Nutritional Status of Migrant Mainland Chinese Children in Auckland

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ABSTRACT

Objective: To assess the food and nutrient intake, activity levels and body composition of migrant Chinese children living in Auckland, and compare the results with data from European children of the same age in New Zealand.

Subjects: Fifty children aged between 7 to 10 years of age, who were born in Mainland China and have immigrated to New Zealand (twenty-seven boys and twenty-three girls).

Method: Three 24-hour recalls were used to evaluate dietary intake. Questionnaires were pretested before survey, and were used to determine food consumption patterns, demographic details, medical status, lifestyle and activity patterns. Anthropometric measurements included were height, weight, upper arm circumference, triceps skinfold, subscapular skinfold and elbow breadth. BMI was calculated.

Results:

- The average body height and weight of the migrant Chinese children was 131.8cm and 29.2kg respectively, higher and heavier than their peers in Mainland China. Each anthropometric measurement was higher in 9 – 10 year old children than 7 – 8 year old children, but only the differences between weight ($p < 0.001$), arm circumference ($p < 0.005$), and elbow width ($p < 0.001$) were significant. Except the triceps skinfold, most anthropometric measurements for the migrant Chinese children were lower than the European children in the Validation Report for the Children's Nutrition Survey in New Zealand, indicating Chinese children had higher arm fat and lower muscle than their counterparts in new Zealand.
- The overall average energy intake of migrant Chinese children was 7712 kJ, close to the recommendations. The average protein intake of children was well above the UK RNI and USA RDA values (69.3g compared with RNI of 28.3g and RDA of 28.0g), and higher than that of their New Zealand and Mainland Chinese counterparts. Mean percentage of food energy derived from carbohydrate was 52.5%. Mean percentages of food energy derived from fat and saturated fat were 29.6 and 12.8, respectively. The fat

intake of children was higher than that found in Mainland Chinese children where the mean percentage of total energy from fat in this age group varies from 23.4-28.5. However, it was lower than that found in New Zealand European children where the average percentages of food energy derived from fat and saturated fat were 34.9 and 16.3 for boys, and 31.4 and 13.8 for girls, respectively.

- Mean intakes of most micronutrients were in excess of UK RNI. Lower intakes of vitamin A Eq were found (95.5% of RNI and 68.5% of RDA), reflecting lower consumption of fruits and vegetables than European New Zealand children.
- The food frequency questionnaire designed to assess nutrient intake in New Zealand European, Maori and Pacific children in the Children's Nutrition Survey was not applicable to migrant Chinese children.
- For the children in this study, breakfast and lunch at school, especially lunch at school, were "Westernized". Dinner of the children mainly maintained Chinese traditional foods.
- While parents of the children realized the importance of modern nutrition, most of them applied the ancient Chinese philosophies regarding food and health to their children. Seventy percent of the parents could feel their children in "hot" or "cold" conditions, and used dietary restriction or encouraged their children to eat certain foods when their children were in hot" or "cold" conditions. All the Cantonese families used herbs in their children's dishes.
- In these Chinese families, the mothers played a very important role in determining food choice of their children.
- The migrant Chinese children achieved the recommended activity levels. However, their activity levels were lower than their counterparts in New Zealand.

Conclusions:

- The trend towards increasing fat and protein intake should be avoided in migrant Chinese children, and the importance of maintaining the traditional Chinese cereal-based diet should be emphasized.
- Foods rich in vitamin A should be recommended for the migrant Chinese children.

- It is crucial that migrant Chinese children during their diet transition adopt healthy western food habits.
- Cultural preferences and mothers' influence should be considered when making nutrition recommendations for migrant Chinese children.

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Chapter 1

Introduction

1. Introduction

Children are one of the most vulnerable groups in our society. The New Zealand Ministry of Health has emphasized the importance of nutrition and physical activity to the growth and development of children in New Zealand. Children living in New Zealand come from a variety of different countries, with their own natural traditions and beliefs about food and health (Ministry of Health, 1997).

The number of migrants in New Zealand arriving from Mainland China has increased in recent years (Statistics New Zealand, 1997). While migrant Mainland Chinese families bring their original food habits and food beliefs to their new country, the culture of the new country also influences their food choices strongly at the same time. Food habits changes as the culture changes.

Furthermore, body composition is related to diet composition and physical activity. Higher dietary fat intake and lower activity levels affect the incidence of obesity. In industrialized societies, obesity and obesity-associated metabolic diseases are epidemic.

Childhood diet influences the long-term health of the child. An understanding of the food habits of migrant Mainland Chinese children, their cultural background and the transition in their dietary practices and lifestyle is important when making nutrition recommendations, designing nutrition education materials, and counseling immigrant Mainland Chinese families about nutrition. However, a question arises: what do we know about the nutritional status of Mainland Chinese children?

At present, limited data are available on children including migrant Mainland Chinese school age in New Zealand with regard to their dietary intake and nutritional status (Ministry of Health, 1997). The only study that has been done was on a small sample of 17 pre-school Chinese children in Dunedin (Soh et al., 2000). Nothing is known about the determination of food choices and dietary acculturation among migrant Mainland Chinese children in older age groups in New Zealand.

The objectives of this survey are:

- To assess the food and nutrient intake, activity levels and body composition of 50 migrant Chinese children aged between 7 to 10 years of age, who were born in Mainland China.
- To compare the results with data from European children of the same age in New Zealand.
- To assess the accuracy and applicability of a food frequency questionnaire designed to assess nutrient intake in New Zealand European, Maori and Pacific children when used in New Zealand Chinese children.
- To suggest if necessary, dietary and lifestyle modifications that could improve the long-term health of migrant Mainland Chinese children living in New Zealand.

Chapter 2

Literature Review

2.1 Migrant Chinese Children in New Zealand

The number of Asian people living in New Zealand has increased significantly over the past decade. As shown in Figure 2.1, Asian people in New Zealand will be nearly double of that in 1996 by the year of 2016. The size of the Asian population in New Zealand is next to the European and Maori groups in 2001 (Table 2.1). This increase is due both to natural increase and immigration. Asian children will increase to 11% of all New Zealand children in 2016, from an estimated about 6% in 1996 (Statistics New Zealand, 2002a).

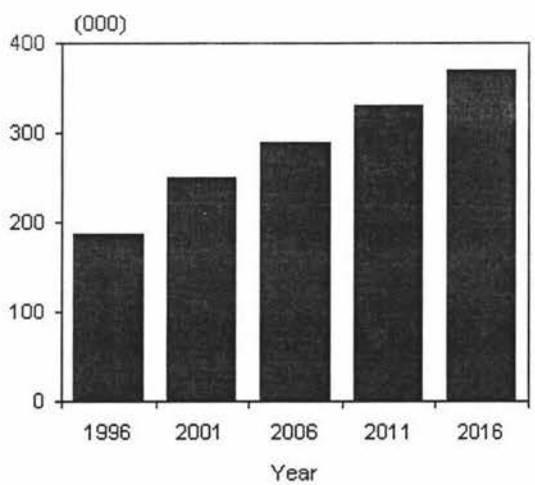

Figure 2.1 Asian Population 1996 – 2016

Source: Statistics New Zealand, 2002a

Table 2.1 Population of New Zealand

	1996	2001
Census night population	3,681,546	3,820,749
Main Urban Areas		
Auckland	997,980	1,087,152
Wellington	335,667	342,852
Christchurch	331,443	342,285
Hamilton	159,234	167,325
Napier-Hastings	113,718	116,211
Dunedin	112,158	110,757
Ethnic Groups	%	%
European	83.1	80.0
New Zealand Mäori	15.1	14.7
Pacific Islands	5.8	6.5
Asian	5.0	6.6
Other	0.5	0.7

Source: Adapted from Statistics New Zealand, 2002b.

The Chinese population is the largest ethnic minority group from Asia in New Zealand. The total Chinese population in New Zealand was 100,203 in 2001 (Statistics New Zealand, 2002), being 42.2% of the Asian population and 2.6% of the New Zealand population.

The modal cohort of Chinese migrants qualified to immigrate to New Zealand is around 30 years (Friesen and Ip, 1997). The new immigrant point system based on a number of factors such as qualifications, work experience and age (New Zealand Immigration Service, 2002), was introduced in 1991. Since that time the number of Chinese people from Mainland China in New Zealand has been increasing (Selvarajah, 1996). Most of these migrants are married and have children (Seiler, 1997). Both a high fertility rate and immigration (Vasil and Yoon, 1996) are contributing to the growth of the Chinese population. The children in these

Chinese immigrant families are as important as those in other ethnic groups in New Zealand, and we should be concerned about their health and nutritional status.

Chinese mainly live in the five major cities of New Zealand, particularly, Auckland. Table 2.2 shows the geographical distribution of Chinese residents in New Zealand in 1996. According to the 1996 Census, Auckland has the greatest concentration of new immigrants from all ethnic groups. In 1996, 63% of Chinese were resident in the Auckland region (Feng, 1999).

Table 2.2 Geographical distribution of Chinese residents in New Zealand, 1996

	Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay
Male	171	21,240	1,284	378	99	441
Female	162	22,944	1,374	408	114	435
Total	333	44,184	2,658	786	213	876

	Taranaki	Manawatu Wanganui	Wellington	Tasman	Nelson	Marlborough
Male	174	1,347	4,041	24	153	33
Female	177	1,317	4,317	18	168	30
total	354	2,664	8,358	42	321	63

	West Coast	Canterbury	Otago	Southland	Outside Region	Total
Male	15	3,150	1,224	123	3	33,906
Female	18	3,351	1,383	99	-	36,318
Total	33	6,504	2,607	225	-	70,227

Source: Statistics New Zealand, 1997.

2.2 Traditional Food Habits in China: Chinese Culture

Eating patterns with respect to food choice, eating methods, food preparation, number of meals per day, eating time, portion size, and food for special occasions are unique to each ethnic group (Liu *et al.*, 1999). China has a long history and Chinese dietary patterns are steeped in tradition.

2.2.1 Eating Behavior

The Chinese eat three meals a day. Lunch and supper mostly consist of *fan* and a number of *tsai* (Denny, 1994). The main core of the meal (*fan*), is a grain-based food such as boiled or steamed rice, noodles (made from wheat), or steamed wheat buns. Dishes called *tsai* accompany the *fan*. These are vegetable or meat dishes. Ingredients are cut before cooking, and the dishes are served together. Soup or a soup-like dish such as congee is the beverage of choice (Newman, 1999).

Chinese families like to eat together. At meals, everyone gets their own bowl of *fan*, and *tsai* dishes are put in the center of the table for everyone to share (Figure 2.2). The people use chopsticks to help themselves to eat what they want. Soup is served in small bowls with spoons, and is mostly eaten during and at the end of the meal (Denny, 1994).

For breakfast, steamed wheat buns stuffed with pickles are popular in North China, and piping-hot porridge made of rice is common in South China (Denny, 1994).

For children, lunch at school is generally a bowl of rice with one or two accompanying dishes. These may be vegetables, soybean curd (tofu), and perhaps some meat or fish (Denny, 1994). The habit of eating fewer between-meal snacks is recommended in the dietary guidelines for Chinese school-aged children (The Chinese Nutrition Society, 1999).

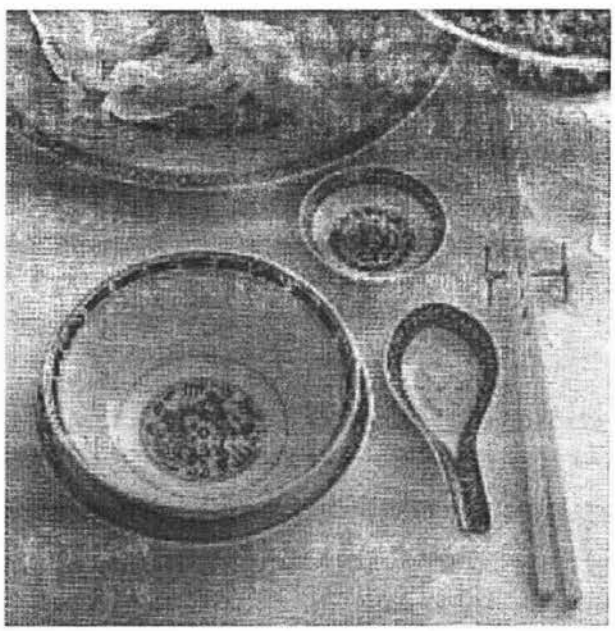

Figure 2.2 The basic table setting is a rice bowl, saucer and chopsticks. On occasion you may also need a soupspoon and small dish for sauces

Source: So, 1998

2.2.2 Foods in the Chinese Diet

According to the Dietary Guidelines for Chinese Residents, five groups of food should be included in the Chinese diet (The Chinese Nutrition Society, 1999):

1. Cereals and tubers:

Examples of cereals include rice, wheat and other grains; examples of tubes include potato, sweet potato, and cassava.

2. Animal foods:

This group includes meat, poultry, fish, milk and eggs.

3. Beans and bean products including soybean and other kinds of dried beans.
4. Vegetables and fruits:

This group includes fresh legumes, tubers, leafy vegetables, eggplants and a variety of fruits.

5. Pure energy-providing foods:

This group includes oils and fats extracted from oily plants and animals, pure starch, sugar and alcoholic beverages.

Cereals

The Chinese diet has traditionally been composed mainly of cereals.

Of all cereals, rice is the most popular (Simoons, 1991). In South China, the phrase *Chih fan* (to eat rice) also means simply "to eat", and the word *fan* (cooked grain-based food) also means simply "food". Rice is normally eaten boiled. The standard cooking way is simply to boil rice in about twice its weight of water until the water is absorbed and the rice is fluffy (Anderson, 1988). This means that rice cooked by the Chinese way has a higher energy and nutrient content than that cooked by the European method using more water (Table 2.3). In addition to its use as a whole grain, rice can also be made into flour, noodles, cakes, and fermented products (Anderson, 1988). There are many kinds of rice snack foods, with attractive tastes, textures, and aromas, served in some cases for special occasions, special tastes and convenience (Luh, 1999).

Table 2.3 Nutrient content per cup of water-cooked rice*

Nutrients	**Chinese**	**European**
Energy (kJ)	1450	485.2
Protein (g)	7	3.2
Carbohydrate (g)	79	25.2
Fat (g)	1	0.4

* Data is from the Food Works Dietary Analysis Programme used in this study.

While rice is common in Southern China, wheat is the usual cereal in northern China (Hsu and Hsu, 1977). Steamed wheat flour dumplings are the standard food of much of North

China as well as being popular elsewhere in the country (Anderson, 1988). These products are at their simplest like bread loaves, but soft and white, since they are steamed rather than baked. The other major consumed form of wheat flour in China is in noodles called *mian* (Anderson, 1988).

Tubers

Tubers are another basic diet group in China. The Chinese today class white and sweet potato as grains (The Chinese Nutrition Society, 1999). They are eaten in many ways (Nagao, 1999).

Animal Foods

With the development of the economy and the rise in the living standard in China, there is a trend towards consuming more animal foods (The Chinese Nutrition Society, 1999).

The meat most in demand in China is pork. (Xiong *et al.*, 1999). Today in China, people are encouraged to eat chicken, fish and beef that contain less fat than does pork, and to reduce their consumption of pork (The Chinese Nutrition Society, 1999).

The Chinese consume few milk products (Anderson *et al.*, 1977). However, they are now recommended to take more to improve the low calcium intake in the Chinese diet (The Chinese Nutrition Society, 1999).

Beans and Bean Products

Beans and bean products are traditional Chinese foods. Today, to increase the protein intake of rural residents and to prevent the unhealthy effects of over-consumption of meat in urban areas, the production and consumption of beans, especially soybeans and soybean products, is strongly encouraged (The Chinese Nutrition Society, 1999). Soybean is considered one of

the classic Five Staples (or Five Grains), along with rice, wheat, barley, and millet in China (Liu, 1999).

Soybeans have build up a huge cluster of imitation-meat foods. During the course of soybean cultivation, the Chinese have gradually transformed soybeans into soyfoods of various forms. *Tofu*, soy sauce, *jiang* (soy paste), and soy sprouts are among the popular ones (Liu, 1999).

Vegetables

Mainland China is a rich resource of vegetable varieties (Wang. 1999). Most of the vegetables are classified into five categories:

- the cabbages and related plants;
- other leafy vegetables;
- squashes, gourds, cucumbers, and other cucurbits;
- onions, leeks, and chives;
- fungi.

In addition to the vegetables that fit into the five categories, there are many others, including several of dietary significance. Some of these are Oriental in origin and, at least until recent times, were not commonly used in Western cuisine. For example, bamboo shoots, lily bulbs, wild rice, and water drop-wort. Others, long common in the West, are celery, asparagus, eggplant, okra, and tomato (Simoons, 1991).

Fruits

There are many varieties of fruits that grow abundantly in China (Shi and Luh, 1999). Many Chinese fruits have spread to the rest of the world such as orange, oriental persimmon, peach, plum, and tangerine. Others are less well known: the pomelo (Citrus mitis), like a large woody grapefruit; the king orange (Cantonese *Kam*; Citrus nobilis), an ancient and long-

established hybird of orange and tangerine; the citrus-like *huang pi* or "wampee" (Clausena lansium); the grape-flavored litchi (Nephelium litchi); the kumquat (Fortunella spp.); and many more (Anderson *et* al., 1977).

2.2.3 The Availability of Chinese Food in New Zealand

Food availability is a major factor influencing food choice. Food choice can only be made from the foods available for purchase, exchange or obtainable from the environment (Southgate, 1996). Many Chinese dishes can be prepared with ingredients commonly used in the West, such as spring onions, garlic, peppers, peanut oil, fish and meat. Some unfamiliar and exotic ingredients are available from Chinese food stores and supermarkets (Bowen *et al.*, 2001).

There are many Chinese stores, supermarkets, restaurants, and café and takeaways at different locations in Auckland (see Appendix 1). Chinese foods can even be bought in Western supermarkets such as Foodtown, Pak'n Save and Woolworths. Due to the availability of Chinese foods, the migrant Chinese in Auckland can mostly maintain their traditional food habits.

However, the price and shopping convenience of Chinese food influence the food choice of the migrant Chinese in Auckland. The price of foods that are unfamiliar or imported is usually more expensive than that in the original country. It means that, if the migrant Chinese want to maintain completely their traditional food habits in New Zealand, they need to pay more money, or choose to eat some Western foods. Besides, Western foods are more convenient for purchase than Chinese foods. There are more Western supermarkets located at each area in Auckland. For this shopping convenience, migrant Chinese sometimes choose some Western foods. Therefore, the food choice of migrant Chinese is partly changed.

2.3 Traditional Food and Health Beliefs in China

Beliefs about food show how people think about food. They are commonly related to health (Parraga, 1990). Ethnicity is particularly relevant to health beliefs and behavior (Harwood, 1981). E.H.Nichols wrote with pardonable exaggeration in 1902 that, it is hard to find a dish in China that is not based upon the recipe of some sage who lived centuries ago and who had an hygienic principle in mind when he designed it. While the reality is less extreme, this point is true: the Chinese have a complex and very ancient science of nutrition. In China, folk nutrition is more important than religion in determining food consumption (Anderson, 1988).

2.3.1 Yin and Yang System

There are a number of ancient philosophies that the Chinese apply to food and health. The Yin and Yang system is the main one (Denny, 1994).

In the past, the Chinese used the Yin and Yang as two forces to explain how the universe worked (Figure 2.3). It represents the nature of all manifest phenomena created by the interaction of opposing yet complementary forces (Le, 1996). While Yin symbolizes a negative force, coolness and the feminine side of nature, Yang symbolizes a positive force, heat and the masculine principle. The two forces are complementary and relatively balanced (Rogans, 1997). Most illness is caused by imbalance. The model is of a person working in the hot sun and suffering heatstroke or falling into cold water and suffering from a chill (Anderson, 1988). Signs such as high fever, red face, thirst, scanty dark urine, rapid pulse, hemorrhaging, and red skin eruptions characterize disease caused by heat. This is a Yang-type disease. Yin disease is any disease where the person feels cold, or is made worse by cold. Cold slows the circulation in the meridians and causes pain (Rogans, 1997).

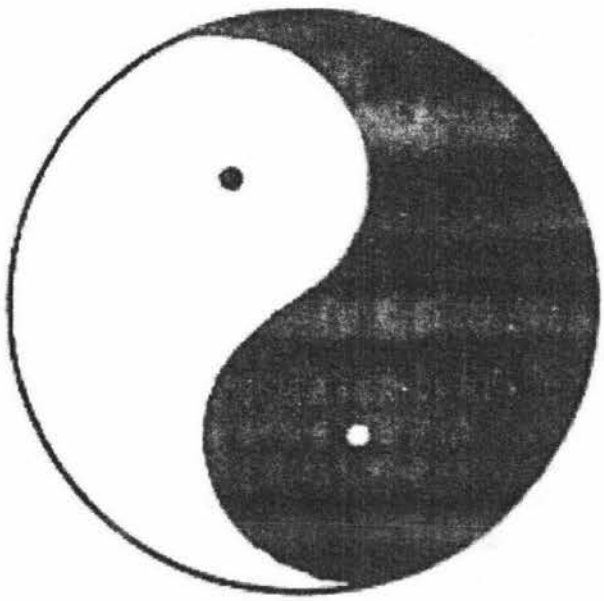

Figure 2.3 The traditional figure of Yin and Yang

Source: Geng and Su, 1990

In terms of the Yin and Yang system, cooling foods belong to Yin, and heating foods belong to Yang (Denny, 1994). High caloric foods were quite correctly seen as more heating as they maintain the body heat. Low caloric foods were considered as cooling as they don't maintain the body heat. Water itself makes the body cold if one falls into cold water, thus it was apparently cooling (Anderson, 1988). Most vegetables and fruits are cold, and some, especially watercress, are very cold. However, there are some exceptions. For example, the fruit of litchis (Figure 2.4), are considered "hot", as it is believed that when the raw fruits are eaten in quantity, they bring a fever and nosebleed (Simoons, 1991). Besides, the concept of "neutral" and "tonic" foods supports the Yin and Yang principle. Foods that are between "cold" and "hot' are "neutral", and "tonic" foods are used for strengthening and nourishment (Xu, 2001).

Figure 2.4 Litchi

Source: Simoons, 1991

The balance between Yin and Yang are the basis for traditional Chinese medicine to cure or prevent diseases (Xu, 2001). People use Yin foods to treat Yang conditions or Yang foods to treat Yin conditions (Newman, 1999). It was reported in a pre-school migrant Chinese children study in Dunedin that, Yin and Yang philosophy played a role in determining eating habits in many Chinese families (71% of the 17 families). These parents used dietary restriction and encouragement when their children were in "heating" and "cooling" conditions (Soh *et al.*, 2000). They restricted the consumption of fried foods, chocolates, biscuits and chips and encouraged the consumption of herbal tea, rice porridge, steamed foods and soups when their children were in a "heating" condition. For children in a "cooling" condition, they restricted fruits such as oranges and bananas, and cold foods such as ice cream and cold drinks.

2.3.2 Use of Herbs

There is an old saying in China, which is, "food and drugs come from the same source" (Li, 1578). Chinese believe the best preventive medicine is the use of proper food in the diet. It is crucially important to provide foods that have not only medicinal value, but also a pleasant flavor (Huang and Huang, 1999). Food, therefore, is also medicine (Chang, 1977). The Chinese medicated diet has been one of the important parts of traditional Chinese medicine during its evolution in the last 2000 years (Xu, 2001).

The basic theories and principles of traditional Chinese medicine are firstly, Yin and Yang, as mentioned above, and, later, the "Five Elements" (Geng and Su, 1990). The "Five Elements" concept categorizes foods and herbs into five tastes: sour, sweet, bitter, pungent, and salty (Huang and Huang, 1999). These tastes describe the effects of therapy. Following is a description of the effects that each of the five tastes has and the examples of food applying to them (Le, 1996; Williams, 1996):

- Sour/astringent: used for their astringent and absorbent properties, affects the liver and gall bladder, and influences the tendons, e.g., wheat.
- Bitter: affects the heart and small intestine, and influences the bones, e.g., mutton or lamb.
- Sweet: affects the spleen and stomach, and influences the flesh, e.g., millet.
- Pungent/acrid: affects the lung and colon, disperses and promotes the movement of Qi in the body and animates the Blood, e.g., onion. (Note: In Chinese medicine, components of process are considered rather than of structure. The human body is seen firstly as an energy system in which various substances interact to create the whole physical organism. These basic substances are Qi, Jing, Blood, Body Fluids, and Shen. They range from the material to the immaterial.)
- Salty: affects the kidneys and bladder, and influences the Blood by helping the body to retain the proper amount of moisture, softeners, and lubrication, e.g., pig.

The belief that food is medicine is especially common among Cantonese (Newman, 1999). There are four main food regions in China: Northern cuisine centered around Beijing, Eastern cuisine centered around Shanghai, Southern or Cantonese cuisine from Canton, and Western or Szechwan cuisine from Szechwan (Denny, 1994). One of the qualities of Cantonese cuisine is the use of herbs in sweetening and flavoring soups. Thus, other Chinese on occasion say that the Cantonese like to use medicine in preparing their dishes (Simoons, 1991). For example, Rhizoma Diosacoreas and Semen Euryales can be used for improving the appetite of children (Ling *et al.*, 1984; Wang and Li, 1999). Here is a recipe where they are used in soup for children (Wang, 1998):

- Ingredients: 60g fish, 1 piece Rhizoma Diosacoreas, 6 – 8 Semen Euryales, 1 candied date, 3g oil, a small amount of ginger and salt, and 750 – 1000ml water.
- Method: Heat the fry pan and pour in the oil. Add the ginger slice and fry until brown. Add the fish, fry for a while until light brown, then pour into a saucepan. Add the water, Rhizoma Diosacoreas, Semen Euryales and candied date, then bring to boil for about 15 minutes. Lower the heat, simmer about 1 hour and serve.

Table 2.4 lists a series of commonly used edible herbal foods with both food and therapeutic properties. This is a group of edible Chinese drugs that are in the regulations issued by the Chinese Health Authority, the National Chinese Medicine Administration, and the Ministry of Health for the use of drugs in food formulas, and they can be consumed as food without prescription (Huang and Huang, 1999). They are claimed as functional foods (Xu, 2001). Further details are attached as Appendix 2.

