males were from rural areas. Seventeen different iwi affiliations were recorded by 85.9% of participants (Table 1) and among those who self-identified as Māori, iwi was reported by 90.5% (90.9% F, 89.8% M). Of those who did not self-identify as Māori, 51 female (4.2%) and 17 male (2.9%) identified their iwi. Marae were named by 2,021 (83.7%) participants, in 668 different locations. By location 61.9% of the marae were inland, 24.4% were near the sea (within 5 km) and 13.6% could not be located.

Table 1. Frequency and percentage of iwi reported (with 30 or more participants) Total participants (n=2,669) and those who identified with an iwi (1,804).

Iwi	Frequency	Percentage within total	Percentage within those who identify
*Ngāti Maniapoto	290	10.9	16.1
*Tainui	277	10.4	15.4
*Waikato	197	7.4	10.9
*Ngāti Tuwharetoa	195	7.3	10.8
Nga Puhi	191	7.2	10.6
*Ngāti Raukawa	172	6.4	9.5
Ngāti Porou	125	4.7	6.9
Ngāti Kahungunu	101	3.8	5.6
*Ngāti Haua	84	3.1	4.7

Te Arawa	58	2.2	3.2
Ngāti Tamatera	35	1.3	1.9
Tuhoe	35	1.3	1.9
Ngai Te Rangi	32	1.2	1.8
Other iwi	498	19.1	27.6
Did not answer	379	13.8	21.0

*Iwi that originate from the Tainui or Te Arawa waka

Foods consumed

Over one year, boil-up was consumed a median of 10 (IQ range 2 to 25) times per year, with only one in five (20.9%) reporting that they did not consume boil-ups. 14.7% reported consuming boil-ups more than 50 times a year, 8.4% more than once a week and 4.1% more than twice a week. Of those who consumed boil-up, over half (52.1%) reported not skimming the fat off before eating.

Hangi food was consumed three (median, IQ range 1 to 3) times a year. Twenty-one (0.7%) participants reported consumption more than once a week and 22.9% (611) reported not consuming hangi in the previous year. Sixty-four percent of those identifying food eaten at a hangi reported that fat was not removed from the meat.

Table 2. Specific food item consumption frequencies with more than 50 responses at a hui

Item	Frequency	Percentage
Salad	708	26.5
Kaimoana / Seafood	524	19.6
Meat	475	17.8
All Kinds / Everything	453	17.0
Chicken	400	15.0
Hangi	365	13.7
Vegetables	319	12.0
Steam Pudding	288	10.8
Pork	251	9.4
Riwai / Potato	222	8.3
Kumara / Sweet Potato	213	8.0
Boil-ups	188	7.0
Fruit	186	7.0
Fish	152	5.7
Sandwich	123	4.6
Stuffing	121	4.5
Bread	116	4.3
Māori Bread (Rewena)/Fried Bread	114	4.3
Pumpkin	113	4.2
Watakerehi/Watercress	80	3.0
Titi / Mutton Bird	75	2.8
Dessert	66	2.5
Kutai / Mussel	57	2.1

More than 160 different foods and recipes were given in response to the question “what kai (food) do you choose at a hui?” The median number of foods chosen at a hui was 3 (IQR 2-3); 33 listed more than 10 (maximum 16) foods, while 17% reported that they ate “all kinds/everything/an assortment”. The most popular food items consumed at a hui are ranked in Table 2. Salad was rated as the most common food eaten, followed by kaimoana and meat.

Hangi and boil-ups were also frequently reported as eaten at a hui. When the foods were categorised into groups, vegetables were the most frequently consumed food and fruit the least frequent. Kaimoana, meats and desserts were reported by at least one in every five respondents, among whom kaimoana was more likely to be eaten at a hui when they were from a marae located near the sea compared with those located inland (35.0% versus 29.2% P=0.027).

Table 3. Foods by food groups ranked by proportion of the respondents that reported foods from these groups as eaten at a hui or as traditional foods.