Table 2.4 Some commonly used edible Chinese herbs

Name of herbs	Therapeutic uses
Rhizoma Diosacoreas (Wild yam)	For treatment of diarrhea, asthma, polyuria, and diabetes.
Semen Armeniaceae Amarum (Bitter almond)	For treatment of cold and coughing, unproductive coughing, constipation, dyspnea, and asthma.
Semen Euryales (Euryale seed)	For treatment of diarrhea, incontinence, seminal emission, leukorrhea, joint pains in lower extemities, and backache.
Semen Loti (Lotus seed)	For treatment of spleen-deficient diarrhea, excess dreaming and seminal emission, metrorrhagia and leukorrhea.
Fructus Lycii (Medlar)	Used as a tonic. For treatment of nutritional deficiency eye diseases, diabetes, inadequate liver and kidney function, and seminal emission.
Pericarpium Citri Reticulatae (Tangerine peel)	Is used as an expectorant and stomachic.
Bulbus Lilii (Lily root)	For treatment of coughing, hematemesis nerves, anxiety, and indigestion. It also promotes uiuresis.
Tuckahoe (China root)	For treatment of moisture dominance in kidney deficiency, edema, pulmonary congestion, vomiting and diarrhea, difficult urination; apprehension, and insomnia. Outer covering tends to promote diuresis and reduce edema; scarlet fu ling tends to circulate moisture and to reduce moisture-based heat.
Fructus Euphori (Longan)	For anemia, hyperactive mental activity, and forgetfulness.
Fructus Jujubae (Jujube)	Mainly used as a tonic and sedative. For treatment of weak stomach and spleen, anemia, inadequate energy (fatigue), and salivation.

Source: adapted from Huang and Huang, 1999; Tang, Eisenbrand, 1992.

2.4 The Nutritional Status of Chinese Children: 1992 National Nutrition Survey of China

This national survey, funded by the Chinese Ministry of Health, was the third national survey of Chinese dietary and nutritional status. In this survey, the number of children and adolescents aged 0–18 years old was 26,794, 26.7% of the total sample (Ge, 1999). There were 1,728 urban children (Table 2.5) aged 7-10 years old (boys, 867; girls, 861).

Table 2.5 Sample size of urban children aged 7 – 10 years in Chinese 1992 National Nutrition Survey

Age (Y)	Total	Boy	Girl
7-	384	187	197
8-	406	203	203
9-	412	212	200
10-	526	265	261

Source: adapted from Ge, 1999.

This survey used a range of methodologies. Dietary intake was estimated using combination of weighing and recording methods to collect household food consumption data, and 24-hour recall to collect food intake data of individual members. Anthropometric measurements for children comprised height, weight and upper arm circumference (Ge, 1999).

2.4.1 Dietary Status

Table 2.6 shows the mean energy and nutrient intake of urban children aged 6-11 years. The Recommended Dietary Allowance (RDA) for energy and nutrients was adopted from the values suggested by the Chinese Nutrition Society in 1989.

Mean intakes of calcium, vitamin A, and riboflavin were low. The iron intake was higher than RDA.

Table 2.6 Main nutrients intakes and as percentage of RDAs of children aged 6-11 years in urban areas in China

	Mean	Chinese RDA%
Energy (KJ)	8066.8	101.7
Protein (g)	64	101.3
Fat (g)	59	-
Calcium (mg)	373	43.7
Iron (mg)	20.2	191
Zinc (mg)	11	96.6
Retinol (μg)	465	66.3
Thiamin (mg)	1.0	86.8
Riboflavin (mg)	0.8	69.5

Source: adapted from Ge, 1999.

The average intake of cereals of urban children aged 6-11 years was 364g. The average intake of animal products for the children was 131g. The overall average intakes of legumes, vegetables, and fruits for the children were 9.3g, 225g, and 73g, respectively. Intake of milk and dairy product by children was low, averaging 13.6g.

For the children, protein from cereals, legumes, and animal foods was 48%, 4%, and 33% of total intake, respectively.

2.4.2 Growth and Development

Compared with the data of the 2nd National Nutrition Survey in 1982, the physical development of Chinese children has improved greatly. The average height and weight of boys and girls in 1992 are obviously higher than that in 1982 (Table 2.7 and 2.8).

Table 2.7 Average body height (cm) of 7-10 years old children in urban areas in 1992 and 1982 in China

Age	Boys		Girls	
	1992	1982	1992	1982
7-	120.2	118	118.6	116.2
8-	125.3	123.5	124.7	121.7
9-	131.1	126.6	130.7	127.5
10-	136.4	131.5	136.0	131.1

Source: adapted from Ge, 1999.

Table 2.8 Average body weight (kg) of 7-10 years old children in urban areas in 1992 and 1982

Age	Boys		Girls	
	1992	1982	1992	1982
7-	22.7	21.4	21.6	20.2
8-	25.4	23.2	24.7	22.3
9-	28.3	25.4	27.7	25
10-	31.2	27.9	30.7	26.5

Source: adapted from Ge, 1999.

2.5 The Nutritional Status of New Zealand European Children: Validation Report for the Children's Nutrition Survey

The data from the Validity Report for the Children's Nutrition Survey (Watson *et al.*, 2001) will be discussed as there is little other information available on New Zealand children of this age. The record assisted 24-hour recall and the 24-hour diet recall were used to assess dietary intake. Ninety children (30 Maori, 30 Pacific, and 30 European) boys and girls equally, aged 5-14 years living in the Auckland urban area were included. Table 2.9 shows the number of children aged 5-10 years in the study.

Table 2.9 Number of children aged 5-10 years in the Validation Report

Age	Sex	Number
5 – 7.9	Female	15
5 – 7.9	Male	18
8 – 10.9	Female	13
8 – 10.9	male	11

Source: Watson *et al.*, 2001.

2.5.1 Dietary Status

Table 2.10 shows the mean energy and nutrient intake of New Zealand European children aged 8 – 10 years in New Zealand.

The average percentage of energy from carbohydrate was 48.5% for boys and 53.6% for girls. Fat provided 34.9% and 31.4% of the dietary energy on average for boys and girls, respectively. The share of protein in energy was 14.6% for boys and 12.9% for girls on average.

Table 2.10 Nutrient intake of 8-10 years European children in Urban New Zealand

	Sex	Mean	SD
Energy (kJ)	Boy [a]	7570.50	1798.85
	Girl [b]	8830.30	3570.73
Protein (g)	Boy	67.30	35.34
	Girl	65.80	27.08
Fat (g)	Boy	72.60	30.27
	Girl	75.30	32.09
Calcium (mg)	Boy	665.90	376.33
	Girl	667.40	484.07
Iron (mg)	Boy	10.60	5.71
	Girl	10.10	3.39
Zinc (mg)	Boy	10.10	9.46
	Girl	8.90	3.28
Total A Eq (μg)	Boy	944.70	563.66
	Girl	577.60	452.32
Thiamin (mg)	Boy	1.40	0.92
	Girl	1.80	0.99
Riboflavin (mg)	Boy	1.60	0.67

[a] n = 11. [b] n = 13.

2.5.2 Growth and Development

Table 2.11 Shows the anthropometric measurements of European children aged 8- years in New Zealand.

Table 2.11 Anthropometric measurements of 8-10 years European children in New Zealand

Measure	Sex	Mean	SD
Weight (Kg)	Boy [a]	37.62	8.09
	Girl [b]	35.37	7.20
Height (cm)	Boy	138.50	8.80
	Girl	140.30	6.80

[a] n = 11. [b] n = 12.

2.6 Dietary Behaviors of Migrant: Acculturation

There is an inherent tendency of cultures to change over time. Migration and exposure to the different cultural practices of the adopted country inevitably hasten this process of change. Acculturation is the term used to describe this acceleration of cultural change that occurs when different cultures interact. Through the process of acculturation, dietary practices are modified in the light of food availability and as an adaptation to new cultural rules, customs and expectations (Fieldhouse, 1995).

2.6.1 Maintenance of Traditional Food

Although immigrants are usually forced to change many of their traditional ways to be accepted by the nationals of their new home, food is frequently the site of the migrants' last stand. In many cases it is the cultural core they try to maintain against the culinary temptations of their host country (Fieldhouse, 1995).

> "It is generally understand that for many immigrants, eating habits are more difficult to change than other aspects of behaviors, including clothing fashions, house styles and even the language spoken. Food may be the last thing to change for an immigrant. In my own experience of living in the Western world for over 25 years, I found that for me food was the most difficult habit to change. When I feel weak after catching cold or the flu, I want Korean food. When I feel weak (physically and psychologically), I feel home sick and the Korean food often alleviates the burden of the home sickness." – (Vasil and Yoon, 1996)

Certain traditional dietary practices remain intact. In a study of 193 Korean Americans (97 men and 96 women), subject data was stratified by length of stay in the United States as a measure of acculturation. The results showed that rice remained a staple food and kimchi remained a side dish. Nearly all consumed rice at least once each day. Nearly 80% consumed kimchi daily, and overall there was no change with length of residence. Besides, ginseng use was not affected by age, gender, length of residence in the United States, or language used at home (Gordon *et al.*, 2000).

A survey was conducted on the dietary patterns of new immigrants from Taiwan, Japan and the Philippines in Auckland to test the degree of integration into the host culture and the degree of emotional shift to their new home in New Zealand. Table 2.12 gives a summary of their findings on migrant Taiwanese.

Table 2.12 Dietary Habits of Taiwanese in Auckland (%)

	Western diet	**Taiwanese diet**
Breakfast	72	4
Lunch	26	26
Dinner	3	97

Source: Vasil and Yoon, 1996. In those cases where the figures do not add up to 100, the remainder represents a mixed diet of Western and Taiwanese.

Another survey was conducted on the food consumption patterns of preschool Chinese children and families in Dunedin. It was found that, rice was the one of the most common foods consumed for lunch and dinner, and soup homemade from chicken or pork bones/pieces with Chinese herbs and added vegetables was often part of the evening meal (Soh *et al.*, 2000).

Cultural food habits and personal taste preferences are strongly marked among the elderly. To study the dietary habits and food practices, 45 elderly Chinese-American women living in the San Francisco Bay area were investigated. The 24-hour dietary recalls showed that 95% of the subjects consumed mainly Chinese staple foods for lunch and dinner. Although five percent of the subjects consumed the American food for lunch, they still chose the Chinese staple foods for dinner (Chau *et al.*, 1990).

2.6.2 Cultural Change and Food Habits Change

Cultural changes have a strong influence on food choice (Southgate, 1996). Acculturation is known to affect dietary behaviors (Kuczmarski, 1995). Data from 244 Chinese-Americans and Chinese–Canadians showed that, although the samples of the study were less acculturated, most participants had Western foods such as butter, lunchmeats, snack chips,

and milk (Satia et al., 2001). A study investigated the degree of retention and/or abandonment of traditional Mexican food and dishes and adoption of new foods by 266 females aged 19-44 years. The results showed that the consumption of most traditional foods decreased after immigration into the US. There was a significant increase in consumption of non-traditional foods, particularly ready-to-eat breakfast cereals, sliced white bread, peanut butter, soft drinks, margarine, vegetable oils, cookies, mayonnaise and salad dressings (Romero *et al.*, 1993).

Acculturation is a gradual process, and it is related to length of exposure to the new environment (Chavez *et al.*, 1994; Selvarajah, 1996). In a study, ninety-minute qualitative interviews were conducted with 30 less-acculturated Chinese-American women (Satia, *et al.*, 2000). Most participants identified both "Chinese" and "American" foods in their homes, while only two women, who had lived in the United States for the shortest time, reported having no "American" foods. Another study also showed that, the longer the Chinese had lived in America, generally the more changes in food habits they made. To investigate the food habit changes of first-generation Chinese in America, 104 Chinese people who were not born in the United States and who lived in Lincoln, Nebraska were surveyed. The results showed that present use of typical Chinese foods was markedly less compared with the past consumption. The pattern had shifted to more Americanized diet with a greater diversity of food items (Yang and Fox, 1979).

Food habits change most rapidly among the young who are subject to school and work peer influences, and where there is little cultural support for the old ways (Fieldhouse, 1995). To examine acculturation and diet among Korean Americans, a sample of 348 Korean Americans was investigated and their acculturation levels were measured. The most acculturated group was the youngest, the most comfortable in mainstream American society and the most fluent in English; they also had the most American education. The results of the study showed that Korean Americans who were more acculturated consumed more American food and less Korean food (Lee *et al.*, 1999).

Asian children and adolescents changed their eating patterns after living in the United States. Students of American universities and junior colleges who were born in China, Taiwan, Hong Kong, Japan, or Korea and were aged 18 years or older participated in a study designed to collect information on dietary patterns before and after immigration. Results showed that subjects were selecting more American-style fast foods when they ate out. There were significant increases on the consumption of fats/sweets, dairy products, and fruits (Pan *et al.*, 1999). A study compared the children of Japanese descent living in the United States and Japan (Perry *et al.*, 2002). The results showed that, there were significant differences between percentage of fat intake (26.1% and 20.3% for children in the United States and Japan, respectively), percentage of saturated fat intake (7.9% and 6,1% for children in the United States and Japan, respectively), and percentage of carbohydrate intake (57.9% and 63.9% for children in the United States and Japan, respectively).

2.7 Energy Intake and Body Composition

2.7.1 Energy Intake and Energy Density

The study of energy balance is important in the modern nutritional scene (Forbes, 1996). The primary reason for food intake is to meet energy requirements, and both the food energy content and the energy source determine the regulation of energy intake and balance of body energy (Anderson, 1996).

Studies show that energy density influences energy intake. High energy foods tend to be palatable but not satiating, while low energy density foods, typically those that contain most water and least fat, are more satiating but less palatable (Drewnowski, 1998). Such studies support the hypotheses that high-fat foods are overeaten because the high energy density of fat facilitates its overconsumption (Rolls, Bell, 1999). Studies have shown that when both the fat content and the energy density are increased, energy intake also increases (Lissner *et al.*, 1987; Miller *et al.*, 1998). However, in studies in which the fat content but not the energy density was different, fat content did not influence energy intake (van Stratum *et al.*,

1978; Saltzman *et al.*, 1997). Energy intake is directly influenced by energy density independent of fat content (Bell *et al.*, 1998). But, fat intake is still currently considered to be the dietary energy source that is most likely to lead to obesity (Anderson, 1996). It was found that obese children did not consume more energy than nonobese children, but they consumed a greater proportion of their overall energy in the form of total dietary fat and less in the form of carbohydrate than nonobese children (Gazzaniga and Burns, 1993).

In the diets of the affluent, nutrient density is often almost a mirror image of energy density. Foods or diets that contain much energy but few nutrients such as fats and sugar raises the energy density but reduces the overall nutrient density (Webb, 1995). Energy density is a very informative criterion for the evaluation of diet (Mohr, 1984). A study assessed the adequacy of nutrient intakes of 162 Tongan and Tokelauan children aged 10 – 13 years old. It was reported that, Tongan and Tokelauan children living in New Zealand consume a diet that is larger in amount but lower in nutrient content compared to that of other non-Pacific Island New Zealand children. A high fat intake contributed to the low nutrient density of their diets (Bell, Parnell, 1996).

2.7.2 Energy Intake and Body Composition

Although a relationship is not found between energy intake and BMI, researchers observe that composition of the diet is important in determining BMI (Zive *et al.*, 1998). In one study, a sample of 262 children aged 9 and 10 years was used to ascertain the association between diet composition and body fat percentage. The findings of this study were not surprising, the fattest subjects derived significantly more energy from fat than the lean subjects, and fat consumption of those with moderate body fat somewhere in between (Tucker *et al.*, 1997).

"Westernized" diet and lifestyle increase the consumption of high-fat foods among Chinese children. Childhood obesity has recently been recognized as an emerging problem in many newly industrialized Chinese societies (Wang *et al.*, 1994). The dietary fat intake in the

traditional Chinese diet was originally low, but has shown a rising trend in association with urbanization (Chen, 1994; Chen, 1995; Popkin, 2001). Table 2.13 shows the different fat intake of Chinese children aged 7-10 years in urban Chinese. Obesity is rapidly increasing among children in urban China (Chen, 2000).

Table 2.13 Dietary fat intake and percentage of energy from fat of urban children aged 7-10 years in Mainland China (1992)*

Age and Sex	Fat (g)	% of energy
7y		
Boys	57.0 ± 36.0	23.4 ±12.9
Girls	49.9 ± 31.8	25.7 ± 12.4
8y		
Boys	63.5 ± 28.3	28.5 ± 12.7
Girls	57.5 ± 33.5	27.7 ± 13.9
9y		
Boys	62.3 ± 32.8	26.9 ± 10.6
Girls	58.7 ± 31.5	28.3 ± 12.1
10y		
Boys	64.9 ± 36.5	27.3 ± 12.3
Girls	58.9 ± 32.6	27.3 ± 12.3

* ±SD. Source: Adapted from Chen, 2000.

Western dietary acculturation is significantly associated with high dietary fat intake after immigration. Children in Hong Kong are the second generation of Chinese migrants from Guangdong Province of Mainland China. The prevalence of childhood obesity in Hong Kong reported in 1993 was 10-13%. (Children aged 6-18 years with weights > 120% of the Hong Kong median weigh-for-height were considered obese). It was considered that this emergence of childhood obesity was related to the changes of lifestyle (Leung *et al.*, 2000). In Singapore, 78% of the population is Chinese. A study investigated obesity prevalence of children aged 6 –7 years and 11 – 12 years from 1976 to 1983. The results showed that the prevalence of obesity (defined as ≥ 120% of ideal weight-for height) for children of 6 –7 years and 11 –12 years was 1.4% and 2.2%, respectively in 1976, and increased to 3.1% and 12.1%, respectively in 1983 (Wang *et al.*, 1994).

2.8 Physical Activity

Besides diet, physical activity is another environmental cause of obesity that has been widely studied (Bouchard, 1991). In a study, the relationship between physical activity and body fat was investigated in 2379 black and white girls aged 9 – 10 years. The results found that, television viewing was directly associated with BMI and skinfold thickness in both black and white girls, and physical activity was negatively associated with BMI and skinfold thickness in black girls (Obarzanek *et al.*, 1994). The overall energy expenditure is low among the obese. The extent of TV viewing is strongly associated with the prevalence of obesity (Bar-Or *et al.*, 1998). Americans are among the fattest people in the world. One possible explanation is that the high proportion of automobiles and large amounts of time spent watching television may reduce energy expenditure significantly more than in other countries (Bray, 1996).

Different groups of population have different patterns and levels of physical activity. For example, Singaporean Chinese youths spent more time in sedentary activities, less time sitting, and more time in light or moderate activities (such as walking, shopping, climbing stairs, and cleaning) compared to Chinese American youths (Wang *et al.*, 1994). The activity patterns in Mainland Chinese also represent a shift towards less onerous physical activities (Popkin, 2001).

In additional to appropriate nutrition, a healthy lifestyle is partially dependent on regular physical activities. Physical activity plays an important role in the prevention of overweight and obesity and in the treatment of overweight and obese individuals (Wilmore, 1996). Exercise has protective effects against several chronic diseases, including coronary heart disease (CHD), hypertension, non-insulin-dependent diabetes mellitus, osteoporosis, colon cancer, anxiety, and depression (Buskirk, 1996).

2.9 Family and Children's Food Choice

Among a child's total environment affecting his or her food behavior, family is the most influential part (Dunn *et al.*, 1998). The family influences the development of children's food habits.

2.9.1 Parental Influence

Childhood has been recognized as a critical period of learning influenced by the family (Parrage, 1990). Parents have a strong influence on their children's food preferences, presumably by power of controlling food availability and choice, making food beliefs known, and acting as a role model for food preferences (Rozin, 1996).

Parents can influence their children's dietary intake by acting as role models (Hertzler, 1983). It was reported that parental modeling of healthy dietary behavior for the children was connected with their lower fat intake and higher consumption of fruit and vegetables (Tibbs *et al.*, 2001). Another study also demonstrated that parents' own fruit and vegetable intake may encourage fruit and vegetable intake in their daughters, leading to higher micronutrient intakes and low dietary fat intakes (Fisher et al., 2002). In a study conducted to identify cafeteria factors influencing milk-drinking behaviors of elementary school children, adults were identified as providing information, support, and acting as models (Connors *et al.*, 2001). Although the potential for learning from adult modeling was seriously limited in this study as little adult milk drinking took place in the school cafeteria, adults still influenced children's milk experiences by encouraging repeated exposure 'don't forget your milk' and establishing a supportive social context 'milk is good for you'.

Food ideology passes to the children through their families. Food ideology subscribed to by a culture group symbolizes a collection of learned attitudes and behaviors which dictate what is acceptable as food, and when and how that food is to be prepared, served and eaten. Each culture tends to think of its own rules and practices as normal (Fieldhouse, 1995).

Differences between New Zealand and Chinese eating guidelines are not scientific but reflect cultural and social values. China takes a more imperative stance to children's nutrition. For example, the Chinese guidelines are as following with the more dictatorial comments in italics (McNutt, 1999):

- During mealtime, children *should be required* to concentrate on eating and stop other activities.
- Some outdoor activity *should be arranged* every day.
- Children *can be taught* to form healthy dietary habits.
- Unhealthy dietary habits, such as excessive consumption of a particular food, *should be corrected.*
- Eating meals together with peers improves the appetite and food intake of children. This *should be arranged* whenever possible.
- Both underweight and overweight *should be corre*cted as soon as possible.
- For the small proportion of children who tend to be obese, the total energy intake and the composition of the diet *should be adjusted* accordingly and outdoor activities increased.
- Alcoholic beverages are *absolutely inappropriate* for children.

The New Zealand guidelines recommend that "healthy children need to eat many different foods, eat enough for activity and growth, eat mini-meals or snacks, have plenty to drink, have treat foods now and then, and take part in regular physical activity" (Ministry of Health, 1997).

Parents in the USA have minimal influences on their children's food preferences. They often complain to their pediatricians about their children's food choice, and think they lack success in modifying their children's food habits (Rozin, 1996).

2.9.2 Women as Gatekeepers

Women are regarded as gatekeepers of children's dietary habits in many dietetics and nutrition textbooks. Women are specially recognized as controllers over the purchasing, storing, cooking, and serving of food. Besides, they are perceived to have a strong influence on the food habits of family members (McIntosh and Zey, 1998). In urban black American families, the mother is most often charged with the responsibility for making certain the family members eat properly to help them maintain good health (Jackson, 1981). A study in which mothers were allowed to modify their children's food choices showed that mothers had a marked effect on the food choice of their children (Klesges et al., 1991).

Mothers' beliefs are important when choosing foods. A study was conducted to investigated the relationship between potential criteria mothers use to select foods for their children, their food knowledge, and food consumption of their children. Participants were 218 predominantly latino mothers and their 4 to 5-year-old children. Mothers rated 17 foods in terms of 19 food attributes (how tasty specific foods were to their child, whether they were convenient to prepare, etc.). Six distinct subgroups of families, who had different orientations ranging from "high health" to "high taste", emerged. Children in the "high health" groups had diets significantly lower in calories, fat, saturated fat, and sucrose, and higher in fiber and vitamin A. The nutrient intake of children was also connected with mother's health knowledge (Contento *et al.*, 1993).

Maternal acculturation influences foods offered to children. In a survey of 238 low-income Mexican families with preschool children living in California during 1998, it was found that, compared with more acculturated mothers, less acculturated mothers tend to offer alternative foods more often when their children refuse to eat. However, more acculturated mothers were more likely to give vitamins than less acculturated mothers. Maternal acculturation was not associated with differences in weight-for-height z-scores, height-for-age, or body mass index of the children. Triceps skinfold thickness were larger in children of more acculturated mothers than in children of less acculturated mothers (Kaiser *et al.*, 2001).

Chapter 3

METHODS

3.1 Study Participants

Fifty 7 – 10 year old Chinese children from Chinese schools after hours in Auckland, who were born in Mainland China, identified the study sample.

3.2 Ethical Approval

Ethical approval for the survey was obtained from the Massey University Human Ethics Committee (see Appendix 3).

3.3 Informed Consent

Informed consent was obtained from each participant. Two separate consent forms were used: one for parents in Chinese and English requiring parental or guardian approval and one for the children (see Appendix 4).

3.4 Sample Recruitment

Chinese schools are run after school hours in Auckland. Children go to these schools for learning Chinese, drawing, maths, or dancing etc. Some of these schools were visited, and a presentation was given to the parents outlining the study and what was required. An Information Sheet (see Appendix 5) in Chinese and English was handed out after the presentation. Volunteers who were interested in having their child take part in the study then

contacted the researcher by phone, or by post using the form supplied at the end of the Information Sheet. Table 3.1 lists the Chinese schools visited in the research.

Table 3.1 Auckland Chinese schools visited in the research

Name	Address	Telephone
Auckland Contemporary Chinese School	• 58 Symonds Street, City • Parnell District School • 50 B Frost Rd., Mt. Roskill	09 8462858 021 1161121
B'Smart Centre of Education	Level 2, 17 Aviemore Dr., Highland Park, Pakuranga	09 5353018
New Zealand Chinese Dance School	• 587 Manukau Rd., Epsom • 2 The Stant, Takapuna	09 525 1887 021 328866
Sue's Chinese School	• 15 Hutchinsons Rd. Howick • Pakuranga Intermediate School	09 5329274 025 6672375

Children were eligible to participate in the study as long as they were aged between 7 to 10 years, were apparently healthy, were born in Mainland China, and their parents were of Chinese ethnicity and had immigrated to New Zealand. A total of 50 participants (27 boys and 23 girls) were identified, of whom 100% consented to participate in the survey (n = 50).

3.5 Evaluation of Nutritional Status

3.5.1 24-Hour Diet Recall

The 24-hour diet recall is a very commonly used method for obtaining food intake information (Pao and Cypel, 1996). There is a within-person variation in a person's nutrient intake data due to the difference of day-to-day dietary intake of people. Therefore, the 24-hour recall should be repeated (Quigley, Watts, 1997).

All foods and drinks that the child consumed the previous day, covering a 24-hour duration from midnight to midnight were recorded. This includes everything the child ate and drank at home, school and away (see Appendix 6).

Carrying Out the 24-Hour Recall

The three-sweep method was used. First a list of foods eaten by the subjects in the previous 24 hours was recorded as they were recalled. Next a description of each food and drink was recorded. This included the name, brand, preparation such as boiling, frying, microwave etc., recipe if necessary, eating time, meal type, and the amount or volume consumed. Subjects were asked if they added anything to these foods, and the details of any added foods were recorded in a similar manner.

Food and drink measures such as cups, bowls, spoons, dried beans and photographs were used to help the respondent identify portion volumes, size and weights etc.

Finally, the detailed intake record was reviewed. The researcher reviewed what was eaten in chronological order and asked if anything else was eaten or drunk, besides the foods and drinks recorded. The portion sizes reported were also clarified. New foods could be added or deleted at this time and weight/volumes could be edited.

Repeated 24-Hour Recall

Three 24-hour diet recalls (conducted in the first, second, and third visit respectively) were collected on non-consecutive days over a two to three-week period, including one weekend and two weekdays.

Analysis of 24-hour Recall

The Food Works (1998-2000) Dietary Analysis Programme was used to analysis the data collected in the 24-hour dietary recalls. The database contained information on core nutrients for New Zealand foods. The Chinese Food Database completed by Kai Hong Tan (Massey University) was added to analyze the Chinese foods eaten by the participants.

3.5.2 Food and Dietary Supplement Consumption Questionnaires

The food and dietary supplement consumption questionnaires conducted in the first visit examined the key food habits of the child (see Appendix 7). It was also important to collect information on dietary supplement intake because cases where dietary supplement intake was high would significantly impact on total nutrient intake (Quigley, Watts, 1997).

The questions focused on food habits that have a significant effect on the food and nutrient intake of the child. For example, type of milk or bread consumed. These questions can be used to estimate whether potential health promotion strategies are effective and to compare the food habits of different population groups.

Most of the questions used in this section were developed and tested by the Children's Nutrition Survey Pilot team (Watson *et al.*, 2001).

A food frequency questionnaire designed by the National Children Nutrition Survey Pilot team to assess nutrient intake in New Zealand European, Maori and Pacific children was also used in this study (see Appendix 8), to assess its accuracy and applicability when used in New Zealand Chinese children (Metcalf *et al.*, 2001).

Additional questions about the type of Chinese cuisine used were developed by the researcher. Participants were divided into two groups according to their cuisine – a Cantonese group, and the remainder in the Mandarin group, to examine herbal use. Information on the use of Chinese herbs was collected, that is, consumption, full name, dosage, frequency, reasons for consumption, and form.

As well, because fluoride is added to the water supply in most areas of Auckland (Public Health Commission, 1994), specific information was also collected on fluoride including the consumption of fluoride tablets, and knowledge of fluoride and fluoridation of water supply

in Auckland. It was used as an example to examine the parents' knowledge of nutrition and local health problems.

3.6 Anthropometric Measurement

Body measurements were taken (see Appendix 9) according to the methods laid down by the International Society for the Advancement of Kinanthropometry (Hume, 2001).

3.6.1 Height and Weight

The three basic measures used to assess growth status in children are age, weight, and height (Wardley et al., 1997).

The children were asked to remove their shoes when the measure of height was taken. The children were asked to stand with their feet flat on the floor. The children's back was as straight as possible, their aims hanging loosely by their sides and their heads positioned so that their line of vision was parallel to the floor. The children were asked to breathe in deeply and stretch to their fullest height, without altering their head position. The bar was brought gently onto the participant's head with enough pressure to compress their hair. Two measurements were made (to the nearest 0.1 cm) for each child. The children were asked to step away between each measurement. If the two measurements differed by more than 0.5 cm, then a third measurement was taken.

The children were also asked to remove their shoes when the measure of weight was taken. An electronic digital scale (Wedderburn, tanita, model 1609N), calibrated at every interview, was used. The scale is able to measure weight up to 150 kg. A masonite board was taken to each interview so that the scale could be placed on a hard level surface. The children were asked to stand on the scale with their feet together, arms hanging loosely by their side and head facing forward. Two measurements were made (to the nearest 0.1 kg) for each child.

The children were asked to step away from the scale between each measurement. If the two measurements differed by more than 0.5 kg, then a third measurement was taken.

3.6.2 Upper Arm Circumference

Mid-upper arm circumference can be used in conjunction with the triceps skinfold to calculate arm muscle and fat areas as an indicator of nutritional status (Quigley, Watts, 1997).

Mid-upper arm circumference measurements were taken on bare skin where possible, and on the right side of the body. The interviewer stood behind the child to locate the mid point between the tip of shoulder and the point of the elbow. The mid point was marked with a felt tip pen. The circumference measurement was taken with the child's arm hanging just away from their side with their palm facing their thigh.

The measurement was taken with the tape in a horizontal position, pulled firmly but not causing indentation. Two measurements were made (to the nearest 0.1 cm) for each child. If the two measurements differed by more than 0.5 cm, then a third measurement was taken.

3.6.3 Skinfolds

Measures of triceps and subscapular skinfolds can be used in conjunction with the ratio of weight/height^2 (body mass index [BMI]) as indicators of levels of body fatness and the location of fat (Heyward, Stolarczyk, 1996).

Measurements of triceps and subscapular skinfolds were taken using the Holtain skinfold caliper. The measurements were taken on the right side of the body where possible, with the child standing in the anthropometric posture, arms hanging comfortably and loosely at their side.

The triceps skinfold was measured on the posterior of the arm at the mark for the mid-upper arm circumference. The interviewer stood behind the participant and grasped the tricep skinfold firmly with the thumb and index finger directed downwards, so that their edges were in line with the mark. The caliper was applied so its jaw was 1cm away from mark and held for two seconds before the reading was taken.

The subscapular skinfold was measured on the back, just under the inferior tip of the scapula. The interviewer stood behind the participant and identified the inferior angle of the scapular by running the fingers along its border, and inclined downwards and outwards 2cm, 45° to the horizontal plane in line to mark the point. The interviewer grasped the tricep skinfold firmly with the thumb and index finger directed downwards, so that their edges are in line with the mark. The caliper was applied so its jaw was 1cm away from mark and held for two seconds before the reading was taken.

Two measurements were made (to the nearest 0.1 mm) for each child. If the two measurements differed by more than 0.5 mm, then a third measurement was taken.

3.6.4 Elbow Breadth

Elbow breath measurement can be taken as an indicator of frame size (Quigley, Watts, 1997).

This measurement was taken using a vernier bone caliper. The interviewer measured the distance between the epicondyles of the humerus on the right arm, standing in front of the child as they flexed their elbow to 90°. Two measurements were made (to the nearest 0.1 cm) for each child. If the two measurements differed by more than 0.5 cm, then a third measurement was taken.

3.7 Demographic, Medical Status, Lifestyle and Activity Questionnaires

These questionnaires (see Appendix 10) were conducted in the third visit. Most of the questionnaires were based on questions developed by the National Children Nutrition Survey Pilot team (Watson *et al.*, 2001). The questions on physical activity focus on those activities that determine the energy expenditure of the child. For example, the days playing outside, or the time going to bed at night. It includes all daily activities of the child after school including sedentary activities (Metcalf *et al.*, 2001). Additional questions developed by the researchers were:

- Lifestyle questions on how the parents rate the importance of Chinese medicine and modern nutrition knowledge.
- Lifestyle questions on whether the parents think their children have had "hot" or "cold" conditions, and whether they have food restriction for the children or encourage the children eat some foods when their children are in "hot" or "cold" conditions.
- Lifestyle question about the factors influencing the purchase of "Western" foods.
- General background questions. These questions covered a range of personal information about family composition in New Zealand, parental education level, parental occupation and work situation at present after immigration and in China before immigration, and length of residence in New Zealand.

3.8 Pre-testing

The questionnaires were pre-tested before the survey began to ensure the questionnaires were clear and easy to understand, were acceptable to the participants, and that the coding was appropriate for the questions.

Pre-testing participants were recruited via contact with parents whose children were in the Auckland Contemporary Chinese School run at Parnell District School on Saturdays. A total

of eight participants were identified. Five of them (two boys and three girls) were aged 7-10 years. Three of them (one boy and two girls) were aged 4-7 years.

Individual feedback on the interview process was collected from parents and children during, or at the end of the interview. The participants were asked how they felt about each question or section in the interview.

Responses from the parents are shown in Table 3.2. The socioeconomic questions causing concern were household income, parents' occupation and dwelling conditions.

Table 3.2 Responses from parents in the pre-testing sample (%)

Responses	Number (n = 8)
Being unhappy about the socio-economic questions	87.5%
Socioeconomic questions are not related to nutrition	62.5%
What is the purpose of the questions asked	75%

As a result the following changes were made to the questionnaires:

- Questions in the socioeconomic section about household income, home ownership and house size were removed.
- A question about considering the budget when buying any food for the child was put into the section on lifestyle (Q. E6) as an indirect way of asking about household income.
- The socioeconomic section was put at the end of the final interview when trust had developed between interviewee and the researcher.
- A simple explanation about the purpose of the questions was given for each section.

3.9 Interview Process

Once the child was identified as being eligible to enter the study, the researcher then posted the consent form and contact sheet to the parent and child, and arranged a suitable time and place for the first visit. This visit was at a location chosen by the volunteer e.g. home,

workplace, or school etc. The signed consent forms and contact sheet were collected at the first visit. Appointments were made for the second and third visits, again at locations and times convenient to the subjects.

3.9.1 First Visit

This visit required around 30 minutes.

The child and parent were interviewed about the food consumption patterns of the child, and the food that the child had eaten during the last 24 hours. Participants were also left with a food frequency questionnaire for the child to fill out.

3.9.2 Second Visit

This visit required around 20 minutes.

The child and parent were again interviewed about the food that the child had eaten during the last 24 hours. The food frequency questionnaire was also checked and collected.

3.9.3 Third Visit

This visit required around 50 minutes.

Here the child and parent were interviewed about the food that the child had eaten during the last 24 hours, the life style of the child, and the activity level of the child. In addition, the following measurements were made:

- Height
- Weight
- Triceps skinfold

- Subscapular skinfold
- Upper arm circumference
- Elbow width

Finally, demographic information was collected, such as household composition, parents' occupation and education background, and arrival time in New Zealand.

3.10 Statistical Analysis

Excel was used for the statistical analysis. Means, standard deviation, lower quartile, medians, and upper quartile were calculated as representative parameters.

The two-tailed t-test with $\alpha = 0.05$ was used to detect significant differences between boys and girls, and age groups of 7 – 8 years and 9 – 10 years for their anthropometric measurements and nutrient intakes.

3.11 Feedback to Participants

A summary of the child's results was sent to each participants. The results included a report in both English and Chinese on the child's body measurements and intake of important nutrients. They were able to compare the results with the recommendations provided. They also received a summary of the study results. Examples of the feedback are included in Appendix 11.

Chapter 4

RESULTS

4.1 Characteristics of Participants

4.1.1 Participant Children

The children who participated in the survey were all born in Mainland China and had immigrated to New Zealand. Of the 50 participants, 27(54%) children were male and 23(46%) were female. The detailed composition of the sample is shown in Table 4.1 below.

Table 4.1 Numbers of participants by age and sex

Age (year)	Sex	Number (n =50)	Total
7 – 7.9	Male Female	11 (22%) 6 (12%)	17 (34%)
8 – 8.9	Male Female	6 (12%) 4 (8%)	10 (20%)
9 – 9.9	Male Female	5 (10%) 8 (16%)	13 (26%)
10 – 10.9	Male Female	5 (10%) 5 (10%)	10%

4.1.2 Occupation and Work Status of the Parents

Table 4.2 shows the father's occupation in New Zealand and in China. Subjects were grouped according to the *International standard classification of occupations: ISCO-88* (International Labour Office, 1990).

All the parents of participants had a full time job when they worked in China. Table 4.3 shows the present work status of the parents in New Zealand.

Table 4.2 Occupation of the father in New Zealand and China (ISCO-88 Classification)

Occupation group [1]	New Zealand [2]	China
Group 2	12%	56%
Group 3	14%	4%
Group 4	4%	0%
Group 5	10%	0%
Self employee	20%	24%
Student	4%	0%
No information given	18%	16%

[1] Occupation group: Group 2 - Professionals; Group 3 - Technicians and associate professionals; Group 4 - Clerks; Group 5 - Service workers; "Self employee" - it was portrayed as one group because the participants did not give the further details of their employment.

[2] The figures do not add up to 100% because 18% were still working in China.

Table 4.3 Present work status of the parents in New Zealand (%)

Occupation status	Father (n =50)	Mother (n = 50)
Full time	94%	58%
Part time	4%	12%
At home	0%	30%
NA	2%	0%

4.1.3 Income

As an indirect way of asking about household income, parents were asked if they considered the budget when buying food for their child. Table 4.4 shows the frequency of family consideration about the budget when buying the food.

Table 4.4 Family consideration of budget for child's food (%)

Consideration of budget	Family number (n = 50)
Often	12%
Sometimes	46%
Never	42%

4.1.4 Education Level of Parents

Table 4.5 shows the education level of the parents. Most of the parents (100% of the fathers and 96% of the mothers) had finished 5-6 years of high school education. Many of them (88% of the fathers and 78% of the mothers) had tertiary training, with university being the most common type of tertiary training.

4.1.5 Family Members living with the Child in New Zealand

There were 78% children living with father and mother. Eighteen percent lived with one parent while the other parent worked overseas, and these children generally lived with the mother (16%). Four percent lived in one-parent families. These children all lived with the mother and all had grandparent(s) living with them (Table 4.6). Forty four percent of the children had brother(s) and/or sister(s). Fifty four percent of the children had grandparent(s) and/or relative(s) living with them.

Table 4.5 Education level of parents (%)

Education level	Category	Father (n =50)	Mother (n = 50)
Years of high school completed	• 5-6 years • Less than 5 years	100% 0%	96% 4%
Tertiary training	• Yes • No	88% 12%	78% 22%
Type of tertiary training	• Working training • Polytech • University	6% 4% 78%	2% 8% 68%

Table 4.6 Household composition of the child in New Zealand (%)

Family members	Children number (n = 50)
Father and mother	78%
One parent (the other working overseas)	18%
One parent (separate)	4%
One-parent separate with Grandparent(s)	4%
Brother(s) and/or sister(s)	44%
Grandparent(s) and/or relative(s)	54%

4.1.6 Time Living in New Zealand for the Children

For the participants of this study, 60% of children had lived in New Zealand for 4 or more than 4 years. The time the children had lived in New Zealand is shown in Table 4.7.

Table 4.7 Time living in New Zealand for children (%)

Time	Children number (n = 50)
< 6 months	8%
6 months - < 2 years	4%
2 – < 3 years	12%
3 - < 4 years	16%
≥ 4 years	60%

4.1.7 Health of the Children

Of the 50 children, only 3 children (6%) had a long term (>6 months) medical condition, the rest 47 (94%) had no problems. Of those 3 children, all suffered from asthma.

No children had been admitted to hospital in the last 12 months or were taking any medicine prescribed by a doctor at the time of the interview.

4.2 Anthropometric Measurements of Children

4.2.1 Growth and Development of Children

Table 4.8 presents the combined anthropometric measurement data of all the 50 participant children and Table 4.9 by age group. There was no significant difference between boys and girls for any body measurement. When body measurements were considered by age group, there were significant differences between weight ($p = 0.0003$), upper arm circumference ($p = 0.0028$), and elbow width ($p = 0.0005$). There was no significant difference between the other body measures.

According to standard growth charts from London Child Growth Foundation (Wardley *et al.*, 1997), the average weight-for-age and height-for-age of children both lie between the 25th – 91st centile. Referral is recommended when weight and height are below the 0.4th centile or above the 99.6th centile. No child's weight-for-age and height-for age were below the 0.4th centile while one child's weight (2%) and another child's height (2%) were above the 99.6th centile.

There are no well-accepted criteria for assessing school age children so far, and BMI-for-age is recommended by the WHO as the best index (Ge, 1999). BMI-for-age is used to identify children either at risk of overweight or underweight (Flegal *et al.*, 2002). Table 4.10 shows the BMI of children by age group. There was no significant difference of BMI between sexes and age groups. According to standard BMI charts from London Child Growth Foundation (Wardley *et al.*, 1997), the average BMI of children lies between the 50th – 75th centile. Boys or girls who's BMI fall above the 99.6th centile or below the 0.4th centile are considered significantly above or under weight. No children were severely under weight while only one child (2%) was significantly over weight.

Table 4.8 Anthropometric measurements of children (n = 50)

Measure	Mean	SD	LQ	Median	UQ
Weight (kg)	29.21	6.22	24.75	29.2	31.19
Height (cm)	131.80	8.72	124.49	132.38	136.76
Upper arm circumference (cm)	19.36	2.36	17.91	19.10	20.08
Elbow width (cm)	5.11	0.37	4.91	5.12	5.32
Triceps skinfold (mm)	11.70	4.13	8.54	10.75	13.85
Subscapular skinfold (mm)	7.90	3.56	5.70	6.90	8.58

Table 4.9 Anthropometric measurements of children by age group

Measure	Age group	Mean	SD	LQ	Median	UQ
Weight (kg)	7 – 8 years [a]	26.38	4.81	23.30	25.20	29.50
	9 – 10 years [b]	32.54	6.11	28.40	29.85	36.85
Height (cm)	7 – 8 years	127.18	5.81	121.75	128.20	132.10
	9 – 10 years	137.22	8.53	134.25	137.85	139.08
Upper arm circumference(cm)	7 – 8 years	18.46	2.12	17.43	18.10	19.40
	9 – 10 years	20.42	2.23	19	20	21.40
Elbow width (cm)	7 – 8 years	4.95	0.28	4.70	4.98	5.12
	9 – 10 years	5.31	0.37	5.17	5.21	5.50
Triceps skin fold (mm)	7 – 8 years	10.65	3.77	7.85	9.50	13.25
	9 – 10 years	12.92	4.28	10.05	12.20	15.63
Subscapular skinfold (mm)	7 – 8 years	7.02	3.21	5.35	5.95	8.11
	9 – 10 years	8.92	3.74	6.80	7.20	10.48

[a] n = 27. [b] n = 23.

Table 4.10 BMI of children by age group

Age group	Mean	SD	LQ	Median	UQ
7 – 8 years [a]	16	2	15	16	17
9 – 10 years [b]	17	2	16	16	18

[a] n = 27. [b] n = 23.

4.2.2 Comparison with Chinese National Nutrition Survey of 1992

Table 4.11 – 4.14 show the comparison of average height, weight, upper arm circumference, and BMI of children in the present study and the urban Chinese children in the Chinese National Nutrition Survey of 1992.

Table 4.11 Average body height (cm) of migrant Chinese and Mainland urban Chinese children

Age	Chinese migrant (n = 50)		Chinese urban (n = 1728)	
	Boys	Girls	Boys	Girls
7	125.06	121.84	120.2	118.6
8	133.03	132.24	125.3	124.7
9	132.52	134.12	131.1	130.7
10	140.85	143.27	136.4	136.0

Table 4.12 Average body weight (kg) of migrant Chinese and Mainland urban Chinese children

Age	Chinese migrant (n = 50)		Chinese urban (n = 1728)	
	Boys	Girls	Boys	Girls
7	26.25	22.75	22.7	21.6
8	28.65	28.78	25.4	24.7
9	30.95	30.84	28.3	27.7
10	33.38	36.00	31.2	30.7

Table 4.13 Average upper arm circumference (cm) of migrant Chinese and Mainland urban Chinese children

Age	Chinese migrant (n = 50)		Chinese urban (n = 1728)	
	Boys	Girls	Boys	Girls
7	18.67	17.39	13.1	12.8
8	18.74	19.10	13.0	12.9
9	20.61	20.30	13.0	12.9
10	20.17	20.67	13.3	13.2

Table 4.14 Average BMI of migrant Chinese and Mainland urban Chinese children

Age	Chinese migrant (n = 50)	Chinese urban (n = 1728)
7	16	16
8	16	16
9	17	16
10	17	17

4.2.3 Comparison with Validation Study for the Children's Nutrition Survey of New Zealand

Table 4.15 compares the anthropometric measurements of children in the present study with those of children in the Validation Report for the Children's Nutrition Survey of New Zealand. Children are compared by age group of 8 – 10 years according to the age band in the Validation Report.

Table 4.15 Average anthropometric measurements of 8-10 years old Chinese migrant and European children*

Measure	Children group	Boys	Girls
Age (year)	Chinese Migrant [a]	8.94 ± 0.85	9.06 ± 0.75
	European [b]	9.31 ± 0.63	9.50 ± 0.91
Weight (kg)	Chinese Migrant	30.85 ± 5.16	31.87 ± 5.92
	European	37.62 ± 8.09	35.37 ± 7.20
Height (cm)	Chinese Migrant	135.31 ± 7.61	136.37 ± 7.72
	European	138.50 ± 8.80	140.30 ± 6.80
Arm circum-ference (cm)	Chinese Migrant	19.77 ± 1.97	20.13 ± 2.12
	European	22.60 ± 2.70	21.60 ± 2.40
Elbow width (cm)	Chinese Migrant	5.33 ± 0.29	5.14 ± 0.38
	European	5.36 ± 0.30	5.24 ± 0.44
Triceps skin-fold (mm)	Chinese Migrant	11.29 ± 4.22	13.03 ± 3.77
	European	9.53 ± 3.84	10.04 ± 4.07
Subscapular skinfold (mm)	Chinese Migrant	7.65 ± 2.81	8.85 ± 3.80
	European	7.79 ± 4.24	8.87 ± 4.07

*±SD. [a] n = 33. [b] n = 23.

4.3 Dietary Status of the Children

4.3.1 Nutrient Intakes (Per Capita Per Day)

The overall average energy intake of boys and girls was 8000kJ (1911kcal) and 7374kJ (1761kcal), respectively. Table 4.16 – 4.19 show the status of nutrient intakes and energy sources of all the 50 participant children, and by age group. There was no significant difference between boys and girls in their nutrient intake except fibre ($p = 0.0169$) and total sugars ($p = 0.0367$). The average fibre intake for boys and girls was 14g and 11.9g, respectively, and total sugar intake was 90.5g and 70.4g, respectively. For the age groups, there were significant differences between cholesterol ($p = 0.0071$), vitamin D ($p = 0.0436$), and vitamin B6 ($p = 0.0288$). There was no significant difference between the intake of the other main nutrients and energy sources for the two age groups.

Table 4.20 compares the intake per 1000 kJ for some nutrients for children of migrant Chinese aged 7 – 10 years (present study), children in urban Mainland China aged 6 – 11 years (Chinese National Survey of 1992), and children of Europeans in New Zealand aged 8 –10 years (Validation Report for Children's Nutrition Survey). Of interest is the apparent lower calcium and higher iron intake of the Mainland Chinese children, and higher protein intake of migrant Chinese children.

The major sources of protein in the diets of migrant Chinese children were animal products, cereals, and milk products, in that order. The leading source of iron in the diets of the children was cereals, following by animal products, fruit and vegetables, and milk products.

Table 4.16 Main nutrient intake of all children (n = 50)

Nutrients	Mean	SD	LQ	Median	UQ
Energy (kJ)	7712	1238	6631	7832	8697
Protein (g)	69.3	15.2	59.0	71.4	78.6
Fat (g)	62.0	16.0	53.5	69.6	70.3
Carbohydrate (g)	252.8	50.0	221.8	251.4	282.9
Sat.Fat (g)	26.4	6.5	22.0	26.0	30.1
Mono.Fat (g)	23.4	6.0	19.6	23.4	27.7
Poly.Fat (g)	11.3	3.7	8.5	11.1	13.8
Fibre (g)	13.1	3.1	11.0	13.1	15.0
Total Sugars (g)	81.3	34.5	58.1	79.2	97.4
Cholesterol (mg)	301.9	103.1	226.6	306.0	374.4
Thiamin (mg)	1.4	0.7	1.1	1.3	1.6
Riboflavin (mg)	1.4	0.6	1.0	1.3	1.6
Niacin Eq (mg)	24.5	6.5	21.1	24.6	28.3
Vitamin C (mg)	107.3	86.8	50.9	83.6	134.9
Vitamin D (ug)	1.4	0.8	0.8	1.3	1.7
Vitamin E (mg)	5.9	1.6	4.8	5.8	6.9
Vitamin B6 (mg)	1.3	0.3	1.1	1.2	1.5
Vitamin B12 (ug)	3.9	2.1	2.6	3.3	5.4
Total Folate (ug)	170.6	55.5	136.4	160.1	194.1
B-Carotene Eq (ug)	1316.7	1152.0	535.7	991.1	1482.5
Total A Eq (ug)	479.5	308.8	290.4	381.7	545.6
Sodium (mg)	2302.9	716.6	1945.5	2198.0	2654.8
Calcium (mg)	610.8	202.4	454.8	621.7	731.4
Zinc (mg)	8.8	2.6	7.1	8.5	10.3
Iron (mg)	11.8	3.9	8.9	11.0	15.0
Selenium (ug)	41.8	16.2	30.9	38.9	47.9

Table 4.17 Nutrient intake of children by age group

Nutrients	Age group	Mean	SD	LQ	Median	UQ
Energy (kJ)	7 - 8 years [a]	7495	1336	6374	7364	8425
	9 - 10 years [b]	8008	1064	7139.5	8436	8867
Protein (g)	7 - 8 years	65.8	15.0	57.4	62.2	75.4
	9 - 10 years	73.5	14.6	65.6	75.8	80.6
Fat (g)	7 - 8 years	62.6	19.0	50.7	59.7	74.7
	9 - 10 years	61.4	11.8	54.3	59.6	66.5
Carbohydrate (g)	7 - 8 years	241.2	41.7	209.4	244.4	270.7
	9 - 10 years	266.4	47.8	227.5	261.3	301.0
Sat.Fat (g)	7 - 8 years	26.4	7.5	22.3	25.8	30.2
	9 - 10 years	26.5	5.2	22.1	26.1	30.0
Mono.Fat (g)	7 - 8 years	23.0	7.1	17.2	22.9	28.0
	9 - 10 years	23.9	4.4	22.1	23.5	27.4
Poly.Fat (g)	7 - 8 years	11.2	3.8	8.1	10.9	15.3
	9 - 10 years	11.5	3.5	9.0	12.2	13.5
Fibre (g)	7 - 8 years	12.6	2.8	10.8	12.1	14.9
	9 - 10 years	13.6	3.4	11.6	13.7	15.1
Total Sugars (g)	7 - 8 years	78.5	33.7	57.1	76.5	98.7
	9 - 10 years	84.6	35.9	65.1	88.2	95.0
Cholesterol (mg)	7 - 8 years	266.2	93.6	183.5	281.3	349.8
	9 - 10 years	343.7	99.6	280.6	313.8	407.2
Thiamin (mg)	7 - 8 years	1.4	0.8	0.9	1.3	1.4
	9 - 10 years	1.5	0.6	1.2	1.5	1.7
Riboflavin (mg)	7 - 8 years	1.4	0.7	0.9	1.3	1.5
	9 - 10 years	1.5	0.5	1.1	1.3	1.7
Niacin Eq (mg)	7 - 8 years	23.0	5.8	20.6	23.0	25.3
	9 - 10 years	26.2	7.0	22.5	26.7	30.2
Vitamin C (mg)	7 - 8 years	90.0	62.1	44.0	67.7	130.2
	9 - 10 years	127.6	106.9	71.7	120.9	138.2
Vitamin D (ug)	7 - 8 years	1.2	0.6	0.7	1.3	1.5
	9 - 10 years	1.6	0.9	1.0	1.3	2.0
Vitamin E (mg)	7 - 8 years	5.8	1.6	4.7	5.9	6.9
	9 - 10 years	6.1	1.6	5.1	5.7	6.7
Vitamin B6 (mg)	7 - 8 years	1.2	0.3	1.0	1.1	1.4
	9 - 10 years	1.4	0.4	1.2	1.4	1.5
Vitamin B12	7 - 8 years	3.4	1.9	1.9	3.1	4.4
(μg)	9 - 10 years	4.6	2.3	2.8	3.5	6.0

(To be continued)

(Continued)

Total Folate	7 - 8 years	157.7	36.2	135.9	149.4	177.2
(μg)	9 - 10 years	185.8	69.7	140.6	171.3	218.4
B-Carotene	7 - 8 years	1242.4	1187.3	468.8	983.2	1178.5
Eq(μg)	9 - 10 years	1404.1	1129.1	576.9	1005.0	2192.5
Total A Eq	7 - 8 years	445.3	343.6	276.9	339.2	500.2
(μg)	9 - 10 years	519.6	264.0	338.5	444.1	658.4
Sodium (mg)	7 - 8 years	2249.0	802.5	1794.0	2205.0	2613.0
	9 - 10 years	2366.2	612.3	2053.0	2191.0	2685.0
Calcium (mg)	7 - 8 years	608.9	231.6	436.5	624.2	749.0
	9 - 10 years	609.6	173.4	475.1	616.7	690.6
Zinc (mg)	7 - 8 years	8.4	2.5	6.4	8.3	9.7
	9 - 10 years	9.1	2.6	7.3	9.0	11.4
Iron (mg)	7 - 8 years	11.2	3.6	8.9	10.8	12.9
	9 - 10 years	12.6	4.2	9.0	12.2	15.3
Selenium (μg)	7 - 8 years	38.7	16.2	26.9	37.9	43.2
	9 - 10 years	45.4	15.9	35.0	42.4	52.5

[a] n = 27. [b] n = 23.