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Food Category	At hui (%) N=2158	Traditional food (%) N=2182
Vegetable	43.3	47.0
Meat	37.8	18.1
Kaimoana/Seafood	27.2	55.0
Dessert	21.1	2.3
Bread	15.8	20.5
Fruit	7.4	0.4
Drink	1.2	0.3

Four out of five respondents (80.8%) answered the question: "what traditional kai Māori do you eat?" Of these, kaimoana was the most frequently identified traditional food eaten, followed by vegetables (Table 3). Kaimoana was more likely to be regarded as a traditional food among those whose marae was located near the sea, compared with those with an inland location (60.0% versus 52.9%, p=0.010).

The frequencies of consumption of specific traditional Māori food items reported by more than 50 respondents (2.3% of respondent sample) are shown in Table 4.

Table 4. Traditional Māori foods in descending order of frequency reported by the *2182/2669 participants who responded.

Specifically named item	Percentage
Kaimoana (Seafood)	55.0
Puha	25.7
Watakerehi /Watercress	23.7
Hangi	18.1
Paraoa Parai (Māori Bread/Rewena/ Fried Bread)	17.8
Boil Ups	16.5
All Kinds / Everything	14.8
Kumara	13.6
Kutai/Mussel	12.0
Poaka/Pork and Pork Bones	10.0
Kānga Wai (Fermented Corn)	9.9
Kina (Sea Egg)	9.8
Ika/Fish	8.8
Teroi/Mussel & Puha	6.8
Tuna/Eel	5.8
Tītī/Mutton Bird	5.3
Paua	4.9
Riwai/Potatoes	4.5
Pipi /Cockle	3.7
Pikopiko /Fern Shoots	3.3

Brisket	2.4
Koura/Crayfish	2.4
Meat	2.3
Tio/Oyster	2.3

*Of the 2669 questionnaires 383 (14.3%) had no response recorded and a further 104 (4.5%) responded that they ate no traditional Māori food i.e. 18.8% named no traditional kai.

There were no significant differences by gender or age in the consumption of traditional foods. Women were slightly more likely than men to record eating kaimoana at a hui (26.3% versus 22.4% p=0.02) but did not record seafood more often than men as a traditional food (45.7% versus 43.8% p=0.35). Age group and rural or urban place of residence did not affect consumption of kaimoana at hui, or as a traditional food.

Discussion

This report, is the first to record the eating patterns of a large sample of Māori people in New Zealand. We found that Māori affiliation, hui, methods of cooking and identification of traditional foods were reported by the majority. Each is discussed in turn, with implications for public health put forward.

Tribal affiliation was identified by two out of three participants, and for those that self-identified their ethnicity as Māori, nine out of ten stated their tribe. This connectedness is recognised as a key approach for community-based public health initiatives.

Whether boil-ups were consumed in the home or at meetings were not asked but it is likely, for some, that it was in the home because of the high frequency at over 100 times a year. Four out of five respondents reported consuming boil-ups, half of whom (52%) did not skim the fat off before cooking. Thus, encouraging the addition of more vegetables and lean meat to the recipe should be encouraged in nutritional education programmes. Similarly, hangi, while not consumed as frequently as boil-up, could have its nutritional quality improved by small modifications to the recipe.

Categories of foods eaten at hui and also regarded as traditional included kaimoana, meat, vegetables and bread. Yet, the categories of dessert, fruit and drinks were not regarded as traditional. When separate foods were examined, it was observed that many different foods were eaten at hui and regarded as traditional. Although salad was a popular food often eaten at hui, it was not identified as a traditional Māori food. Fruit was also not identified as a traditional food and was not eaten frequently at hui. On the other hand, bread was regarded as a traditional food although the base-ingredient, flour was not available pre-colonisation. This is an indication that culture and tradition may evolve as resources and food processes, such as refining of flour change. The frequent reporting of kaimoana and meat suggests that meals and occasions are usually based around the protein foods. The fact that meat may be purchased from a butcher (or be donated) suggests that even traditional foods consumed could be high in saturated fat, particularly if the fat is not removed.