Table 4.18 Energy sources in the diet of children (% of total energy)

Energy source	Mean	SD	LQ	Median	UQ
Carbohydrate	52.5	5.2	49.6	51.4	55.6
Protein	15.4	2.8	13.8	15.2	16.7
Fat	29.6	5.0	26.9	29.9	33.2
Fat as Mono	11.3	1.0	10.6	11.2	12.0
Fat as Poly	5.5	1.4	4.5	5.3	6.4
Fat as Saturated	12.8	1.5	11.9	12.7	14.5

Table 4.19 Energy sources in the diet of children by age group (% of total energy)

Energy source	Age group	Mean	SD	LQ	Median	UQ
Carbohydrate	7 - 8 years [a]	52.1	5.4	49.4	50.8	54.0
	9 - 10 years [b]	53.0	4.9	49.7	52.0	56.3
Protein	7 - 8 years	15.1	2.8	13.7	15.1	16.2
	9 - 10 years	15.7	2.9	14.3	15.2	17.3
Fat	7 - 8 years	30.6	5.2	27.8	30.5	34.0
	9 - 10 years	28.5	4.5	25.2	28.5	30.1
Fat as Mono	7 - 8 years	11.6	1.2	10.7	11.6	12.6
	9 - 10 years	11	0.8	10.4	10.8	11.5
Fat as Poly	7 - 8 years	5.7	1.4	4.7	5.5	6.4
	9 - 10 years	5.3	1.4	4.3	5.2	6.2
Fat as Saturated	7 - 8 years	13.3	1.7	12.3	13.4	14.6
	9 - 10 years	12.2	1.3	11.3	12.2	13

[a] n = 27. [b] n = 23.

Table 4.20 Average nutrient density of the diet for children of migrant Chinese, urban Mainland Chinese and Europeans in New Zealand (per 1000kJ)

Nutrient	Migrant Chinese	Mainland Chinese [a]	European boys [b]	European Girls [b]
Protein (g)	9.0	7.9	8.0	8.5
Fat (g)	8.0	7.3	9.4	9.6
Thiamin (mg)	0.2	0.1	0.1	0.2
Riboflavin (mg)	0.2	0.1	0.2	0.2
Calcium (mg)	79.7	46.2	63.7	67.0
Zinc (mg)	1.1	1.4	1.1	1.3
Iron (mg)	1.5	2.5	0.9	1.1

[a] Calculated by total average value.

[b] Calculated by total median value.

4.3.2 Serving Size of Commonly Consumed Foods

The common serving size for different foods frequently varies between different ethnic groups and cultures. To determine the serving size of some commonly consumed foods for the migrant Chinese children, the weights of these foods were calculated in this study (Table 4.21).

Table 4.21 Serving size of some commonly consumed foods as eaten by migrant Chinese children (g)

Food	Mean	SD	LQ	Median	UQ	Standard Measure NZ[3]
Rice [1]	90.1	38.5	75.0	100.0	100.0	144
Noodles [1]	87.4	29.7	65.0	85.0	100.0	169
Chinese dumpling [2]	261.1	101.2	203.2	254.0	362.0	-
Breakfast cereal	23.8	13.2	15.0	18.0	30.0	30-45
Milk	220.0	80.9	155.0	206.0	258.0	258
Ice cream	85.3	36.4	57.0	72.0	114.0	68
Tofu	71.8	69.4	50.5	52.0	70.5	-
Green/leaf vegetables	75.7	61.9	30.0	62.5	100.0	96
Other vegetables	103.2	70.8	53.0	105.0	119.0	117-127
Fish	48.1	31.4	20.0	49.0	70.0	57
Pork	70.9	61.1	26.0	50.0	100.0	-
Beef	94.6	71.6	48.0	100.0	100.0	137
Chicken	70.2	45.1	41.0	50.0	95.0	88-95

[1] raw rice/noodles weight for migrant Chinese children.

[2] Weight of each dumpling was standardized as 25.4g.

[3] Serving size used in the Validation Study. Source: Watson *et al.*, 2001.

4.4 Eating Behavior of Participants

All children ate three main meals a day, with a snack at morning and afternoon break. Sixty percent had a third snack after evening dinner.

4.4.1 Breakfast

For breakfast, both Western style foods, such as bread, milk, and breakfast cereals etc. and Chinese traditional style foods, such as noodles, steamed buns or congee etc. were consumed. From the one hundred and fifty 24-hour recalls collected (three for each child), the number consuming Western food, Chinese food, and mixed Western and Chinese food for breakfast was calculated. The numbers are shown in Table 4.22. The days that children ate Western or Chinese food at breakfast were not consistently either weekdays or weekends.

Table 4.22 Breakfast eating habits of children (%)

Food style	Number of diets	% of total diets (n = 150)
Western diet	81	54%
Chinese diet	21	14%
Mixed diet	48	32%

4.4.2 Lunch

For the children, lunch at school was all Western foods. Among the 100 24-hour recalls taken at the weekdays (two for each child), there were 94 recalls taken on school days, and the rest, 6 were during school holidays. Apart from 3 new arrivals who had not yet gone to school and 1 who was taken home from school for lunch, all the remaining 46 children ate lunch at school on schooldays (Table 4.23). The 94 recalls from these 46 children who ate lunch at school showed that, all ate Western style foods such as breads or sandwiches taken from home, or foods ordered at school. There was no one eating Chinese traditional style food.

Table 4.23 Lunch eating place for children at schooldays (%)

Eating place	Children number (n = 50)
School	92%
Home	8%

In contrast, for the 6 recalls taken at the weekdays of school holidays, lunch foods were all Chinese, such as rice and accompanying dishes.

For the 3 new arrivals and the 1 taken home for lunch, among their 8 weekday, schooldays' 24-hour recalls, 7 lunch meals were Chinese foods and 1 lunch meal (by the child taken home from school) was Western foods.

In the weekends, lunch for the children was Chinese style foods (44%), Western style takeaways (42%), mixed Chinese and Western foods (10%), and Western foods (4%).

4.4.3 Dinner

Dinner for children was mainly Chinese traditional foods such as boiled rice (*fan*), with dishes of meat, vegetables (*tsai*), and soup.

4.4.4 Consumption of Western Style Takeaways

The children consumed Western style takeaways such as McDonalds, KFC, and bought fish and chips. Table 4.24 shows the frequency that the children ate takeaways.

Table 4.24 Frequency of consumption of Western style takeaways (%)

Frequency	Children number (n = 50)
Once per month	10%
Once in two weeks	24%
1 – 2 times per week	60%
2 – 3 times per week	2%
3 – 4 times per week	4%

4.4.5 Food Groups

Most children (96%) ate a variety of all foods except 4% who did not drink or use any kind of milk.

Table 4.25 – 4.35 show the consumption of different types of foods by the children (aged 7 – 10 years old) in the present study and children (aged 5 – 14 years old) in the Validation Report for the Children's Nutrition Survey of New Zealand.

Table 4.36 shows the dietary supplement intake of these two groups of children. No migrant Chinese children used fluoride tablets. Eighty eight percent of the Chinese parents knew about fluoride, however, just twenty percent of them were aware of the fact that water was fluoridated in most areas of Auckland.

Table 4.25 Fruit consumption level of children (%)

Level	Present study (n = 50)	Validation study (n = 90)
Doesn't eat fruit	0%	2.2%
< 1 helping/day	16%	18.7%
1 helping/day	46%	19.8%
2 helpings/day	26%	38.5%
≥ 3 helpings/day	12%	20.9%

Table 4.26 Vegetable consumption level of children (%)

Level	Present study (n = 50)	Validation study (n = 90)
Doesn't eat vegetables	0%	2.2%
< 1 helping/day	12%	18.5%
1 helping/day	52%	32.6%
2 helpings/day	26%	26.1%
3 helpings/day	8%	14.1%
≥ 4 helpings/day	2%	6.5%

Table 4.27 Cereals (noodles, pasta, rice) consumption level of children (%)

Level	Present study (n = 50)	Validation study (n = 90)
Doesn't eat cereals	0%	2.2%
< 1 helping/day	0%	6.5%
1 – 2 helpings/day	6%	32.6%
3 – 4 helpings/day	41%	38%
5 –6 helpings/day	41%	8.7%
≥ 7 helpings/day	12%	12%

Table 4.28 Breakfast cereal consumption level of children (%)

Level	Present study (n = 50)	Validation study (n = 90)
Doesn't eat b'fast cereals	36%	5.4%
< 1 helping/day	36%	33.7%
1 – 2 helpings/day	26%	39.1%
3 – 4 helpings/day	2%	12%
≥ 5 helpings/day	0%	9.8%

Table 4.29 Bread consumption level of children (%)

Level	Present study (n = 50)	Validation study (n = 90)
Doesn't eat bread	0%	0%
< 1 helping/day	8%	0%
1 – 2 helpings/day	68%	29.3%
3 – 4 helpings/day	20%	47.8%
5 –6 helpings/day	4%	17.4%
≥ 7 helpings/day	0%	5.4%

Table 4.30 Type of bread usually consumed (%)

Bread type	Present study* (n = 50)	Validation study (n = 90)
White	82%	73%
White – High Fibre	12%	15%
Grain breads	2%	4%
Wholemeal	6%	18%
Other	2%	0%

*The total figures are not 100%, because there are two children representing a combined type.

Table 4.31 Milk product (milk, yoghurt, dairy food, ice cream. cheese) consumption level of children (%)

Level	Present study (n = 50)	Validation study (n = 90)
Doesn't eat milk products	2%	2.2%
1 helping/day	36%	20.9%
2 helpings/day	54%	36.3%
3 helpings/day	2%	29.7%
4 helpings/day	6%	6.6%
≥ 5 helpings/day	0%	4.4%

Table 4.32 Type of milk usually consumed (%)

Milk type	Present study [a] (n = 50)	Validation study [b] (n = 90)
Whole milk	0%	1.1%
Standard homogenised	78%	69.7%
Reduced fat	10%	20.2%
Trim milk	2%	4.5%
Super trim	0%	3.4%
Calcium trim	10%	11%
Bought flavoured	2%	0%

[a] the figures are not 100%, because there are two children representing no milk consumption and another two representing a combined type.

[b] 96.7% of the children drink some type of milk.

Table 4.33 Protein product (meat, chicken, fish, seafood, eggs, dried beans) consumption level of children (%)

Level	Present study (n = 50)	Validation study (n = 90)
<1 helping/day	0%	18.5%
1 - 2 helpings/day	60%	72.8%
3 - 4 helpings/day	40%	7.6%
≥ 5 helpings/day	0%	1.1%

Table 4.34 Type of fat spread usually consumed (%)

Fat spread type	Present study [a] (n = 50)	Validation study [b] (n = 90)
Butter	2%	16.3%
Butter & margarine blend	4%	31.4%
Margarine (oil type not specified)	2%	8.1%
Polyunsaturated margarines	30%	31.4%
Monounsaturated Margarines	0%	11.6%
Other	0%	1.1%

[a] 38% of the children used fat spread on bread and 62% did not.

[b] 93.3% of the children used fat spread on bread and 6.7% did not.

Table 4.35 Addition of salt to food (%)

Time of salt addition	Present study (n = 50)	Validation study (n = 90)
Salt added when cooking	100%	69.6%
Salt added when eating:		
• Usually	2%	12%
• Sometimes	2%	30.4%
• Rarely	6%	22.8%
• Never	92%	34.8%

Tables 4.36 Dietary supplement intake (%)

Type of supplement	Present study (n = 50)	Validation study (n = 90)
Vitamins/mineral tablets	22%	15.2%
Fluoride tablets	0%	1.1%

4.5 Food Frequency Questionnaire

The questionnaire designed by the Pre-testing team for the Children's Nutrition Survey was used. It included 134 questions about 116 items of food, except the questions about the dietary supplements. The objective of this exercise was to assess the accuracy and applicability of this food frequency questionnaire designed to assess nutrient intake in New Zealand European, Maori and Pacific children when used in New Zealand Chinese children. Many of the foods listed in the questionnaire were not eaten by the Chinese children. Foods that were eaten by 50% or more of the children only three times a month or less were

investigated (see Table 4.37). Fifty percent or more of children ate 54 of the 116 foods "never or less than once a month", and 8 foods were answered "1-3 times a month".

Table 4.37 Foods that were eaten 'never/less than once a month' or '1-3 times a month' by 50% or more of the children

Food	Never/less than once/month	1-3 times/month
Strawberries/other berries	88%	
Tinned/cooked fruit	86%	
Dried fruit	60%	
Lamb/mutton chops		54%
Other potatoes	82%	
Taro	96%	
Kumara	74%	
Cassava	100%	
Cooked green banana	100%	
Pumpkin	68%	
Roast vegetables	96%	
Butter/margarine on cooked vegetables	98%	
Capsicum	52%	
Avocado	94%	
Meat and vegetable 'boil-up'	94%	
Meat stew/casserole with vegetables	98%	
Pasta with meat and tomato sauce	90%	
Pasta with cream, white/cheese sauce	96%	
Roast beef, lamb or pork	66%	
Steak	52%	
Boiled corned beef/silverside	52%	
Tinned corned beef	98%	
Liver/liver pate	78%	
Fried chicken/chicken nuggets	62%	
Fried fish/take away fish	86%	
Fish cake, fish fingers or fish pie	56%	
Tinned fish	82%	
Shell fish		60%
Sausages		58%
Luncheon, ham and chicken	50%	
Sausage rolls	80%	
Butter on bread	98%	

(To be continued)

(Contiuned)

Margarine/margarine blend on bread	66%	
Sugar/honey/sugar added to cereal	76%	
Marmite/vegemite	100%	
Mayonnaise/salad dressing	76%	
Gravy	86%	
Pizza		50%
Tinned spaghetti with tomato sauce	86%	
Baked beans	50%	
Cheese	66%	
Cream	96%	
Muesli bars	68%	
Cake		54%
Doughnuts/croissants	54%	
Scones/muffins/sweet buns		56%
Pancake/pikelets	66%	
Fruit pie/fruit crumble/tart	78%	
Pudding	90%	
Custard/custard puddings	96%	
Popcorn		70%
Candy coated chocolate	54%	
Other sweets	54%	
Milk shake	78%	
Milo powder/quik/drinking chocolate	72%	
Powdered fruit drink	92%	
Fruit drink concentrate, cordial	100%	
Mountain dew	90%	
Energy drink	64%	
Sports drink	92%	
Ice blocks		58%
Tea	78%	

4.6 Food and Health Beliefs

Most participant families believed both Chinese traditional medicine such as the Hot and Cold (Yin and Yang) system, and modern nutritional knowledge were relevant when considering the diet and health of their children. Table 4.38 shows the importance they placed on Chinese medicine and modern nutrition.

Table 4.38 Food and Health beliefs of families (%)

category	Chinese medicine (n=50)	Modern nutrition (n=50)
1 (Not important)	4%	2%
2	10%	0%
3	46%	20%
4	24%	44%
5 (Very important)	16%	34%

Thirty-five families (70%) reported they could feel when their children were in "hot" or "cold" conditions (Table 4.39). The "hot" conditions of children felt by the parents were nosebleeding, mouth ulcers, thirst, sore throats, coughing, and dark urine. The "cold" conditions were sore stomachs. When the "hot" conditions occurred, the children's consumption of deep-fried foods, chips, barbecue meats, and sweets was restricted, and the consumption of water, fruits, and vegetables was encouraged. When the "cold" conditions occurred, the consumption of cold foods such as ice cream was restricted, and the consumption of warm water was encouraged.

Table 4.39 The incidence of "hot" or "cold" conditions in the children (%)

Condition	Family number (n = 50)
None	30%
"Hot" but "cold" never/rarely happened	56%
"Hot" or "cold" happened	12%
"Cold" but "hot" never/rarely happened	2%

The families were divided into two groups according to their use of herbs: 54% were in the Cantonese group and 46% were in the Mandarin group. There were 29 families (58% of the total sample) using Chinese herbs in their children's dishes (Table 4.40). Among these families, 27 were from the Cantonese group (100% of the group) and 2 were from the Mandarin group (8.7% of the group). The herbs usually used were Shan Yao, Gou Qi Zi, Qian Shi, Lian Zi, Ku Xing Ren, Chen Pi, Bai He, Fu Ling, Long Yuan, and Zao (see Appendix 9). They usually used the herbs 1-2 times a week (30%) or 1- 2 times a month (24%). The reasons for using herbs was to improve health (58%), to prevent disease (12%),

and to heal or accelerate healing of disease (10%). (The figures did not add up to 58% because some used herbs for several reasons.)

Table 4.40 Use of Chinese herbs of the families [a] (%)

Category	Family number (n =50)
Frequency:	
• 1 – 2 times per week	30%
• 1 – 2 times per month	24%
• 2 – 3 times per month	4%
Reason for taking [b]:	
• Preventing disease	12%
• Improving health	58%
• Healing or accelerating healing disease	10%
Form :	
• Soup	52%
• Soup and Drink	4%
• Other	2%

[a] 58% of the families used the herbs and 42% did not.

[b] The figures do not add up to 58%, because 22% of them used herbs for several reasons.

4.7 Food Purchasing Habits and Influences in the Families

Table 4.41 – 4.51 describe the food purchasing behaviour and influences in the families of the children, and the comparison where appropriate with the families of children (aged 1 – 14 years old) in the Pre-testing of Methodologies for Children's Nutrition Survey of New Zealand (Table 4.44 - 4.51).

Table 4.41 Most usual food shopper in the family* (%)

Family member	Family number (n = 50)
Mother	90%
Father	32%
Grandmother	4%
Grandfather	2%
Other	2%

*The figures do not add up to 100%, because more than one family member shopped most of the time.

Table 4.42 Most usual food preparer time in the family* (%)

Family member	Family number (n = 50)
Mother	64%
Father	22%
Grandmother	34%
Grandfather	12%
Other	2%

*The figures do not add up to 100%, because more than one family member prepared food frequently.

Table 4.43 Importance of three factors when buying Western foods for the children* (%)

Category	Shopping convenience	Easier preparation	Acculturation
1 (Not important)	16%	4%	16%
2	46%	18%	18%
3	16%	12%	34%
4	16%	54%	30%
5 (Very important)	6%	12%	2%

*n = 50.

Table 4.44 Importance of food health when buying foods for the children (%)

Category	Present study (n=50)	Pre-testing study (n=147)
1 (Not important)	0%	0%
2	0%	3%
3	28%	20%
4	32%	33%
5 (Very important)	40%	45%

Table 4.45 Importance of children being willing to eat the food when buying foods for the children (%)

Category	Present study (n=50)	Pre-testing study (n=141)
1 (Not important)	0%	4%
2	4%	1%
3	18%	15%
4	56%	22%
5 (Very important)	22%	57%

Table 4.46 Influence of the children on parents when buying dairy products for the children (%)

Category	Present study (n=50)	Pre-testing study (n=147)
1 (Not important)	0%	15%
2	12%	12%
3	36%	28%
4	30%	21%
5 (Very important)	22%	23%

Table 4.47 Influence of the children on parents when buying fruit and vegetables for the children (%)

Category	Present study (n=50)	Pre-testing study (n=147)
1 (Not important)	4%	20%
2	34%	11%
3	38%	21%
4	18%	20%
5 (Very important)	6%	28%

Table 4.48 Influence of the children on parents when buying bread, cereals, pasta and rice for the children (%)

Category	Present study (n=50)	Pre-testing study (n=147)
1 (Not important)	10%	19%
2	60%	16%
3	22%	22%
4	4%	20%
5 (Very important)	4%	23%

Table 4.49 Influence of the children on parents when buying protein products for the children (%)

Category	Present study (n=50)	Pre-testing study (n=147)
1 (Not important)	14%	29%
2	58%	18%
3	18%	14%
4	4%	14%
5 (Very important)	6%	24%

Table 4.50 Influence of the children on parents when buying snacks for the children (%)

Category	Present study (n=50)	Pre-testing study (n=147)
1 (Not important)	2%	16%
2	6%	19%
3	8%	24%
4	56%	22%
5 (Very important)	28%	19%

Table 4.51 Influence of the children on parents when buying takeaways for the children (%)

Category	Present study (n=50)	Pre-testing study (n=147)
1 (Not important)	2%	22%
2	10%	18%
3	40%	20%
4	38%	17%
5 (Very important)	10%	22%

4.8 Physical Activity Levels in the Children

Table 4.52 – 4.61 show the activity levels of the children before or after school, and the comparison with the children (aged 1 – 14 years old) in the Pre-testing of Methodologies for the Children's Nutrition Survey of New Zealand.

Table 4.52 Time out of bed of the children (%)

Time	Present study (n=50)		Pre-testing study (n=150)	
	Week day	Weekend day	Week day	Weekend day
Before 7.00 am	2%	0%	19%	10%
7.00 – 7.29 am	24%	14%	37%	23%
7.30 – 7.59 am	50%	10%	34%	16%
≥ 8.00 am	24%	76%	11%	51%

Table 4.53 Time to bed of the children (%)

Time	Present study (n=50)		Pre-testing study (n=150)	
	Week day	Weekend day	Week day	Weekend day
Before 8.00 pm	0%	0%	25%	7%
8.00 – 8.29 pm	2%	0%	25%	13%
8.30 – 8.59 pm	16%	4%	25%	13%
≥ 9.00 pm	82%	96%	25%	67%

Tables 4.54 Number of days that children watch TV each week (%)

Day	Present study (n=50)		Pre-testing study (n=150)	
	Week day	Weekend day	Week day	Weekend day
0 day	0%	12%	6%	7%
1 day	6%	12%	1%	9%
2 days	0%	76%	3%	85%
3 days	6%		2%	
4 days	0%		3%	
5 days	88%		85%	

Tables 4.55 Average hours that children watch TV on the days they watch it (%)

Hours	Present study (n=50)		Pre-testing study (n=150)	
	Week day	Weekend day	Week day	Weekend day
< 1 hour	18%	22%	19%	15%
1 - < 2 hours	42%	30%	29%	19%
2 - < 4 hours	40%	38%	29%	29%
≥ 4 hours	0%	10%	23%	38%

Tables 4.56 Number of days that children play computer/video games each week (%)

Day	Present study (n=50)		Pre-testing study (n=150)	
	Week day	Weekend day	Week day	Weekend day
0 day	50%	20%	58%	61%
1 day	8%	46%	8%	8%
2 days	18%	34%	5%	31%
3 days	10%		4%	
4 days	0%		1%	
5 days	14%		24%	

Tables 4.57 Average hours that children play computer/video games on the days they play (%)

Hours	Present study (n=50)		Pre-testing study (n=150)	
	Week day	Weekend day	Week day	Weekend day
0 hour	50%	20%	62%	65%
> 0 – 1 hour	30%	30%	26%	17%
> 1 hour	20%	50%	12%	19%

Table 4.58 Number of days children play outdoors each week (%)

Day	Present study (n=50)		Pre-testing study (n=150)	
	Week day	Weekend day	Week day	Weekend day
0 day	8%	4%	1%	3%
1 day	4%	8%	1%	9%
2 days	12%	88%	1%	87%
3 days	4%		5%	
4 days	0%		1%	
5 days	72%		91%	

Table 4.59 Average hours children play outdoors on the days they play (%)

Hours	Present study (n=50)		Pre-testing study (n=150)	
	Week day	Weekend day	Week day	Weekend day
< 2 hours	88%	26%	26%	15%
2 - < 4 hours	10%	68%	39%	26%
≥ 4 hours	2%	6%	35%	59%

Table 4.60 Method of travelling to school from home and home from school for the children (%)

Way	Present study (n=50)		Pre-testing study (n=150)	
	To school	To home	To school	To home
On foot	42%	54%	41%	48%
By bicycle	0%	0%	6%	6%
By bus	2%	2%	9%	11%
By car	56%	44%	43%	34%
By train	0%	0%	0%	0%
By motorcycle	0%	0%	0%	0%
Other	0%	0%	1%	2%

Table 4.61 Time taken for children to travel from home to school (%)

Time	Present study (n=50)	Pre-testing study (n=102)
< 5 minutes	30%	25%
5 – 15 minutes	58%	56%
16 – 30 minutes	12%	16%
31 minutes – 1 hour	0%	4%
> 1 hour	0%	0%

CHAPTER 5

DISCUSSION

5.1 Characteristic of Participants

5.1.1 The Sample

Full dietary information and anthropometric measurements were obtained for the 50 children interviewed.

5.1.2 Parental Occupation and Work Status

Most fathers were employed in much better jobs in China (according to the ISCO-88 International Standard Classification of Occupations) before immigration than in New Zealand after immigration. The number of self-employed in China (24%) was similar in New Zealand (20%), however, the details of self-employment was not given. Ten percent of the fathers were classified as belonging to Group 5, service workers in New Zealand whereas none were in this group when in China (see Table 4.2).

Sixteen percent failed to produce information about the father's occupation in China, and 18% failed to produce information about the father's occupation in New Zealand. The reason may be that fewer had a better job in New Zealand. Families were not proud of the jobs they had, and some even had no job in New Zealand, so they did not want to answer questions about the job. This situation has been reported in other studies. It was found that, only 26% of former professionals remained professionals in the new country, 29% of the former technicians remained technicians, and 25% remained managers (Lidgard, 1996). The

longer exposure to the new country, the better the employment status of the migrant (Tan, 2000).

There were 94% of fathers and 58% of mothers working full time (see Table 4.3). It seems that, in this study, mothers spend more time at home than fathers.

5.1.3 Income

Because the household income question caused concern in the pre-testing for this survey, only consideration of the budget when buying food for children was used to assess income. Just 12% of the families considered the budget often and 42% of the families considered the budget sometimes when buying foods for the children (see Table 4.4). More families considered the budget than those that never considered it.

People chose foods mostly depending on their economic availability. Higher socio-economic groups are generally reported to consume a greater variety of food stuffs than those lower down the social scale (Marshall, 1995). However, higher economic status may relate to many dietary factors that are not good for health. For example, it is reported that the high levels of dietary fat intake in affluent countries is related to incidence of cancer (Archer, 1996) and arteriosclerosis (Lichtenstein, 1996).

5.1.4 Education Level of Parents

The education levels of the parents of participants were high. As shown in Table 4.6, 100% of fathers and 96% of mothers had finished high school education. There were 88% of fathers and 78% of mothers with tertiary training, and among these parents, 78% of the fathers and 68% of the mothers had a university degree. This could be due to the new immigrant point system, where a high level of qualification and expertise in migrants is required by the New Zealand government. In a survey of the profile of new Chinese

migrants in New Zealand, the result showed that over 61% of the respondents had Bachelor degrees (Friesen and Ip, 1997).

5.1.5 Family Members Living with the Children in New Zealand

As shown in Table 4.6, most of the children (78%) live with the parents and over half of them (54%) live with grandparent(s). Forty-four percent of the children had brother(s) and sister(s).

Twenty two percent of the children lived with one parent. Among these families, 18% were one parent working overseas and just 4% were parents separated. However, all the separated one-parent families were with grandparent(s) living together. Among these 22% children, 20% lived with their mothers. The role of mother for the food choice of children is very important in the one-parent family (Peregrin, 2001).

5.1.6 Time Living in New Zealand for the Children

In this study, most participants (88%) had lived in New Zealand for two or more years (see Table 4.7). The association between arrival time and nutrition situation was not assessed in this study. In another study about the dietary intake and anthropometric measurements of Mainland Chinese women in Auckland (Tan, 2000), 55 subjects were divided into two groups, one having lived in New Zealand for less than two years and the other one having lived in New Zealand for more than four years. It was reported that, there were no significant differences in nutrient intake between these two groups, however, all the mean anthropomtric measurements were higher in the 4-year group than in the 2-year group and the differences of waist and hip circumference were significant.

5.2 Anthropometric Measurements of Children

Compared with their peers in urban Mainland China, the average body height and weight of these migrant Chinese children were higher (see Table 4.11 and 4.12). The same situation was reported in a study about Chinese in North America and China, that Chinese in China weighed less and were leaner than North American Chinese (Lee, 1994). It was also reported that, Chinese infants living in America were significantly heavier and longer than those living in Taiwan (Wu, Daniel, 2001).

The average upper arm circumferences of children in the present study were much higher than those in urban Mainland China (Table 4.13). However, their BMI for age was similar (Table 4.14).

Compared with the European children in the Validation Report (see Table 4.15 ~~and 4.16~~), most anthropometric measurements for the migrant Chinese children were lower. The exception was the triceps skinfold (11.29 and 13.03 for migrant boys and girls, compared with 9.53 and 10.04 for European boys and girls). This, along with the upper arm circumference measurement, indicated that Chinese children had more upper arm fat and less upper arm muscle, although they were shorter and lighter, compared with the European children in New Zealand.

Body composition differs with race, for example, Orientals are usually shorter and lighter than Caucasians (Forbes, 1996). In a study that compared Chinese and Americans, it was reported that Chinese subjects were less heavy, leaner and had a greater percentage of fat free body mass (Jiang *et al.*, 1994). The strong relation between BMI and ethnicity was also found in Australian children (Lynch *et al.*, 2000). In a survey of four groups of children, Mediterranean white, other white, mixed ethnicity and Asian, the results showed that BMI was highest in the Mediterranean white group, then the groups of white and mixed race, and lowest in the Asian group. Large differences in weight-for-height and triceps skinfold were

also found in children from Caucasian, Afro-Caribean and Indo-Pakistani in England (Rona, Chinn, 1987).

Body fat distribution also differs among races. The correlation between BMI and percent of fat and the comparison between six circumferences and eight skinfolds in 455 white and 242 Asian adults were studied. It was found that although Asians had lower BMI, they had more upper body subcutaneous fat than did whites (Wang *et al.*, 1994). A study evaluated the differences between sex and race in fat distribution among prepubertal children of Asian, African-American, and Caucasian. The results showed that the body fat distribution in Asian children was different compared with African-Americans and Caucasians. Asian boys had lower adjusted extremity fat but greater gynoid fat than African-Americans, and Asian girls had lower adjusted extremity and gynoid fat than Caucasians and African-Americans (He *et al.*, 2002).

Further research is needed to investigate the influences of diet and environment on body composition.

5.3 Dietary status of Children

5.3.1 Nutrient Intake

Nutrient intakes are compared with the dietary reference values (DRVs) from United Kingdom and the recommended dietary allowances (RDAs) from United States of America (Ralph, 1999), for the children aged 7 – 10 years (Table 5.1 and 5.2).

Significant Differences between Sexes and Age Groups

Boys' diets were significantly higher in fibre ($p < 0.05$) and total sugars ($p < 0.05$). Older children's diets were significantly higher in cholesterol ($p < 0.05$), vitamin D ($P < 0.05$), and vitamin B6 ($p < 0.05$).

Differences in nutrient intakes between sexes and age groups were also found in other studies. Vitamin D intake was studied in 1768 children and adolescents aged 3, 6, 9, 12, 15 and 18. It was found that the dietary vitamin D intake was highest in the age groups of 9, 15 and 18, and lowest in the groups of 3, 6 and 12 (Lamberg-Allardt *et al.*, 1984). Dietary nutrient intakes were calculated from food records of boys and girls in second and sixth grade (Cook, Payne, 1979). Analyses showed that, second graders consumed better diets than sixth, and boys better diets than girls. In an Edinburgh study, energy and nutrient intakes were assessed in 136 children aged 7 – 8 years (Ruxton and Kirk, 1996). The results showed that boys' diets were higher in energy and some nutrients, however, there were no significant differences between the composition of the diets when nutrient density was examined, suggesting that the differences between boys and girls were only a function of total food intake.

The reason for the differences of nutrient intakes between sexes and age groups was not examined in this study. However, there was no significant difference of anthropometric measurements and BMI between boys and girls. Besides, nutrient needs of boys and girls of the same age differ little in childhood (Dwyer, 1996), and the DRVs and RDAs for boys and girls from birth to 10 years of age are similar for most nutrients.

Energy and Macronutrients

The overall average energy intake of migrant Chinese children was 7711.76 kJ (Table 4.16). The average energy intakes of boys and girls were 8000kJ (97% EAR and 95.6% AEA) and 7374kJ (101.2% EAR and 88.1% AEA), respectively (Table 5.1). The energy intakes of all children were close to or reached their EAR or AEA.

The energy intake of these children was quite similar to their counterparts in urban Mainland China in the 1992 National Nutrition survey (8066.8 kJ for children aged 6 – 11 years, shown in Table 2.5), and in New Zealand in the Validation Report for the children's Nutrition Survey (7570.5 kJ for boys and 8830.3kJ for girls aged 8 – 10 years).

Table 5.1 Energy intake of the migrant Chinese children as a percentage of the dietary reference values (kcal/day)

Sex	UK EAR [1]	EAR%	USA AEA [2]	AEA%
Male	1970	97	2000	95.6
Female	1740	101.2	2000	88.1

[1] EAR, estimated average requirement. [2] AEA, average energy allowance.

The average protein intake of children was 69.3g (244.9% of RNI and 247.5% of RDA, shown in Table 5.1), contributing 15.36% of the energy sources, well above the RNI and RDA values. The protein intake of these children was higher than their peers aged 6 –11 years in urban Mainland China (Table 2.5). In the Validation Report for the Children's Nutrition Survey of New Zealand, the protein intake of children aged 8 – 10 years was 67.3g, 14.6% of total energy for boys and 65.8g, 12.9% of the total energy for girls, lower than the migrant Chinese children. The higher protein intake of Chinese migrant children than their counterparts in New Zealand was more obvious when it was calculated with body weight (2.37g/Kg/day for migrant Chinese children aged 7 – 10 years, compared with 1.79g/kg/day and 1.86g/kg/day for European boys and girls aged 8 – 10 years in New Zealand). A higher total energy from protein in young migrant Chinese women than their counterparts both in Mainland China and New Zealand was also reported in Tan's study (Tan, 2001).

A similar result was outlined when comparing the nutrient density of the diet. The nutrient density for protein was highest in the diets of migrant Chinese children. As shown in Table 4.21, it was 9.0g/1000KJ for migrant Chinese children, compared with 7.9g/1000KJ for urban Mainland Chinese children, and 8.0g/1000KJ and 8.5g/1000KJ for European boys and girls in New Zealand, respectively.

The major source of protein in the Mainland Chinese diet is still cereal, with only 37% coming from animal products and legumes (Ge, 1999; Ye, 1995). It was reported that rice was the leading source, with soybean being the second-highest source of protein for the Korean American living in Chicago (Cross *et al.*, 2002). However, the major sources of

protein in the diet of New Zealand migrant Chinese children were animal products, cereals, and milk products with animal products being the leading source of protein for the children.

The fat intake averaged 62.0g, contributing 29.6% of total energy in the diet of migrant Chinese children. As a result of Western dietary acculturation in Asian migrants, there is an increase in fat consumption. This study shows that these migrant Chinese children had a higher consumption of high-fat foods in comparison to urban Mainland Chinese children of the similar age group where the mean percentage of total energy from fat in this age group varied from 23.4-28.5. However, the fat intake of these children was lower than that of European children in New Zealand. In the Validation Report, the average percentages of energy from fat and saturated fat for 8 – 10 year old boys and girls were 34.9 and 16.3, and 31.4 and 13.8, respectively. Comparing the nutrient density from fat in the diet, the result remained the same, with the urban Mainland Chinese the lowest, migrant Chinese children the next, and the European children in New Zealand the highest (7.3g/1000KJ for urban Chinese children, 8.0g/1000KJ for migrant Children, and 9.4g/1000KJ and 9.6g/1000KJ for European boys and girls in New Zealand, respectively).

The migrant children in this study have shown an increased trend towards high-fat consumption following acculturation. In a study measuring Chinese immigrants' adoption of Western eating patterns, subjects with high scores on the Western scale reported high dietary fat intake (Satia *et al.*, 2001). To investigate the relationship between affluence and coronary risk, the serum cholesterol and dietary fat intake of children in Hong Kong (HK) and in the city of Jiangmen (JM) of Guangdong Province was compared. Fasting serum cholesterol was examined in 94 HK and 99 JM children aged 7 years. Duplicate meals were collected in two subsamples of 20 children, one each from HK and JM and analyzed for their total fat intake and fatty acid profile. The mean (SD) cholesterol of HK children was significantly higher at 4.59 (0.83) mmol/l, compared with that of JM at 4.16 (0.61) mmol/l. The mean dietary fat intake of HK children was higher at 48g, compared with that of JM at 35g. It suggested that the dietary pattern has changed in a society with a rapid developing economy (Leung *et al.*, 1994).

A high intake of fat is of concern not only because of the impact on nutrient density but also because it increases the risk of developing obesity and heart disease when children reach adulthood (Webber *et al.*, 1991). Strategies to lower total fat and saturated fat in diets should begin during childhood (Dwyer, 2000). The Chinese Dietary Guideline that diet should be based on cereal (The Chinese Nutrition Society, 1999) should also be stressed to migrant Chinese group.

The average carbohydrate intake of children was 252.8g. The mean percentage of food energy derived from carbohydrate was 52.5%, higher than the RNI (50%) and meeting the RDA (> 50%) for adults. The migrant Chinese children had the similar mean fibre intake to their New Zealand counterparts (13.1g for migrant Chinese children, compared with 13.4g and 15.5g for European boys and girls, respectively). However, migrant Chinese children had a substantially lower total mean sugar intake than the European children in New Zealand (81.3g for migrant Chinese children, compared with 114.1g and 147.3g for European boys and girls, respectively).

Micronutrients

Mean intakes of most micronutrients for the migrant Chinese children met or exceeded the UK RNI or US RDA, but there were some exceptions (Table 4.16 and Table 5.2). The inadequate vitamin A intake was shown in this study.

Average vitamin A (retinol equivalents) of migrant Chinese children was below the US RDA (68.5%). Although the mean intake of vitamin A was close to the UK RNI (95.9%), the median intake of vitamin A was 381.7g, 76.3% of the RNI. A low intake of vitamin A was also found in Mainland Chinese children (Ye, 1995). In the Validation Report, the mean intake of vitamin A for European children aged 8 – 10 years in New Zealand met the RNI (944.7μg for boys and 577.6μg for girls, respectively), however, the lower quartile value for boys (400.8μg) and medium value for girls (408.6μg) were also lower than the RNI. An inadequate (marginal) vitamin A status is still a problem for millions of children in the

world (Olson, 1996). Therefore, foods rich in vitamin A should be recommended for migrant Chinese children.

The average vitamin E intake of migrant Chinese children was 82.9% of the RDA. There was no RNI for children aged 7 – 10 years. In the Validation Report, the mean intake of vitamin E for European boys and girls aged 8 – 10 years was 95.7% and 112.9% of the RDA, respectively, higher than the Chinese migrant children.

The mean calcium intake of migrant Chinese children was 76.3% of the RDA, however, it was above the RNI (111% of the RNI). These children had a similar energy intake to their peers both in Mainland China and New Zealand. When comparing the nutrient density of calcium in the diet (Table 4.20), migrant Chinese children had the highest nutrient density, 79.7mg/1000KJ compared to 46.2mg/1000KJ for Mainland Chinese children, and 63.7mg/1000KJ and 67.0mg/1000KJ for European boys and girls, respectively. Calcium deficiency is a major nutritional problem in Mainland Chinese children (Ge, 1999; Ye, 1995). An inadequate intake of calcium was also found in migrant Chinese women in New Zealand (Tan, 2001). However, calcium deficiency in the migrant Chinese children in this study seems unlikely.

The average zinc intake of migrant Chinese children was above the RNI (125% of RNI), although it was under the RDA (87.5% of RDA). Comparing the nutrient density of zinc in the diet, the children in Mainland China had the highest nutrient density of zinc, and the migrant Chinese children had the similar nutrient density to the European children in New Zealand (1.1mg/1000KJ for the migrant Chinese children, compared 1.4mg/1000KJ for Mainland Chinese children, and 1.1mg/1000KJ and 1.3mg/1000KJ for European boys and girls, respectively).

The average iron intake of migrant Chinese children was well above the RNI (135.7% of RNI) and RDA (118.1% of RDA). However, the lower quartile value of these children was 89% of the RDA. Comparing the nutrient density of iron in the diet, the children in

Mainland China had the highest nutrient density of iron, and the migrant Chinese children had a similar nutrient density of iron to the European children in New Zealand (1.5mg/1000KJ for the migrant Chinese children, compared with 2.5mg/1000KJ for Mainland Chinese children, and 0.9mg/1000KJ and 1.1mg/1000KJ for European boys and girls, respectively). Iron needs are greatest during periods of rapid growth. Diets in which cereals and legumes predominate and that are low in animal tissue protein and ascorbic acid are typical of the traditional Chinese diet. This kind of diet has low-absorbed value of iron (Yip and Dallman, 1996). Although the leading source of iron in the migrant Chinese children was still cereals, the dietary pattern has changed with immigration. They had a higher protein intake than their counterparts both in Mainland China and New Zealand, with animal products being the leading source of protein. It is well known that meat is excellent source of iron because haem iron is more readily absorbed than that from many other dietary sources.

Table 5.2 Comparison of the mean nutrient intake/day of the migrant Chinese children with dietary reference values (percentage)

Nutrient	UK RNI [1]	RNI%	USA RDA [2]	RDA%
Protein	28.3 g [3]	244.9	28.0 g	247.5
Vitamin A Eq	500 μg	95.9	700 μg	68.5
Vitamin D	0 μg [4]	-	10 μg	13.6
Vitamin E	-	-	7 mg	82.9
Vitamin C	30 mg	357.7	45 mg	238.4
Thiamin	0.7 mg	205.7	1.0 mg	144
Riboflavin	1.0 mg	140	1.2 mg	116.7
Vitamin B6	1.0 mg	128	1.4 mg	91.4
Folate	150 μg	113.7	100 μg	170.6
Vitamin B12	1.0 μg	391	1.4 μg	279.3
Calcium	550 mg	111	800 mg	76.3
Sodium	1200 mg	191.9	-	-
Iron	8.7 mg	135.7	10 mg	118.1
Zinc	7.0 mg	125	10 mg	87.5

[1] RNI, reference nutrient intake.

[2] RDA, recommended dietary allowance.

[3] Based on egg and milk protein; assume complete digestibilty.

[4] If exposed to the sun.

5.3.2 Serving Size of Commonly Consumed Foods

There is difference between food patterns in children with different cultural backgrounds. The migrant Chinese children in the study still maintained some of their traditional food habits. The serving size of some foods eaten by Chinese children was quite different from the common standard measure or serving size for foods eaten by European children (Table 4.21). Designs of food frequency questionnaires and food records and recalls using common serving sizes as a measure of intake need to take these ethnic differences into account. For example, the serving size for breakfast cereals was 30 – 45g for New Zealand European children, however, the average consumed size of breakfast cereals each meal was just 23.8g for the migrant Chinese children because of their lower consumption of breakfast cereals. Besides, foods cooked in different ways can have different energy and nutrient contents. As shown in Table 2.3, one cup of rice cooked in the Chinese way has a higher energy and nutrient content than that cooked by the European method using more water. Therefore, the serving size of rice was measured using the raw rice weight in this study.

5.4 Dietary Behaviors of Migrant Chinese Children

5.4.1 Change of Food Habits

For the children in this study, breakfast and especially lunch at school, were the meals mainly "Westernized".

Three factors influencing change in food choice were looked at in this study: easier preparation, shopping convenience and acculturation (Table 4.43). When buying Western foods for the children, only 'easier preparation' was thought most important. Many Chinese foods are available in Auckland. However, most of the children's breakfasts and school lunches were "Westernized" even when Chinese food was readily available. Food habits changed when only about one third of parents thought that acculturation was very important.

It seems that the food habits of the children had to partly change in the new land. The present study showed a strong influence of cultural change on food choice.

Food habits change rapidly in the young who are at school. The number of children eating a Western breakfast and lunch at school were 86% (including mixed diet) and 100% respectively (see Table 4.22 and 4.23). Because nutrition education provides one method of promoting healthy eating behavior (Carter, 1996), introducing healthy Western diets at school for migrant children during their diet transition may help them form healthy Western eating habits.

5.4.2 Maintenance of Traditional Foods

While Western culture changed some of the food habits of these migrant Chinese children, dinner was mainly Chinese traditional foods. This contributes to the maintenance of Chinese culture.

Meals at home for school-aged children are almost the same as those for adults. They sit before the table with their families, have their own bowls of fan, and help themselves to *tsai* from the accompanying serving dishes. Today in most urban areas of China, parents usually keep an eye on what and how much their children eat during the meal. They add (or reduce in some specific situations) the amount of their children's *fan*. They let their children eat the *tsai* that they think the children should eat by encouraging repeated exposure (e.g., don't forget to drink the milk), teach nutritional knowledge (e.g., vegetables are good for you), or help by putting *tsai* directly into their children's bowls or dishes.

5.4.3 Comparison of Food Group Intake

Most participant children consumed a variety of all foods. The exception was two (4%) who did not drink milk or did not use any kind of milk. The consumption level of the different

food groups in the children was different to that in the Validation Report for Children's Nutrition Survey of New Zealand. This difference reflected cultural differences.

European children in New Zealand ate more fruit. There were 59.4% of European children, but just 38% of migrant Chinese children taking 2 helpings or more of fruits per day (Table 4.25). European children in New Zealand also ate more vegetables. There were 20.6% of European children but just 10% of migrant Chinese children taking 3 helpings or more of vegetables per day (Table 4.26). Fruit and vegetables are common sources of provitamin A carotenoids. The lower intake of fruit and vegetables of migrant Chinese children may be one of the reasons their vitamin A intake was lower than the European children in New Zealand.

The migrant Chinese children ate more cereals. There were 94% of migrant Chinese children but 58.7% of European children eating 3 – 4 helping or more of cereals per day. No migrant Chinese children, but 2.2% of European children did not eat cereals (Table 4.27). This suggests that rice and noodles remained as staple foods for the migrant children.

Only 5.4% of European children but 36% of migrant Chinese children did not eat breakfast cereals (Table 4.28). Breakfast cereals were not popular among the migrant Chinese children.

Bread was not a popular food with the migrant Chinese children either. There were 22.8% of European children but just 4% of migrant Chinese children taking 5 – 6 helping or more bread per day (Table 4.29). Most of the European children and Chinese children (73% of European children and 82% of migrant Chinese children) consumed white bread (Table 4.30).

Fat was less often used as a spread by the Chinese migrant children. There were 93.9% of European children but just 38% of migrant Chinese children who used fat spread on bread (Table 4.34). The number of children who used polyunsaturated margarine was similar

(31.4% of European children and 30% of migrant Chinese children), but more European children (16.3%) used butter than migrant Chinese children (2%). It seems that, European children had more chance to have higher fat and saturated fat intakes than the migrant Chinese children.

Milk consumption was lower in the migrant Chinese children. There were 40.7% of European children but just 8% of migrant Chinese children taking 3 helpings or more of milk and milk products per day (Table 4.31). The number of children who consumed standard homogenized milk and calcium milk was similar (69.7% of European children and 78% of migrant Chinese children for standard homogenized milk, and 11% of European children and 10% of migrant Chinese children for calcium milk). However, There were 28.1% of European children but just 12% of migrant Chinese children taking reduced fat, trim or super trim milk (Table 4.32).

Intake of protein products was higher in the Chinese children. There were only 8.7% of European children but 40% of migrant Chinese children taking 3 – 4 helpings or more of protein products per day. None of the migrant Chinese children, but 18.5% of European children ate less than 1 helping of protein products per day (Table 4.33). The higher protein intake of the migrant Chinese children than their counterparts in New Zealand should be due to this higher protein product intake.

Seventy percent of European children and 100% of migrant Chinese children had salt added to food during cooking. However, 42% of European children and four percent of migrant Chinese children had salt added to food during eating usually or sometimes (Table 4.35).

Dietary supplement intake was similar (Table 4.36) for the European children (16.3%) and migrant Chinese children (22%). No migrant Chinese children took fluoride tablets. While most of the parents (88%) knew about fluoride, few of them were aware of the fact the fluoride is added to the water supply in most areas of Auckland. This suggests that nutrition information designed for migrant Chinese may not be sufficient in New Zealand.

5.5 Food and Health Beliefs

When considering the importance of Chinese medicine and modern nutrition knowledge to the health of their children, more parents (78%) thought modern nutrition knowledge was more important, compared with those (40%) thinking Chinese medicine more important (Table 4.38). This could be connected with the parents' higher education background (Table 4.5) that made them have more knowledge about modern nutrition than the traditional folk nutrition knowledge.

While parents realized the importance of modern nutrition, most of them still applied the ancient Chinese philosophies applying to food and health to their children. As shown in Table 4.39, 70% of the parents could feel their children in "hot" or "cold" conditions. Among these parents, 56% just felt "hot" but never or rarely "cold" conditions. This verifies the Chinese theory "children are pure Yang bodies", which means that children grow fast and Yang ("hot") conditions usually occur in children (Jiang, 1997).

This 70% of parents used dietary restriction and encouragement when their children were in hot" or "cold" conditions. When the children were in "hot" condition, the restricted foods were deep-fried foods and barbecue meats, high caloric foods belonging to Yang, and the encouraged foods were water and fruits, low caloric foods belonging to Yin. When the children were in "cold" condition, the restricted foods were fruits, considered cold belonging to Yin, and the encouraged foods were hot water used for maintaining the body heat so they belong to Yang. The parents used Yin foods to treat Yang conditions and Yang foods to treat Yin conditions, also, they restricted Yang foods to treat Yang conditions and Yin foods to treat Yin conditions.

Chinese migrants in America also perform "hot" and "cold" system home preventive treatments routinely. They eat more "cold" and cooling foods in hot weather and consume soups and special dishes with herbs in cold weather. People in a naturally "cold" state (old people, new mothers, or people with a cold condition) are more careful to avoid "cold"

things. Young, active people who are believed to have warmer bodies are given more "cold" foods (Martin and Ngin, 1981).

The belief that the food is medicine is especially common among the Cantonese. In this study, 100% of the Cantonese families used herbs in their children's dishes (Table 4.40) to improve health, prevent disease, and heal or accelerate healing of disease. The safety and efficacy of some herbs is questionable in the scientific area (Wynne, 2001). In one study it was asked what risks are involved with the herbal foods, whether they are effective, and whether they are "functional foods" (McCaffree, 2001). However, these parents reported that they used the herbs in the diet in the traditional recipes. They thought these food-herb remedies were effective, safe and had no adverse side effects. It is true that, "natural" does not always mean safe, however, traditional foods have been tested for many centuries on thousands of people (Polunin, 1997).