We were not able to find any differences in kaimoana consumption patterns by age which may be because the food supplied at hui is relatively fixed. Kaimoana is normally low in fat, has high quality protein and has many health benefits which are considered to outweigh its potential risks (Mozaffarian & Rimm, 2006). Twice as many participants as those who consumed seafood at a hui considered that it was a traditional food whether their marae was located inland or not. Not reporting consumption of kaimoana at hui may be due to the

temporal and physical availability of seafood and also to the relatively high cost of fresh fish in New Zealand compared with other meats (Statistics New Zealand, 2008).

While the frequency of vegetable consumption was relatively high, fruit consumption appears to be very low. Fresh fruit has the advantage that there is no added sugar or fat, whilst vegetables cooked in the boil-up process could be subject to higher fat content. High saturated-fat intake and low fruit and vegetable intakes are dietary risk factors for various chronic diseases including metabolic syndrome and cardiovascular disease (Hung et al., 2004).

The prevalence of diabetes and vascular-related diseases has been rising in Māori people over the last 30 to 40 years (Simmons, 1996). The low prevalence of non-infectious disease in early Māori may be due, in part, to the presence of protective chemicals (Cambie & Ferguson, 2003) in the 190 edible native plants found in New Zealand (Crowe, 1981) particularly "sowthistle" or puha (*Sonchus asper*). Puha and watercress were identified as traditional foods by one in four respondents in this study. Both these plants are high in vitamin C (ascorbic acid) and various phenolics (Cambie & Ferguson, 2003) and. because of their nutrient density, are recommended as part of a healthy diet.

Two frequently reported traditional foods were kumara and riwai (Māori potato). Kumara, originating in South America, is a recognised healthy food and is one of the most common starch sources for the New Zealand diet (Cambie & Ferguson, 2003; Kiple & Ornelas, 2000). The major storage proteins of kumara (Sporamins A and B), which account for more than 80% of its total protein, act as proteinase inhibitors and may have other anti-colon cancer properties (Cambie & Ferguson, 2003). The tubers also contain the anti–coagulant coumarins, scopoletin, aesculetin and umbelliferone, which are reputed to inhibit HIV replication (Cambie & Ferguson, 2003; Weiss & Finkelmann, 2000). Anthocyanins are reputed to improve circulation, improve eyesight and act as potent antioxidants and anti-inflammatory agents (Cambie & Ferguson, 2003). These constituents are also major components of the "Māori potato" or riwai; a variety officially known as ureniki that has a purple skin and flesh and was widely eaten in the early 1900s (Cambie & Ferguson, 2003).

There are caveats to these data. Although the questionnaire had been approved by the Māori advisory group, this study was limited by its open question format. Some respondents found it difficult to understand how full an answer would be helpful and at times, spelling and legibility made interpretation of the writing difficult. How often specific foods were eaten or who gathered the food, was not asked. Fishing, hunting, gardening and gathering all involve considerable physical activity and would add to the health benefits of the traditional diet for the hunter and gatherers. This study may also not be applicable to all New Zealand Māori as it is restricted to the responses of those from the Waikato and Southern Lakes areas who participated in the Te Wai o Rona: Diabetes Prevention Strategy.

However, this study does provide important information on the eating patterns of Māori people. Many traditional foods were identified and consumed at hui, and diverse tribal affiliations were apparent. Kaimoana, vegetables and salad were the most popular foods consumed and there was also a diversity of traditional and cultural foods obtained from the sea and the land. Those whose marae was within 5 km of the coast ate more kaimoana at hui and more often regarded kaimoana as a traditional food than those who attended the marae inland. We conclude that education relating to the need to cut fat off meat, skim fat off a boil up and increase fruit consumption should be encouraged in any new community and environmental approaches designed to help reduce the burden of chronic disease in Māori people. Such programmes should be delivered in a way appropriate for Māori, such as that undertaken by the Māori Community Health Workers in the Te Wai o Rona: Diabetes Prevention Strategy (Simmons, Rush, & Crook, 2008).

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