5.6 Food Frequency Questionnaire

The accuracy and applicability of the food frequency questionnaire designed to assess nutrient intake in New Zealand European, Maori and Pacific has been assessed when used in migrant Chinese children in this study. Among the 134 questions about 116 items of food, 62 (49.27%) questions were answered "never or less than once a month" or "1 – 3 times a month" by 50% or more of the children (Table 4.37). According to this high ratio, almost half of the food items in this questionnaire were not foods routinely eaten by the migrant Chinese children. Therefore, this questionnaire can not be said to be appropriate for this group. As the Chinese make up 2.6% of the New Zealand population, the relevance of this questionnaire in accurately analyzing the nutrient intake of this section of our population in the Children's Nutrition Survey must be questioned. Food frequency questionnaires are not useful for population groups who do not consume foods on the list (Dwyer, 1996).

5.7 Food Purchasing Habits and Influences in the Families

Chinese parents take a more dictatorial stance to children's nutrition than European parents. This stance can be seen in the migrant Chinese families in this study, when their results are compared with the Pre-testing Study for the Children's Nutrition Survey.

When buying foods for the children, the number of parents thinking 'importance to health' was similar (Table 4.44), 72% on the scale of 4 – 5 for the present study and 78% on the scale of 4 – 5 for the pre-testing study. However only 22% of the families in the present study compared to 57% in the pre-testing study thought that children 'willing to eat' the foods was important (table 4.45). Hence while all families thought that the health of food was very important for the children, more European families put importance on the willingness of children to eat the food.

When buying dairy products for the children, there was little difference in influence between the two studies (Table 4.46). However, when buying fruits, vegetables, bread, cereals, pasta, rice, and protein products, more European families thought the children had an important influence (Table 4.47 – 4.49). When buying snacks, 84% of the migrant Chinese families thought the children's influence was very important compared with the 41% of the European families (Table 4.50). When buying takeaways, the number of migrant Chinese families thinking that their children's influence was 'not very important' was less than the European families (Table 4.51); 12% for the migrant Chinese families and 40% for the European families.

It seems that, except for dairy products, European children had more influence on foods purchased for main meals than the migrant Chinese children. But the migrant Chinese children had more influence on the purchase of snacks and takeaways than the European children. In other words, migrant Chinese parents had more control on the foods in the main meals, but they preferred to cheer up their children with the snacks and takeaways.

In this study, 'mother' was the main family member who did the shopping and prepared most meals. As shown in Table 4.41 and 4.42, 90% of the mothers did the shopping most of the time, and 64% of the mothers prepared the meals most of the time. Women are sometimes regarded as "gatekeeper" in food choice (Mclntosh and Zey, 1998). In this study, the mothers played a very important role in the food choice of their Chinese children. This dictatorial stance to children's nutrition based on Chinese cultural and social values should be considered when making nutrition recommendations, designing nutrition education materials, and counseling migrant Mainland Chinese families about nutrition.

5.8 Physical Activity

The benefits of physical activity to health and fitness, and normal growth and development are not debated (Hills, 1995). It is suggested that children should take part in physical activity each day at school, at home, and in the wider community (Ministry of Health, 1997).

Limited data are available on physical activity levels of New Zealand children (Ministry of Health, 1997). In this study, the activity levels of migrant Chinese children before or after school have been assessed, in comparison with the children in the Pre-testing Methodologies for the Children's Nutrition Survey of New Zealand.

5.8.1 Sleeping

Overall, the migrant Chinese children were later to bed and later out of bed compared to the European children. During the week, 74% of migrant Chinese children and only 45% of European children were out of bed at, or after 7.30am (Table 4.52), and 82% of migrant Chinese but 25% of European children went to bed at, or after 9pm (Table 4.53). During the weekend, 86% of migrant Chinese children but 67% of European children were out of bed at, or after 7.30am (Table 4.52), and 96% of migrant Chinese but 67% of European children went to bed at, or after 9pm (Table 4.53).

5.8.2 Watching TV

Overall, migrant Chinese children spent less time watching TV than European children. As shown, in Table 4.54 and 4.55, although there was no obvious difference in the number of weekdays and weekend days children watched TV, no migrant Chinese children, but 23% of European children watched TV for 4 or more hours each weekday, and 10% of migrant Chinese children but 38% of European children watched TV for 4 or more hours each weekend day.

5.8.3 Playing Computer or Video Games

The migrant Chinese children spent more time playing computer or video games than the European children. There was no obvious difference between the two groups of children playing computer or video games at during weekdays. However, during the weekend, 80% of migrant Chinese children but just 39% of European children played computer or video games on one or two days, and 50% of migrant Chinese children but 19% of European children played computer or video games more than one hour each weekend day (Table 4.56 and 4.57).

5.8.4 Playing outdoors

The migrant Chinese children spent less time playing outdoors than the European children did. During the weekdays, 72% of migrant Chinese children and 92% of European children played outdoors for 4 or 5 days (Table 4.58), but just 12% of migrant Chinese children compared to 84% of European children played outdoors for 2 or more hours each weekday (Table 4.59). Just 6% of migrant Chinese children compared to 59% of European children played outdoors for 4 or more hours each weekend day (Table 4.59).

5.8.5 Travelling Home and School

There were not many differences in the time taken and the method of transport to and form home to school between the migrant Chinese children and European children. Overall, the time taken for these two groups of children to travel from home to school was mainly less than 15 minutes (Table 4.61). Travel was mainly on foot or by car (Table 4.60).

5.8.6 Physical Activities

The number of children who participated in physical activities before or after school was similar in the present study and the pre-testing study.

5.8.7 Summary

The recommended level of physical activity for children is 30 – 60 minutes of moderate intensity physical activity each day, including spontaneous play, physical education, organized games and sport, as well as lifestyle factors (walking or cycling to school) and domestic activities (Ministry of Health, 1997). Although the variety of activity levels of migrant Chinese children may be different from those of European in New Zealand, combining home and school activities, these migrant children should have achieved the recommended activity level. However overall the activity levels of the Chinese children were lower their counterparts in New Zealand.

Chapter 6

Conclusions and Recommendations

In summary, the average body height and weight of the migrant Chinese children were 131.80cm and 29.21Kg respectively, higher than their peers in Mainland China. The underweight rates and over weight rates was 0% and 2%, respectively. Each anthropometric measurement was higher in 9 – 10 year old children than 7 – 8 year old children, but only the differences between weight ($p < 0.001$), arm circumference ($p < 0.005$), and elbow width ($p < 0.001$) were significant.

Except the triceps skinfold, most anthropometric measurements for the migrant Chinese children were lower than the European children in New Zealand.

Although growth and development of children are affected by many factors, nutrition should be one of the most important ones. It is crucial that migrant children during their diet transition adopt healthy western food habits.

The overall average energy intake of migrant Chinese children was 7712KJ, close to or reached their EAR or AEA. The average protein intake of children was 69.3g, well above the RNI and RDA values. Mean protein intake in the migrant Chinese children was higher than their New Zealand and Mainland Chinese counterparts. Mean percentages of food energy derived from fat and saturated fat were 29.6% and 12.8% compared with RDV of 35 and 11, and RDA of <30 and <10. The percentage of total energy from fat in migrant children's diets was higher than that in Mainland Chinese children. This study shows a trend toward consuming more high-protein and high-fat foods by migrant Chinese children. Therefore, high intakes of animal products and fat should be discouraged, and diets based on cereal in traditional Chinese style should be encouraged.

The mean percentage of food energy derived from carbohydrate was 52.5%, higher than the RNI and meeting the RDA for adults. The migrant Chinese children had a similar mean fibre intake to their New Zealand counterparts (13.1g for migrant Chinese children, compared with 13.4g and 15.5g for European boys and girls, respectively). However, migrant Chinese children had a substantially lower total mean sugar intake than the European children in New Zealand (81.3g for migrant Chinese children, compared with 114.1g and 147.3g for European boys and girls, respectively).

Mean intakes of most micronutrients were meet or in excess of the UK RNI or US RDA, except vitamin A Eq (95.5% of RNI and 68.5% of RDA). Foods rich in vitamin A should be recommended for the migrant Chinese children. Calcium intake should be also improved in the diet of migrant Chinese children.

The food frequency questionnaire designed to assess nutrient intake in New Zealand European, Maori and Pacific children was found to be not applicable to migrant Chinese children.

The weight of foods mainly consumed in the meals (serving size) of migrant Chinese children was calculated in this study. These findings will be useful in future dietary surveys on migrant Chinese children where intake is recorded in terms of servings of different foods.

For the children in this study, breakfast and lunch at school, especially lunch at school, were the meals first "Westernized". Dinner of the children mainly maintained Chinese traditional foods. The migrant Chinese children ate less fruit and vegetables, breakfast cereals, bread, spreads and milk products than European children in the Validation Report, but more cereals (rice and noodles) and protein products. School changed the food habits of the migrant Chinese children most, therefore, introducing healthy Western diets at school for migrant children during their diet transition may help them form healthier Western style eating habits.

While parents of the children realized the importance of modern nutrition, most of them still applied the ancient Chinese philosophies regarding food and health to their children. Seventy percent of parents could feel their children in "hot" or "cold" conditions and used dietary restriction or encouragement when their children were in these conditions. One hundred percent of the Cantonese families used herbs in their children's dishes. These cultural preferences should be considered when making nutrition recommendations for migrant Chinese children.

Through the lifestyle of the migrant Chinese families, in a comparison with these in the pre-testing study for the Children's Nutrition Survey of New Zealand, it can be seen that these Chinese families took a more imperative stance to children's nutrition. Furthermore, the mothers had a very important influence on the food choice of migrant Chinese children. The importance of mother's influence on Chinese children's eating habits should also be considered when making nutrition recommendations for this ethnic group.

The migrant Chinese children achieved the recommended activity levels. However they were less active than European New Zealand children and the time spent on various activities was different.

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Appendix 1 Chinese Supermarkets and Restaurants in Auckland

The information on each supermarket and restaurant listed here is from name cards of supermarkets and restaurants, Yellow Pages of Telecom New Zealand, and the advertisements in Chinese newspapers.

Table I Main Chinese Supermarkets in Auckland

Name	Address	Telephone
Botany Garden & Orchard	308 Te Irirangi Dr., ETmki	09 272 1168
Fruit World	313 Lincoln Rd., Hendn	09 838 8166
	290 Ti Rakau Drv., ETmki	09 274 0878
	26 Saleyards Dr., Otahu	09 276 2119
	CNR Rankin & Margan Ave., Newln	09 827 9993
	185 Apirana Ave., Glnln	09 528 8878
	CNR State Hight Way 1 & East Coast Rd., Svdle	09 426 8883
Happy Super Market	660 Dominion Rd., Balmoral	09 623 8220
Lim Chhour Garden & Orchard	3 Edsel St., Hendn	09 835 2588
Lim Supermarket Centre	949 New North Rd., MtAlb	09 845 2588
Sam's Chicken LTD	11/29 Aviemore Dr., HihgP	09 533 8396
	949 New North Rd., MtAlb	09 845 2381
Seafood Harbour	949 New North Rd., MtAlb	09 529 0222
Silver Bell Market	83 Dominion Rd., MtEdn	09 630 2900
	519 Ellerslie Parmure Highway, Panmu	09 570 9966
SongKee Veg and Fruit	5-11 Kent St., Nwmkt	09 520 6288

(To be continued)

(Continued)

Soung Yueen & Co.Ltd.	235 Hobson st., City	09 373 4936
	424 Great South Rd., Otahu	09 276 9713
Sunny Nook Fruit & Veges	7/20 Link Dve., Glnfd	09 443 1999
Tai Ping Trading Company Limited	105-111 Beach Rd., City	09 377 4903
	8 Gooch Pl., Hwick	09 534 3813
	26 Saleyards Rd., Otahu	09 276 7159
	35 Pearn Cre., Ncote	09 480 8408
	181 Apirana Ave., Glnln	09 578 0452
T-Mark Supermarket	4-6 Short St., Nwmkt	09 522 2158
	9/29 Aviemore Dve., HihgP	09 537 0158
	3/20 Link Dve., Glnfd	09 442 1158
Tofu Shop	290 Ti Rakau Dve., ETmki	09 273 9363
	89 Dominion Rd., Mt Edn	09 631 0016
	19 Pearn Cre., Ncote	09 480 8067
	Pioneer Plaza, Hendn	09 836 0616
Vegie World	26 Saleyards RD., Otahu	09 276 2119
	313 Lincoln Rd., Hendn	09 838 8166
	88-96 Gt South Rd., Takni	09 296 2500
	54 Northcote Rd., Ncote	09 480 0980
	290 Ti Rakau Drv Etmki	09 274 0878
	cnr Rankin Ave. & Margan Ave., Newln	09 827 9993
	185 Apirana Ave., Glnin	09 528 8878
	261 Great South Rd., Elsle	09 524 8668
Whenuapai Gardens & Orchard	76-82 Atkinson Ave., Otahu	09 276 9537
	533 Great South Rd., Ptoe	09 278 0233

Table II Main Chinese restaurants in Auckland (fully licensed)

Name	Address	Telephone
Buffet House	527 East Coast Rd., BnsBy	09 478 6844
Ding Hao Chinese Restaurant	55 Albert St., City	09 358 4838
Dragon Boat Restaurant	7-37 Elliott St., City	09 379 6996 09 379 0283
Dynasty Chinese Restaurant	57-59 Wakefield St., City	09 534 2272 09 534 2072
Emperor Chinese Restaurant	39 Beach Rd., City	09 377 6207
Enjoy Inn Chinese Restaurant	530 Great South Rd., Grnln	09 525 1288
Golden Seaview Chinese Restaurant	72-74 Mokoria Rd., Bhead	09 419 8138
Grand Harbour Chinese Restaurant	18-28 Custom St., West, Viaduct Harbour, City	09 357 6889
Hees Garden Chinese Seafood Restaurant	599 Mt Eden Rd., Mt Edn	09 630 0785 09 630 0786
Highgate Restaurant	10/16 Gooch Pl., Hwick	09 535 0388
High Woh Chinese Restaurant	Unit/90 Whitford RD., Hwick	09 537 2388
Hong Kong Chinese Seafood Restaurant	164 Gt South Rd., Remra	09 524 4756
Imperial Sichuan Restaurant	164 Parnell Rd., Parnell	09 308 9689
Joyful Chinese Restaurant	299 Manukau Rd., Epsom	09 623 8188
L.A. Restaurant	440 Khyber Pass Rd., Nwmkt	09 523 3218
Lee Garden Restaurant	Level 2, 17 Aviempre Dve., Hwick	09 537 4266
Lotto Chinese Restaurant	27 Kindon St., Nwmkt	09 529 9308
Mandarin Seafood Restaurant	Cnr Albert & Victoria St., City	09 377 2886
Marco Polo Chinese Restaurant	17c, Link Dve., Glnfd	09 443 8277
Ming Court	Level 1, Sky City, Cnr Victoria & Federal St.	09 363 6000

(To be Continued)

(Continued)

New Market Chinese Kitchen	1st floor 424 khyber pass Rd, Nwmkt	09 529 0988
New Mong Kok Special Seafood Chinese Restaurant	B1-B2, Half Moon Bay, Marina	09 534 2272 09 534 2072
New Orient Chinese Restaurant	Strand Arcade, 233 Queen St., City	09 379 7793
North Garden Seafood Restaurant	Level 2, Mid City Centre, 239 Queen St., City	09 366 7128 09 309 4619
Paradise Chinese Restaurant	141 West Coast Rd., GlenE	09 818 6142
Pearl Garden Dim Sim Restaurant	1 Teed St., Nwmkt	09 523 3696
Peking Swallow Chinese Restaurant	555 Mt Albert Rd., MtRki	09 625 4620
Penny City Chinese Restaurant	Shop A8 125 Meadowland Dve., Hwick	09 537 1256
Red Lantern Chafing Dish City	117 Beach Rd., City	09 366 1898 09 373 5228
Red House Restaurant	897 New North Rd., MtAlb	09 849 2398
Sichuan Restaurant	50B Cavendish Dve., MkauC	09 263 7273
Sing Court Restaurant	775 New North Rd., MtAlb	09 846 8242
Swan Sun Chinese Restaurant	264 Swansun Rd., Hendn	09 837 3648
Tasty Zone Chinese Restaurant	Shop K 2-8 Torrens Rd., ETmki	09 272 8583
The Rendezuous Chinese Restaurant	148 Hobson Sr., City	09 356 6912
Trend East Chinese Restaurant	9 Sharkey St., Mnkau	09 263 6338
Yee Hing Restaurant	262 Great South Rd., Ptoe	09 278 3489

Appendix 2 Chinese Herbs

The information of each herb foods listed here is from *Traditional Chinese Functional Foods* (Huang and Huang, 1999), *Chinese Drugs of Plant Origin* (Tang, Eisenbrand, 1992), and *Traditional Chinese Drugs* (Ling *et al.*, 1984). For the safety classification, four classes are defined as follows (Huang and Huang, 1999):

Class 1: items that can be safety consumed when used appropriately.
Class 2: items for which the following use restrictions apply, unless otherwise directed by an expert qualified in the use of the described substance:
2a: for external use only.
2b: not be used during pregnancy.
2c: not to be used while nursing.
2d: other specific use restriction as noted.
Class 3: items for which significant data exist to recommended the following labeling: "To be used only under the supervision of an expert qualified in the appropriate use of this substance." Labeling must include proper use information: dosage, contraindications, potential adverse effects and drug interactions, and any other relevant information related to the use of this substance.
Class 4: items for which insufficient data is available for classification.

Rhizoma Diosacoreas (Shan Yao. Figure 1)

Family: Dioscoreaceae.
Scientific Name: Dioscorea opposita Thunb, D.batats Decaisne.
Other Common Names: huai shan, huao shan yao, shan shu (mountain tuber); wild yam, Chinese yam.
Properties: neutral in nature; pleasant to taste. Safety class: 1.
Chemical Components: saponin, phlegm (mannan and phytic acid), starch (16%), glucoprotein, amino acids, *d*-abscisin II, polyphenoloxidase, vitamin C, and 3,4-dihydroxyphenylethylamine.

Medicinal Action: strengthens the spleen; tonifies the lungs; reinforces the kidney.

Therapeutic Uses: for treatment of chronic enteritis, dysentery, poor indigestion, asthma, "wet dreams", excessive perspiration, leukorrhea, and neurasthenia.

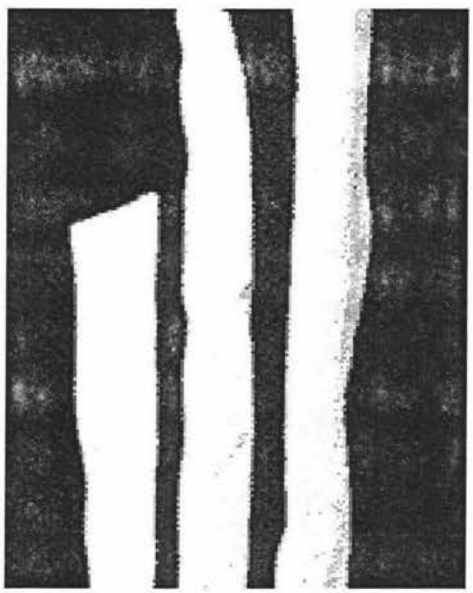


Figure 1 Example of Rhizoma Diosacoreae

Semen Armeniaceae Amarum (Ku Xing Ren. Figure 2)

Family: Rosaceae.

Scientific Name: Prunus armeniaca L.var. ansu. Maxim., P. sibirica L., P. manshurica (Maxim.) Koehen, P. armeniaca L.

Other Common Names: "bitter almond" used for P. dulcis (Mill) D.A. Webb var . Amara (DC.) H.E. Moore, while apricot, or xingren, is used for P. armeniaca L.

Properties: warm in nature; bitter to taste. Safety class: 3.

Chemical Components: amygdalase and amygdalin (cyanogenic glucoside, up to 8.0%).

Medical Action: resolves phlegm; quiets cough; lowers excessive energy; the fat from almonds can lubricate the intestines. A small quantity of cyanic acid (HCN), produced from amygdalin by amygdalase and pepsin of gastric jiuce, can stimulate the respiratory center

and produce a tranquilizing effect (i.e., antitussive and antiasthmatic effects). Overdosage can cause cyanide intoxication, especially in children.

Therapeutic Uses: for treatment of cold and coughing, unproductive coughing, constipation, dyspnea, and asthma.

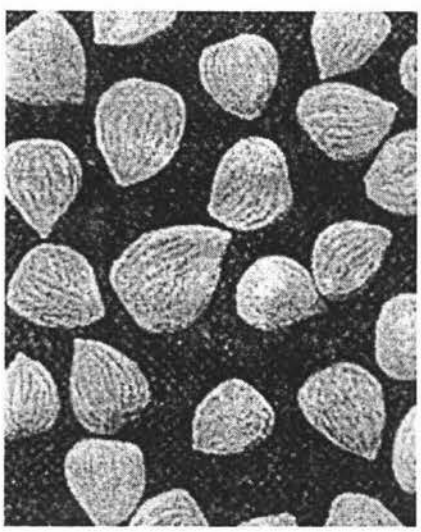


Figure 2 Example of Semen Armeniaceae Amarum

Semen Euryales (Qian Shi. Figure 3)

Family: Nymphaeaceae.

Scientific Name: Euryale ferox Salisb.

Other common Names: chi-toulien (chicken-head water lily), euryale seed, fox nut.

Properties: neutral in nature; pleasant, yet acrid to taste. Safety class: 1.

Chemical Components: protein, lipid, carbohydrate (starch), and vitamins.

Medicine Action: fortifies the spleen; strengthens the kidneys; stops diarrhea and seminal emission.

Therapeutic Uses: for treatment of diarrhea, incontinence, seminal emission, leukorrhea, joint pains in lower extemities, and backache.

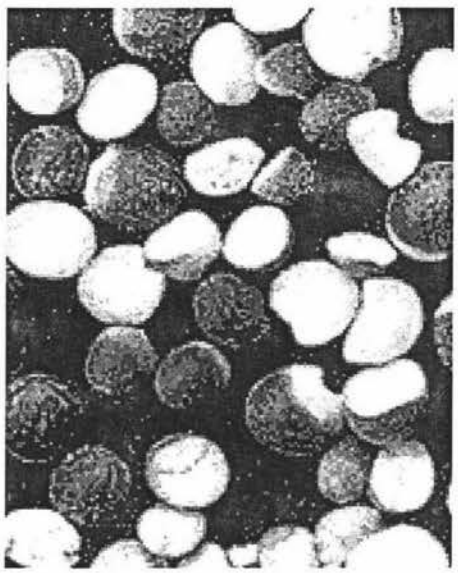


Figure 3 Example of Semen Euryales

Semen Loti (Lian Zi. Figure 4)

Family: Nymphaeaceae.

Scientific Name: Nelimbo nucifera Gaertner, Nelumbium nelumbo, Nelumbium speciousum, Nymphaea nelumbo.

Other Common Names: lotus seed.

Properties: The seed (including plumule and radicle may taste bitter and cold in nature) is neutral in nature; pleasant, yet astringent to taste. Safety class: 2d (but the plumule is classified as Class 1).

Chemical Components: alkaloids, including liensinine, isoliensinene, neferine, lotusine, methylcorypalline, and demethyl-coclaurine.

Medical Action: strengthens spleen; cultivates the heart; controls peristalsis; stabilizes sperm (seminal control); removes "heat"; has antihypertensive and tranquilizing effects.

Therapeutic Uses: for treatment of spleen-deficient diarrhea, excess dreaming and seminal emission, metrorrhagia and leukorrhea.

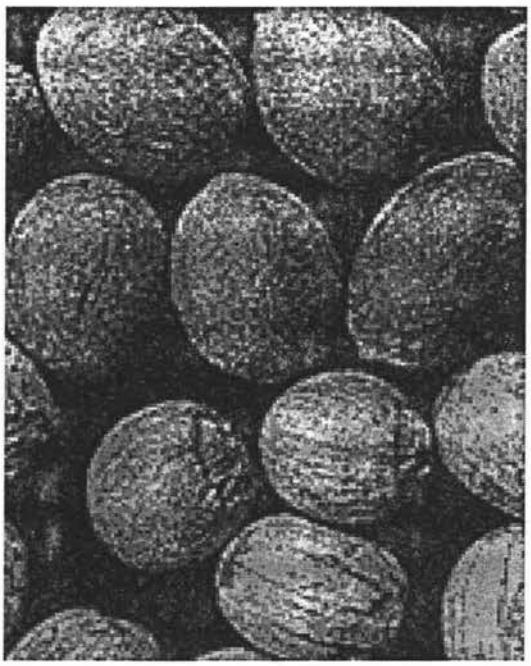


Figure 4 Example of Semen Euryales

Fructus Lycii (Gou Qi Zi. Figure 5)

Family: Solanaceae.

Scientific Name: Lycium chinese Miller; L. barbarum L.

Other Common Names: lycium, medlar, wolfberry, matrimony vine.

Properties: neutral in nature; pleasant to taste. Safety class: 2b.

Chemical Component: betaine, zeaxanthin, physalein, and vitamins (carotine, nicotinic acid, and vitamin C).

Medical Action: strengthens the kidneys; restores semen; nourishes the liver; clears vision.

Therapeutic Uses: for treatment of nutritional deficiency eye diseases, diabetes, inadequate liver and kidney function, and seminal emission.

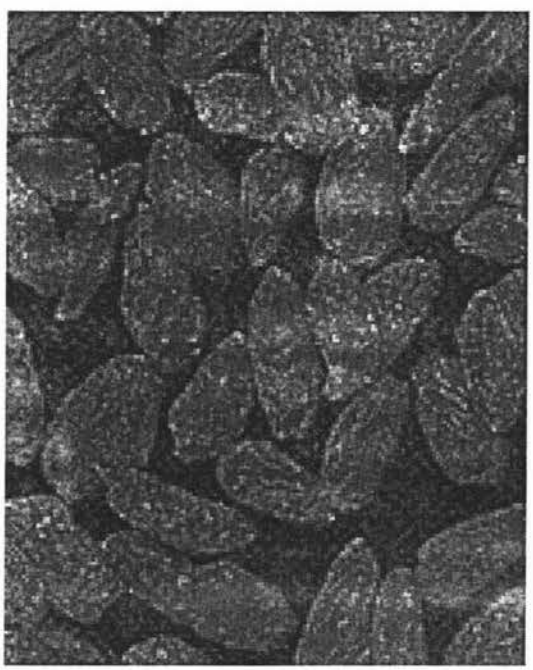


Figure 5 Example of Fructus Lycii

Pericarpium Citri Peticulatatae (Chen Pi. Figure 6)

Family: Rutaceae.

Scientific Name: Citrus reticulata Blanco and C. sinensis Osbeek; C. aurantium L. Subsp. Aurantium.

Other Common Names: tangerine peel, mandarin orange peel.

Properties: dried peel warm in nature; bitter and acrid to taste. Safety class: 1.

Chemical Components: bitter-tasting flavone glycosides (neohesperidin and naringin, neohesperidose); nonbitter flavonoids (hesperidin, rutoside, sinensetin, nibilein, tangeratin); 1-25 essential oils (limonene); pectin.

Medical Action: corrects energy circulation; strengthens the spleen; counteracts excessive moisture in the body; resolves phlegm.

Therapeutic Uses: for treatment of fullness in chest and abdomen, regurgitation and vomiting, chest and abdominal pains, poor appetite, productive coughing, indigestion, and diarrhea.

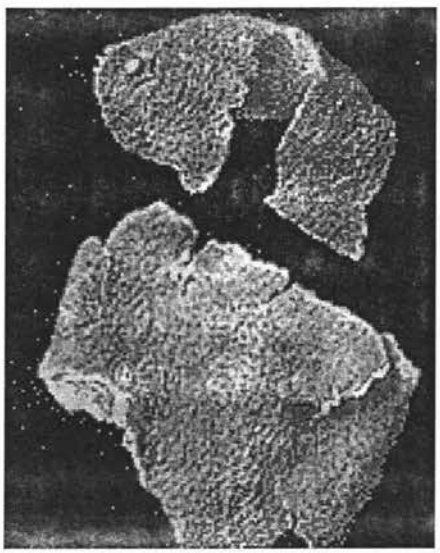


Figure 6 Example of Pericarpium Citri Peticulatatae

Bulbus Lilii (Bai He. Figure 7)

Family: Liliaceae.

Scientific Name: Lilium brownii F.E. Brown var. viridulum Baker, L. lancifolium Thunb., L. Lumilum, L. pumilum D.C., candidum, L. odorum.

Other Common Names: Lily root.

Properties: slight cold in nature; bitter to taste. Safety class: 1.

Chemical Components: n/a.

Medical Action: moistens the lungs to arrest coughing; clears fevers; calms nerves; promotes diuresis; increases the leukocyte count.

Therapeutic Uses: for treatment of coughing, hematemesis nerves, anxiety, and indigestion. It also promotes uiuresis.

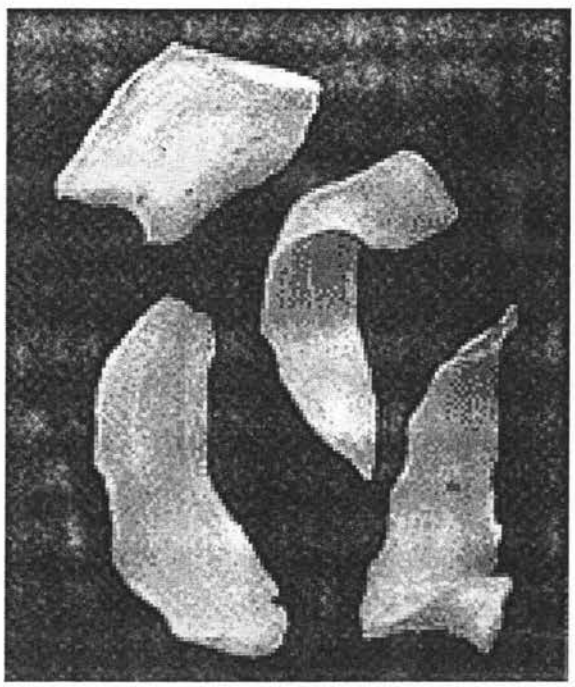


Figure 7 Example of Bulbus Lilii

Tuckahoe (Fu Ling. Figure 8)

Family: Polyporaceae.

Scientific Name: Poria cocos Wolf.

Other common names: China root.

Properties: the dried sclerotium of fungus is neutral in nature; pleasant and light to taste.

Safety class: n/a.

Chemical Components: pachymarose (a polysaccharide) and organic acids, including pachymic acid, tumulosic acid, eburicoic acid, and pinicolic acid.

Medicinal Action: breaks down moisture; promotes diuresis; benefits the stomach and apleen; settles nerves (tranquilizing effects); lowers the blood sugar level; is used as a cardiotonic; increases the immune response of the body to cancer cells.

Therapeutic Uses: for treatment of moisture dominance in kidney deficiency, edema, pulmonary congestion, vomiting and diarrhea, difficult urination; apprehension, and

insomnia. Outer covering tends to promote diuresis and reduce edema; scarlet fu ling tends to circulate moisture and to reduce moisture-based heat.

Figure 8 Example of Tuckahoe

Fructus Euphori (Long Yuan)

Family: n/a.

Scientific Name: Euphoria logan (Lour) Steud.

Other Common Name: Longan.

Properties: neutral in nature; pleasant to taste. Safety class: n/a.

Chemical Components: vitamin B, glucose, sucrose, and tartaric acid.

Medicinal Action: nourishes the spleen; cultivates the heart; supplements the intellect.

Therapeutic Uses: for anemia, hyperactive mental activity, and forgetfulness.

Fructus Jujubae (Zao)

Family: Rhamnaceae.

Scientific name: Zizyphus vulgaris var. spinosa (Ziziphus jujuba Mill.)

Other Common Names: da zao, jujube, Chinese jijube.

Properties: warm in nature; pleasant to taste. Safety class: 1.

Medicinal Action: strengths the spleen and stomach; moisturizes the heart and lungs; regulates various medicines.

Therapeutic Uses: mainly used as a tonic and sedative. For treatment of weak stomach and spleen, anemia, inadequate energy (fatigue), and salivation.

Appendix 3 Ethical Approval

Massey University

Office of the Principal
Massey University
Albany Campus
Privatae Bag 102 904,
North Shore MSC,
Auckland, New Zealand
Principal: 64 9 443 9700 ext 9517
Campus Registrar: 64 9 443 9700
ext 9516
Facsimile: 64 9 414 0814

19 July 2001

Jie Hua Lau
C/o Patsy Watson
Institute of Food Nutrition & Human Health
Massey University
Albany

Dear Jie Hua Lau

HUMAN ETHICS APPROVAL APPLICATION – MUAHEC 01/030
NUTRITIONAL STATUS OF MIGRANT MAINLAND CHINESE CHILDREN IN AUCKLAND

Thank you for your amended application details, which we recently received and have been placed on our files.

The amendments you have made now meet the requirements of the Massey University, Albany Campus, Human Ethics Committee and the ethics of your application, therefore, are approved.

Yours sincerely

Associate-Professor Mike O'Brien
CHAIRPERSON,
MASSEY UNIVERSITY, ALBANY CAMPUS
HUMAN ETHICS COMMITTEE

cc Patsy Watson Institute of Food Nutrition & Human Health

Appendix 4 Informed Consent

Albany Campus

Institute of Food, Nutrition and Human Health

Nutritional Status of Migrant Mainland Chinese Children in Auckland

Consent Form for Parent

- I have been assured that our results will remain confidential and that no identifiable information about my child and my family will be revealed in any written or verbal reports about the survey.
- I understand that this survey has been approved by the Ethics Committee at Massey University, Albany Campus, Auckland.
- I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.
- I understand I have the right to withdraw from the study at any time and to decline to answer any particular questions.

I AGREE TO MY CHILD'S PARTICIPATION IN THIS STUDY UNDER THE CONDITIONS SET OUT THE INFORMATION SHEET.

Signed: _____ (parent/guardian)

Parent/guardian name: _____ (print name)

Date: _____

Albany Campus
Institute of Food, Nutrition and Human Health

家长意向书

奥克兰中国大陆移民儿童的营养状况

- 我确信我们的资料会被保密，我们的身份将不会在任何与此项调查相关的论文或研究报告中披露。
- 我明白此项调查已得到梅西大学Albany分校的道德伦理委员会的批准。
- 我已读过此项调查的介绍并已得到相关解释，我的问题已得到完满的回答，我明白我可在任何时候对调查进一步提问。
- 我明白我有权在任何时候停止参加调查，有权拒绝回答任何个别的问题。

我同意我的孩子参加此项调查

签名(父亲/母亲/监护人)：_____

姓名(父亲/母亲/监护人)：_____

日期：_____

Albany Campus

Institute of Food, Nutrition and Human Health

Nutritional Status of Migrant Mainland Chinese Children in Auckland

Consent Form for Child

What has been involved in the study has been explained to me. Any questions I have asked about the study have been answered. I am happy with the answers, and I understand that I may ask more questions at any time.

I understand I can stop taking part in the study at any time. If I don't want to answer any questions, I know I do not have to.

I understand my name will not be used in the study.

I AGREE TO TAKE PART IN THIS STUDY.

Signed: _____ (child)

Name: _____ (print name)

Date: _____

Contact Sheet

Name of child _____

Date of birth _____

Age of child _____

Sex of child _____

Name of parent/guardian _____

Contact phone No._____

Address _____

Date of interview _____ Code No. _____

Appendix 5 Information Sheet

Albany Campus

Institute of Food, Nutrition and Human Health

Nutritional Status of Migrant Mainland Chinese Children in Auckland

Volunteer parents and children are wanted in 2001 for this Survey

This survey is being conducted by Jie Hua Lu, a MSc in Nutritional Science at Massey University. She is also a mother from Mainland China with an 8 years old boy. She is at present completing her master's degree thesis. Her supervisor is Patsy Watson, Programme Leader in Human Nutrition at Massey University.

Outline of the survey

This survey involves about 50 migrant Chinese children aged 7-10 years old (25 boys and 25 girls) in Auckland who were born in Mainland China.

Children have their own special food needs. However, they are often mistakenly treated as adults in terms of diet. Actually, they are still immature in many aspects and need more care and protection. Inadequate nutrition during childhood may affect directly or indirectly a child's physical and mental performance in the future.

In addition, culture has a strong influence on food choice. When we live in a cultural environment completely different from our original, we really need to know if our children's eating habits have changed, and if this change is beneficial to their health.

The objective of the survey is to measure the kinds and amounts of food eaten by migrant Mainland Chinese children, and provide baseline information on body measurements and activity levels of migrant Mainland Chinese children. The results will be compared with data from New Zealand born Europeans living in New Zealand. The results will be used to make nutrition recommendations, design nutrition education materials and counsel immigrant Mainland Chinese families about nutrition in New Zealand.

Dietary habits are formed during childhood. Childhood diet can influence the long-term health of the child. To know what your child eats and what he/she should eat in New Zealand, please support our survey.

What you and your child will be asked to do as volunteers?

The survey involves three visits over two to three weeks.

First Visit (Requires around 30 minutes)

This visit involves being interviewed about the food consumption pattern of your child, and the food your child has eaten during the last 24 hours. You will also be left with a food questionnaire for your child to fill out.

Second Visit (Requires around 20 minutes)

This visit involves being interviewed about the food your child has eaten during the last 24 hours. The food questionnaire will also be checked and collected.

Third Visit (requires around 50 minutes)

This visit involves being interviewed about the food your child has eaten during the last 24 hours, the life style of your child, and the activity level of your child. In addition, your child will be asked when they eat, and the following measurements will be made:

- Height
- Weight
- Triceps skinfold (on the back of the upper arm)
- Subscapular skinfold (just below the inferior angle of the scapular on the back)
- Upper arm circumference
- Elbow width

Participants may feel a slight pinching feeling when the skinfolds are measured.

Finally, as there may be a relationship between your child's diet and home situation, you will be asked some personal information, such as how many people are there in your family, and how long has your family been in New Zealand, etc.

Confidentiality

Any information you give will be used for statistical purposes and your child will be identified by code number only. Your name, address, and phone number will be kept in a separate file kept under lock and key by Patsy Watson, Programme Leader in Human Nutrition. Your identity will not be revealed in any results, thesis or research papers that result from this work.

Rights of Volunteers

Participation in this survey is entirely voluntary.

- Volunteers may refuse to answer any questions if they wish.
- Volunteers may choose not to have any of the body measures made.
- Volunteers are able to stop taking part in this survey at any time.
- Volunteers can ask any questions about this survey at any time during the survey.
- Information is provided on the understanding that the volunteer's name will not be used at any time.
- Volunteers will be provided with a summary of their child's results.

Feedback

You will receive a summary of your child's results. The results will include a report on your child's body measurements and intake of important nutrients. You will be able to compare the results with the recommendations provided. You will also receive a summary of the study results.

Recruitment

Chinese schools are run after school hours in Auckland. The researcher will visit these Chinese schools and give a presentation to the parents outlining the study. Information Sheet in Chinese will be handed out after the presentation. Volunteers will then contact the researcher.

For further information about the survey please contact:

Jie Hua Lu

Project investigator

Phone: 443 8088

Email: jiehua@pcombo.co.nz

Patsy Watson

Project director

Phone: 443 9755

Email: P.Watson@massey.ac.nz

IF YOU ARE INTERESTED IN, AND WE DO HOPE YOU WOULD BE, PLEASE CONTACT US BY PHONE OR EMAIL ABOVE, OR COMPLETE THE VOLUNTEER FORM BELOW AND SEND BACK TO:

Jie Hua Lu/ c/o Patsy Watson
Massey University
Institute of Food, Nutrition and Human Health
Albany Campus
Private Bag 102-904
North Shore MSC
North Shore City

VOLUNTEER FORM

Yes, I would like my child to take part in this nutritional study.

Name of child _____

Age of child _____

Sex of child _____

Name of parent/guardian _____

Contact phone No._____

Address _____

_____

Albany Campus
Institute of Food, Nutrition and Human Health

奥克兰中国大陆移民儿童的营养状况

寻求在2001年自愿参加此调查的家长和儿童

此项调查由梅西大学食品，营养与人体健康研究所主持进行。调查执行者为卢洁华，梅西大学营养学硕士研究生。她的导师是梅西大学人类营养学科目带头人，Patsy Watson。

调查大纲

此项调查的对象为约50名7至10岁的出生在中国大陆的奥克兰中国移民儿童(25名男孩和25名女孩)。

儿童对食物有自己特别的需求。然而，他们经常在饮食方面被错误地当作大人对待。事实上，他们在许多方面仍未成熟，不适当的营养将会直接或间接地影响他们成年后的身心健康。

更进一步来说，文化对选择食物的影响很大。当我们所住环境的文化迥然不同于从前时，我们十分有必要知道我们的孩子的饮食习惯是否有变，这种变化是否有益于他们的健康。

此项调查的目的在于对中国大陆移民儿童所吃食物的种类和数量进行测量，并对他们的体格和活动水平进行测量。调查结果将与在新西兰的西欧同龄儿童相比较，并将用于为新西兰的中国大陆移民家庭提出营养建议和设计营养宣传资料。

饮食习惯成于儿时，儿时的饮食将会影响他们成年后的健康。为了知道你的孩子在新西兰在吃什么和该吃什么，请支持我们的调查。

我们对自愿参加调查者的要求

调查包括三次访问，在两至三周内完成。

第一次访问(约30分钟)：这次访问是了解你的孩子的食物消费量以及在过去24小时内你的孩子吃了些什么。并且，我们会留下一份食物频率问卷请你孩子填写。

第二次访问(约20分钟)：这次访问是了解你的孩子在过去24小时内吃了些什么，并检查和收回食物频率问卷。

第三次访问(约50分钟)：这次访问是了解你的孩子在过去24小时内吃了些什么，他/她的生活方式和活动水平。并且，我们会问你的孩子在什么时候吃过东西，并给他/她做以下的测量：

- 身高

- 体重
- 三头肌部皮脂厚度(上臂背侧)
- 肩胛下部皮脂厚度(背部肩胛骨下角)
- 上臂围
- 肘部宽度

在皮脂厚度测量时会有轻微的捏压感。

最后，因为孩子的饮食与家庭状况相关，我们会向你请教一些个人问题，如家中人口，到达新西兰的时间等等。

调查的机密性

你提供的任何资料均用于统计目的，而且你的孩子仅以编号标明身份，你们的名字，地址和电话号码将Patsy Watson，人类营养学科目带头人保管在一个特别的上锁的文件夹中，你们的身份将不会在任何与此项调查相关的论文或研究报告中披露。

自愿参加调查者的权利

参加调查者完全出于自愿。

- 自愿者可拒绝回答任何问题。
- 自愿者可选择拒绝任何体格测量。
- 自愿者可在任何时候停止参加调查。

- 自愿者可在调查过程中的任何时候对调查提问。
- 自愿者可从所提供资料中知道他们的名字将不会在任何时候被使用。
- 自愿者将可收到孩子的调查结果。

回馈

调查结果将告知参加者。你将会收到你孩子的身体状况及重要营养素摄取状况的报告，并可以将报告与所附的建议相比较。同时，我们将会向你报告整个调查的结果概况。

如需了解更多有关调查的资料，请联系：

卢洁华，调查执行者

电话：4438088

Email：jiehua@pcombo.co.nz

Patsy Watson，调查指导者

电话：4439755

Email：P.Watson@massey.ac.nz

如果你有兴趣参加(我们非常希望你有兴趣参加)，请用以上的电话号码或电子邮件联系我们，或填写以下的表格寄到：

Jie Hua Lu/ c/o Patsy Watson
Massey University
Institute of Food, Nutrition and Human Health
Albany Campus
Private Bag 102-904
North Shore MSC
North Shore City

自愿参加者表格

是的，我们愿意参加此项营养调查。

孩子姓名 _____

孩子年龄 _____

孩子性别 _____

孩子父亲/母亲/监护人姓名 _____

联系电话 _____

住址 _____

_____

Appendix 6 24 hour Recall

Massey University

Nutritional Status of Migrant Mainland Chinese Children in Auckland

24-Hour Recall

Questions to Child/Parent

B. I'd like you to tell me everything you had to eat and drink yesterday, from midnight to midnight. I would like you to remember everything you ate and drink at home, school and away. Let us start with what you ate or drink when you first woke yesterday, and then go through your day.

我希望你能告诉我你昨天一整天所吃的和喝的东西。请记住每一样你在家，学校或者外面所吃过和喝过的东西。我们从你昨天睡醒起来开始，回忆你昨天一整天吃过和喝过的东西。

Name:		Code No.:	
Date:			
Day of the week:		Day of Food taken:	
Eating time and place	Meal type	Food and beverage name, brand, Description, preparation i.e. boiling, frying, microwave etc, and recipe if necessary	Amount or volume consumed

Eating time and place	Meal type	Food and beverage name, brand, Description, preparation i.e. boiling, frying, microwave etc, and recipe if necessary	Amount or volume consumed

Appendix 7 Food and Dietary Supplement Consumption Questionnaires

Nutritional Status of Migrant Mainland Chinese Children in Auckland

Food Consumption Pattern

Questions to Parent

I would like to know how often your child eats different types of food. Could you please answer the following questions?

我想知道您的孩子吃各类食物的情况。可以请您回答以下问题吗？

C1. How would you describe your child's eating habits?	**C1. Eating habits**
□ Eats a variety of all foods, including animal products.	All foods = 1
□ Eats eggs, dairy products, fish and chicken but avoid other meats.	Eggs, dairy, fish, and chicken = 2
□ Eats eggs, dairy products, fish but avoids chicken and other meats.	Eggs, dairy and fish = 3
□ Eats eggs and dairy products but avoids all meats and fish.	Eggs and dairy = 4
□ Eats eggs but avoids dairy products, all meats and fish.	Eggs only = 5
□ Eats dairy products but avoids eggs, all meats and fish.	Dairy only = 6
□ Eats no meat, fish, milk and egg.	No meat, fish, milk and egg = 7
□ Other (specify) _____	Other = 10
	NA = 8
	DK = 9
C2. How many helping of fruit including fresh, frozen, canned preserved or stewed does your child usually eat each day? (Fruit juices are not included. A helping = 1 apple, 1 orange or 1 banana etc.)	**C2. Fruit intake**

☐ Doesn't eat fruit	No fruit = 1
☐ Less than one helping each day	< 1/day = 2
☐ One helping each day	1/day = 3
☐ Two helpings each day	2/day = 4
☐ Three or more helpings each day	3/day = 5
	NA = 8
	DK = 9 ☐
C3. How many helpings of vegetables including fresh, frozen or canned does your child usually eat each day? (Vegetable juices are not included. A helping = 1 medium potato, 1 tomato or half a cup salad etc.)	**C3. Vegetables intake**
☐ Doesn't eat vegetables	No vegetable = 1
☐ Less than one helping each day	< 1/day = 2
☐ One helping each day	1/day = 3
☐ Two helpings each day	2/day = 4
☐ Three helpings each day	3/day = 5
☐ Four or more helpings each day	4/day = 6
	NA = 8
	DK = 9 ☐
C4. How many helpings of noodles, pasta or rice does your child usually eat each day? (One helping of cereals = 1 cup cooked rice/pasta/noodles)	**C4. Noodles, pasta or rice intake**
☐ Doesn't eat cereals	No cereal = 1
☐ Less than one helping a day	< 1/day = 2
☐ 1-2 helping a day	1-2/day = 3
☐ 3-4 helpings a day	3-4/day = 4
☐ 5-6 helpings a day	5-6/day = 5
☐ 7 or more helpings a day	7/day = 6
	NA = 8
	DK = 9 ☐

C5. How many helpings of breakfast cereals does your child usually eat each day? (One helping of breakfast cereals = 1 cup cereal or 2 weetbix)

- ☐ Doesn't eat breakfast cereals
- ☐ Less than one helping each day
- ☐ 1-2 helping a day
- ☐ 3-4 helpings a day
- ☐ 5-6 helpings a day
- ☐ 7 or more helpings a day

C5. Breakfast cereals intake

No breakfast cereal = 1
< 1/day = 2
1-2/day = 3
3-4/day = 4
5-6/day = 5
7/day = 6
NA = 8
DK = 9

C6. How many slices, or rolls, of bread (or toast or pita) does your child usually eat each day? (One helping of bread = 1 medium slice of bread or 1 roll or 1 small pita bread)

- ☐ Doesn't eat bread
- ☐ Less than one helping each day
- ☐ 1-2 helping a day
- ☐ 3-4 helpings a day
- ☐ 5-6 helpings a day
- ☐ 7 or more helpings a day

C6. Bread (or toast or pita) intake

No bread = 1
< 1/day = 2
1-2/day = 3
3-4/day = 4
5-6/day = 5
7/day = 6
NA = 8
DK = 9

C7. What type(s) of bread does your child eat most?

- ☐ White
- ☐ White – high fibre
- ☐ Grain breads e.g. Molenburg, Vogels
- ☐ Wholemeal (brown bread)
- ☐ Other (specify) _____

C7. Type of bread

White = 1
White + fibre = 2
Grain = 3
Wholemeal = 4
Other = 5
NA = 8
DK = 9

C8. How many helping of milk and products (milk, yoghurt, dairy food, icecream, cheese) does your child eat each day? (One helping = 1 cup of milk or 1 pottle of yoghurt or 2 scoops of icecream or 2 slice of cheese)

☐ Doesn't eat milk and milk products
☐ One helping each day
☐ Two helping each day
☐ Three helpings each day
☐ Four helpings each day
☐ Five or more helpings each day

C8. Milk and milk products intake

No milk and product = 1
1/day = 2
2/day = 3
3/day = 4
4/day = 5
5 or over = 6
NA = 8
DK = 9

C9. Does your child drink or use any type of milk?

☐ Yes
☐ No

C9. Milk intake

Yes = 1
No = 2
NA = 8 DK = 9

C10. What type does your child have most?

☐ Whole or powdered whole milk (silver top)
☐ Standard, homogenised milk (dark blue top)
☐ Reduced fat (light blue top)
☐ Trim milk (dark green top)
☐ Super Trim (light green top)
☐ Skim milk or low fat powered milk

☐Calcium trim (yellow)
☐ Milk straight from cow e.g. if you live in a farm
☐ Soy milk
☐ Bought flavored milk e.g. Primo
☐ Other (specify) _____

C10. Type of milk

Silver top = 1
Dark blue top = 2
Light blue top = 3
Dark green top = 4
Light green top = 5
Skim or low fat powered = 6
Calcium trim = 7
Straight from cow = 10
Soy = 11
Flavored = 12
Other = 13
NA = 8
DK = 9

C11. Does your child use butter or margarine on bread?

C11. Butter or margarine intake

☐ Yes — Yes = 1

☐ No — No = 2

NA = 8

DK = 9

☐

C12. What type does your child use most?

C12. Type of butter/margarine

☐ Butter or home-made butter — Butter = 1

☐ Butter and margarine blend — Butter + margarine = 2

☐ Margarine (oil type not specified) — Margarine = 3

☐ Polyunsaturated margarines e.g. Miracle, Sunflower… — Polyunsaturated margarines = 4

☐ Monounsaturated margarines – Praise, Olivio, Olivani, Margrine — Monounsaturated margarines=5

☐ Other (specify) _____ — Other = 6

NA = 8 DK = 9

☐

C13. How many helpings of meat, chicken, fish, seafood, eggs, dried beans e.g. baked beans, nuts and lentils does your child usually eat each day? (e,g. One helping = ½ tin or ¾ cup baked bean or 2 slices cooked meat or 2 chicken drumsticks or 1 leg of chicken or ¾ cup mince or casserole or 1 medium fillet of fish or 5 medium musseles or 3 kina or 1 medium steak or 1 egg or 1 sausage)

C13. Intake of food rich in protein

☐ Doesn't eat those — Doesn't eat = 1

☐ Less than one helping each day — < 1/day = 2

☐ 1-2 helping each day — 1-2/day = 3

☐ 3-4 helpings each day — 3-4/day = 4

☐ 5 or more helpings each day — 5/day = 5

NA = 8

NK = 9

☐

C14. Is salt usually added to your child's food during cooking?

☐ Yes

☐ No

☐ Don't know

C14. Salt when cooking

Yes = 1

No = 2

Don't know = 9

NA = 8

DK = 9

C15. Do you add salt to your children's food when s/he is eating?

☐ Usually

☐ Sometimes

☐ Rarely

☐ Never

C15. Salt when eating

Usually = 1

Sometimes = 2

Rarely = 3

Never = 4

NA = 8

DK = 9

C16. How often does your child eat Western style takeaways e.g. bought fish and chips, McDonald, KFC etc.?

☐ Once a month

☐ Once in two weeks

☐ 1-2 times a week

☐ 2-3 times a week

☐ 3-4 times a week

☐ Daily

☐ Rarely

C16. Western style takeaway intake

1/month = 1

1/2 weeks = 2

1-2/week = 3

2-3/week = 4

3-4/week = 5

Daily = 6

Rarely = 7

NA = 8 DK = 9

C17. According to Chinese cuisine, which group do you think your family belongs to?

☐ Cantonese Group

☐ Mandarin Group

Specify:

☐ Don't know

C17. Chinese cuisine

Cantonese = 1

Mandarin = 2

NA = 8

DK = 9

Massey University

Nutritional Status of Migrant Mainland Chinese Children in Auckland

Dietary Supplements

Questions to Parents

I would like to know if your child is taking dietary supplements. Could you please answer the following questions?

我想知道您的孩子是否有吃食物补充剂。可以请您回答以下问题吗？

D1.

(a) At present (apart from fluoride tablets/drops) are you giving (child) any extra vitamins or mineral, as tablets, pills, powders, syrups or drops?

□ Yes

□ No

If "yes":

(b) For each type taken, record full description from bottle including brand name and product license number; record dose given to child, how often taken and in what form.

□ Full name (include brand):

_____

□ Does: no. of tablet, drops, 5 ml spoons

_____

D1.

(a) Vitamin or mineral intake

Yes = 1

No = 2

NA = 8

DK = 9

☐ Frequency: no. and times and period e.g. 2 × day

_____

☐ Form:

_____

D2.

(a) At present are you giving (child) fluoride tablets?

☐ Yes

☐ No

D2. Fluoride

(a) Intake

Yes = 1

No = 2

NA = 8

DK = 9

☐

(b) Do you know anything about fluoride?

☐ Yes

☐ No

(b) Knowledge

Yes = 1

No = 2

NA = 8

DK = 9

☐

(c) Are you aware of the fact that fluoride is added to the water supply in most areas of Auckland?

☐ Yes

☐ No

(c) Awareness of fluoride in water

Yes = 1

No = 2

NA = 8 DK = 9

☐

(d) Do you know the reasons for this?

☐ Yes

☐ No

If "Yes", please state the reason that you think:

_____

_____

(d) Reason

Yes = 1

No = 2

NA = 8

DK = 9

☐

D3. Over the last month have you used any Chinese herbal in your child's dishes?

Yes

No

If "yes":

For each type taken, record full name, how often taken and for what reason.

Full name:

_____ _____ _____ _____

_____ _____ _____ _____

_____ _____ _____ _____

Frequency:

_____

D3. Use of Chinese herbal

Yes = 1

No = 2

NA = 8 ☐

DK = 9

Name ☐

Shan Yao = 1

Qian Shi = 2 ☐

Lian Zi = 3

Gou Qi Zi = 4 ☐

Long Yuan = 5

Zao = 6 ☐

Chen Pi = 7

Bai He = 10

Fu Ling = 11 ☐

Xing = 12

Other = 13 ☐

NA = 8

DK = 9

Frequency

1-2 × week = 1

1-2 × month = 2

2-3 × month = 3

Rarely = 4

NA = 8 ☐

DK = 9

☐ Reason for taking:

_____

☐ Form:

_____

Reason

Preventing = 1

Healthy = 2

Healing = 3

Other = 4

NA = 8

DK = 9

☐

Form

Soup = 1

Drink = 2

Soup & drink = 3

Other = 4

NA = 8

DK = 9

☐

Appendix 8 Food Frequency Questionnaire

Massey University

Food Questionnaire

Different eating patterns may affect people's health. To help us understand these eating patterns, we would like you to **think back over the past 4 weeks** and answer the following questions about the foods you usually eat.

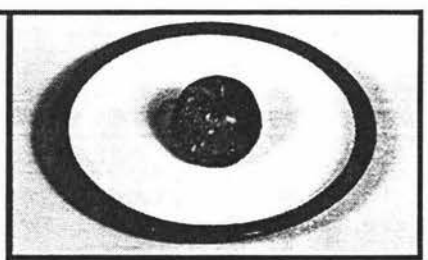
Put a tick in the box which best tells **HOW OFTEN** you usually eat the foods.

Example

If you eat apples on 3 or 4 days each week, put a tick in the '3-4 times a week' box.

2. Apples or pears

Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☑	☐	☐	☐



If you never or rarely eat a food, tick in the box 'never or less than once a month' and go to the next question.

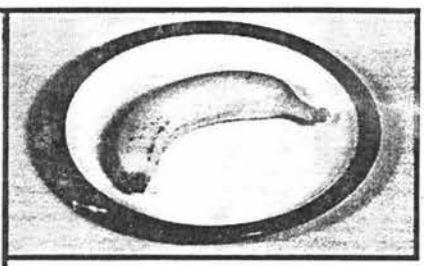
It may be helpful to ask the person who does the cooking and shopping in your household to help you fill in the questions.

PLEASE DO NOT SKIP ANY FOODS

Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

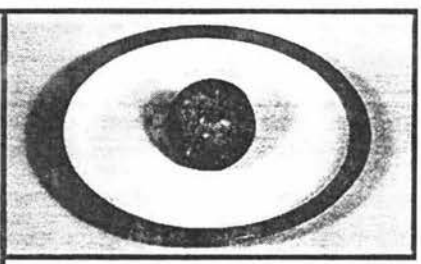
Fruit

1. Banana, raw



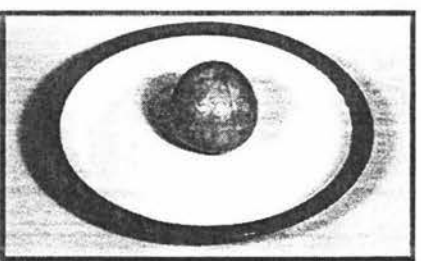
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

2. Apples or pears



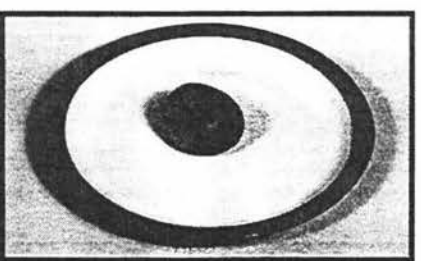
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

3. Oranges or mandarins



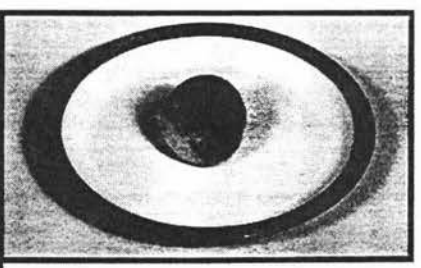
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

4. Kiwifruit



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

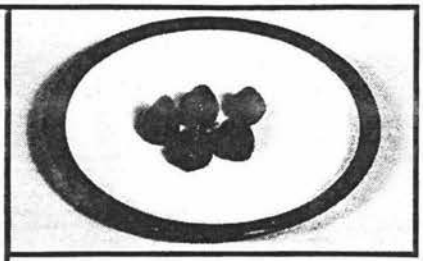
5. Nectarines, peaches, plums or apricots



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

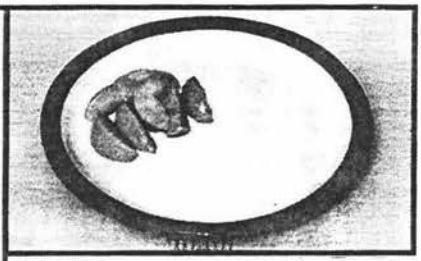
Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

6. Strawberries or other berries



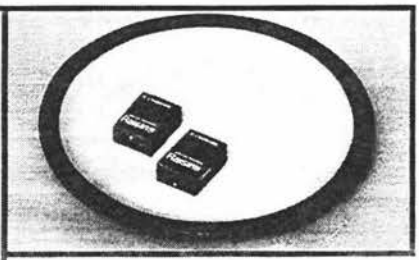
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

7. Tinned or cooked fruit, eg. tinned peaches



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

8. Dried fruit, eg. raisins



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

9. Other Fruit (1) If you often have another fruit, not listed - give the name and tick a box to show how often you eat it

Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

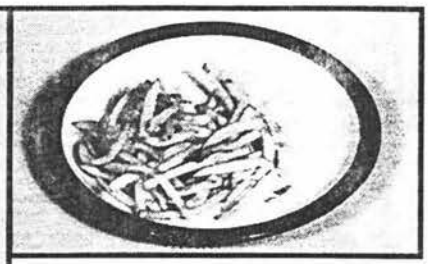
10. Other Fruit (2) If you often have another fruit, not listed - give the name and tick a box to show how often you eat it

Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

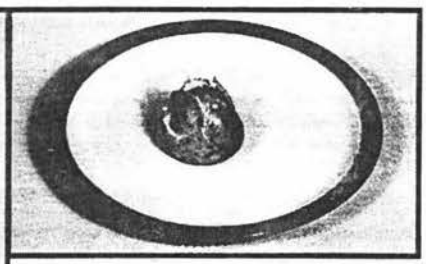
Vegetables

11. **Fried potatoes,** eg. hot potato chips, kumara chips, french fries, wedges or hash browns



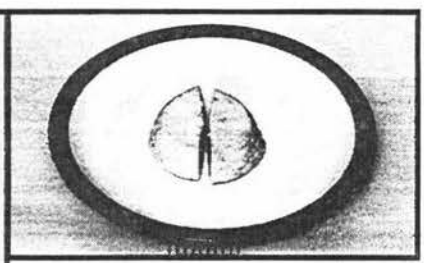
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

12. **Other potatoes,** eg. boiled, mashed, baked or roasted



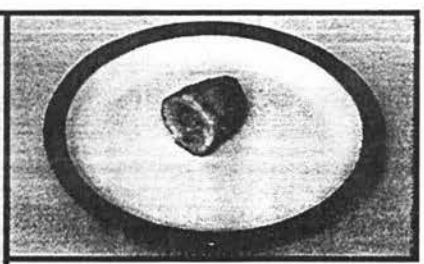
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

13. **Taro**



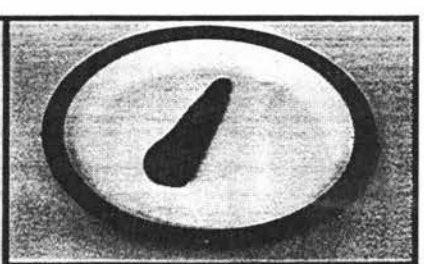
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

14. **Kumara**



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

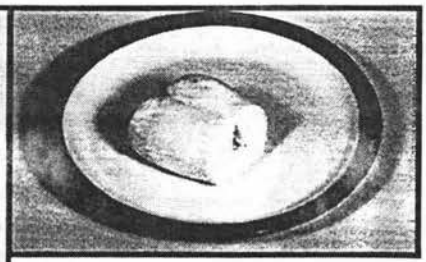
15. **Carrots** (raw or cooked)



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

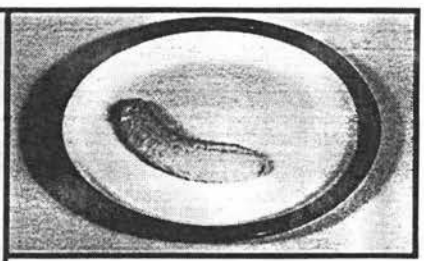
Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

16. Cassava



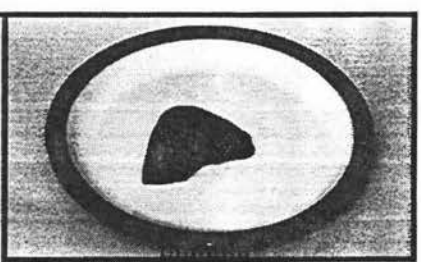
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

17. Cooked green banana



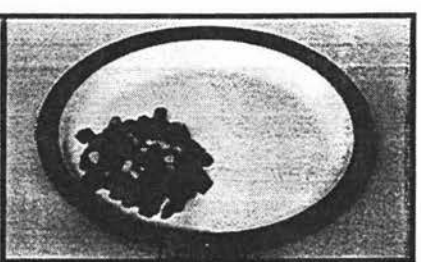
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

18. Pumpkin



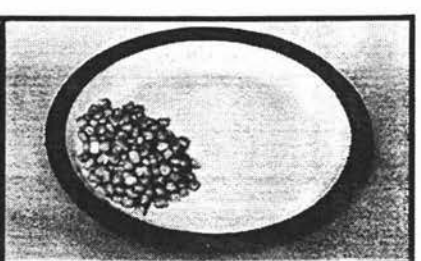
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

19. Mixed vegetables



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

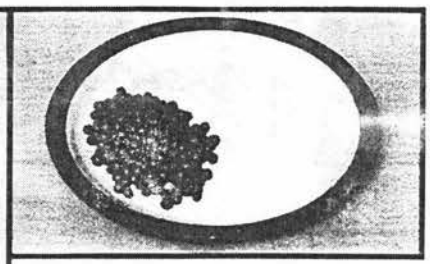
20. Corn



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

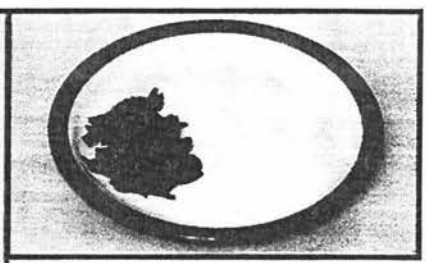
Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

21. Peas



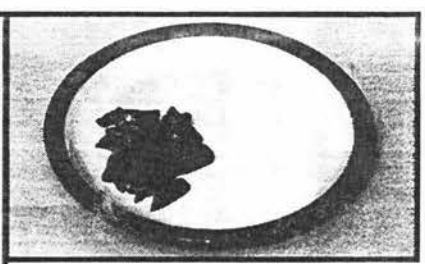
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

22. Silverbeet, spinach, puha or watercress



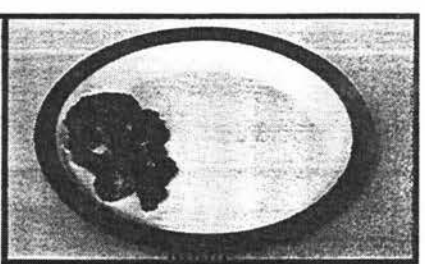
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

23. Green beans



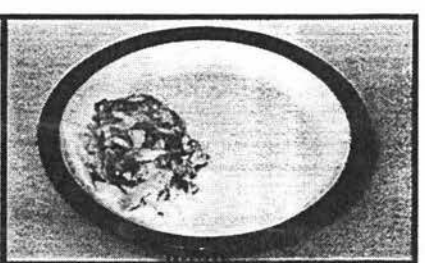
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

24. Broccoli



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

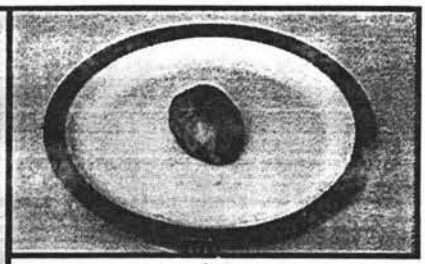
25. Cauliflower or cabbage



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

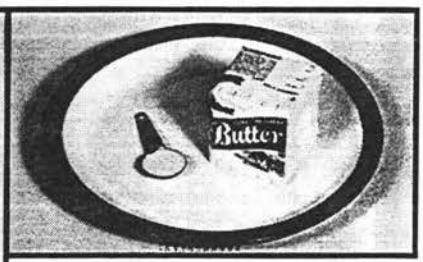
Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

26a. Thinking about **cooked vegetables,** how often would you have **roast vegetables?**



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

26b. Thinking about **cooked vegetables** again, how often would you have **butter or margarine** on them?



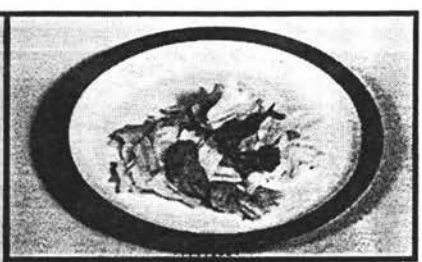
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

26c. Which of these do you usually have on vegetables? *(tick one box)*

- ☐ butter
- ☐ low-fat spread
- ☐ margarine
- ☐ blend (margarine and butter)
- ☐ Don't have either

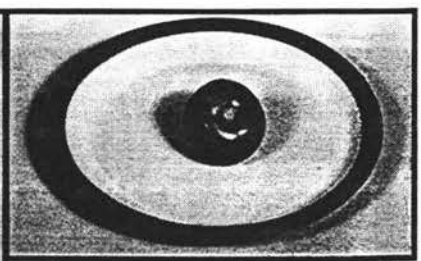
Name of margarine or blend _____

27. **Lettuce or green salad**



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

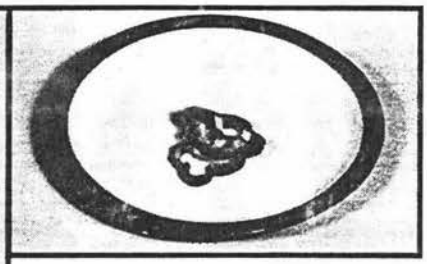
28. **Tomatoes** (raw or cooked)



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

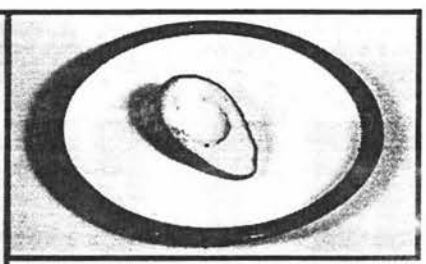
Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

29. Capsicum (green, red or yellow peppers)



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

30. Avocado



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

31. Other Vegetable (1) If you often have another vegetable, not listed - give the name and tick a box to show how often you eat it

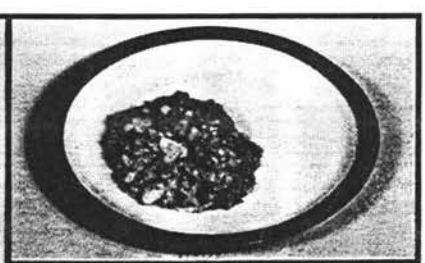
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

32. Other Vegetable (2) If you often have another vegetable, not listed - give the name and tick a box to show how often you eat it

Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

Mixed dishes

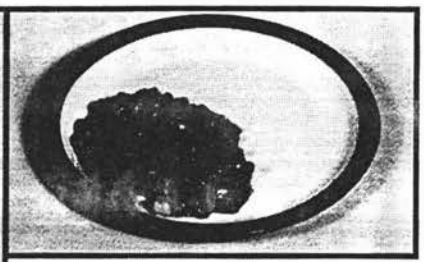
33. Meat and vegetable 'boil-up', eg. puha, povi masima, brisket, mutton flaps, pork bones



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

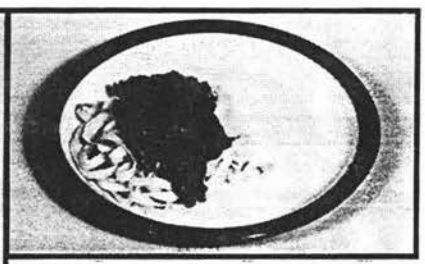
Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

34. Meat stew or casserole with vegetables



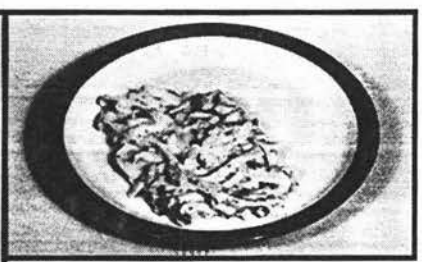
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

35. Pasta with meat and tomato sauce, eg. lasagne, spaghetti bolognaise



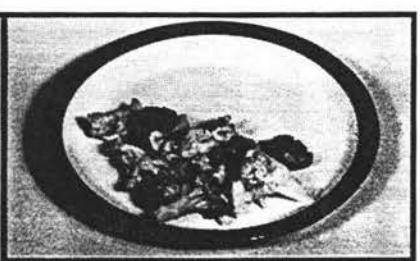
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

36. Pasta with cream, white sauce or cheese sauce



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

37. Chinese type dishes, stir-fry meat or chicken and vegetables



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

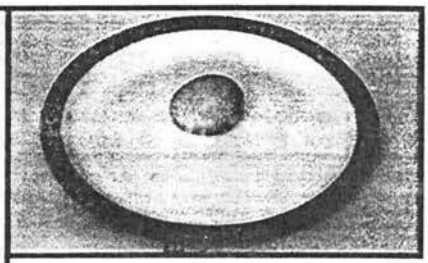
38. Other Mixed Dish If you often have another mixed dish, not listed - give the name and tick a box to show how often you eat it

Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

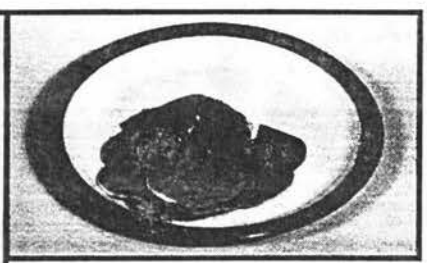
Eggs, meat, poultry and fish

39. Eggs, boiled, poached, fried or scrambled, etc



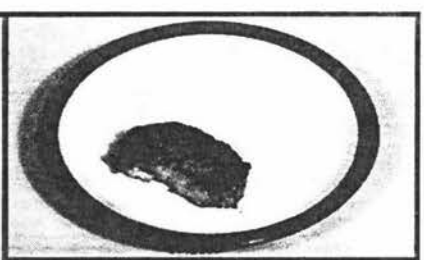
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

40. Roast beef, lamb or pork



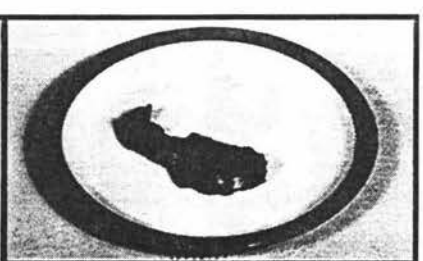
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

41. Steak



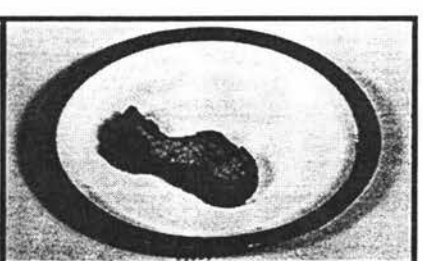
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

42. Lamb or mutton chops



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

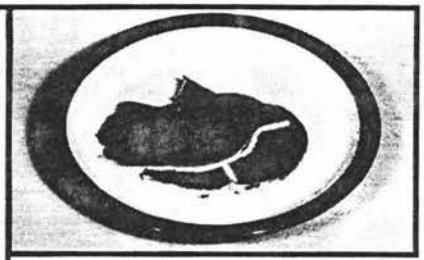
43. Pork chop (or other pork small cuts)



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

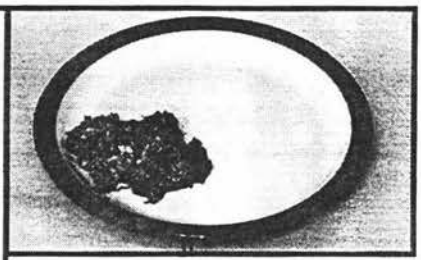
Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

44. Boiled corned beef/silverside



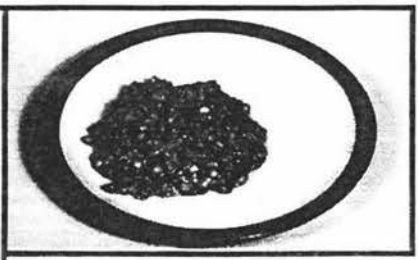
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

45. Tinned corned beef



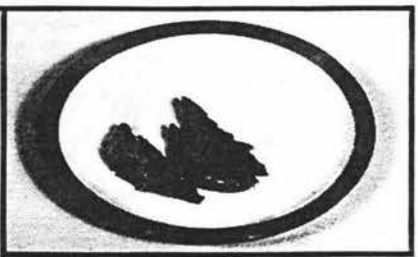
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

46. Mince, including rissoles, patties, Shepherd's Pie, etc



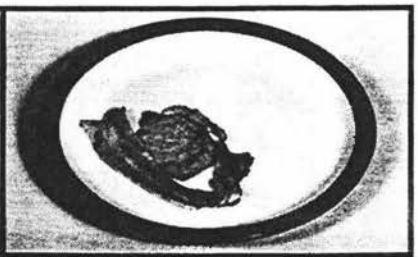
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

47. Liver or liver paté



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

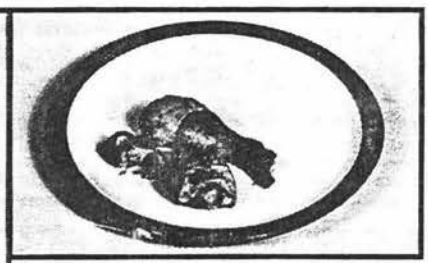
48. Bacon or ham



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

49. Chicken

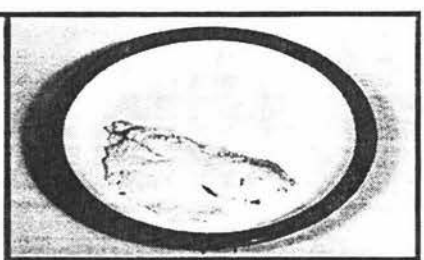


Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

49a. How often was the **chicken** you ate **fried chicken or chicken nuggets?** *(tick one box)*

- ☐ almost never or never
- ☐ ¼ of the time
- ☐ ½ of the time
- ☐ ¾ of the time
- ☐ almost always or always

50. Fish

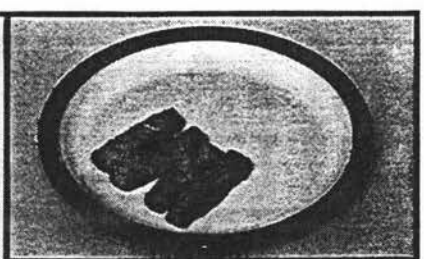


Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

50a. How often was the **fish** you ate **fried fish or takeaway fish?** *(tick one box)*

- ☐ almost never or never
- ☐ ¼ of the time
- ☐ ½ of the time
- ☐ ¾ of the time
- ☐ almost always or always

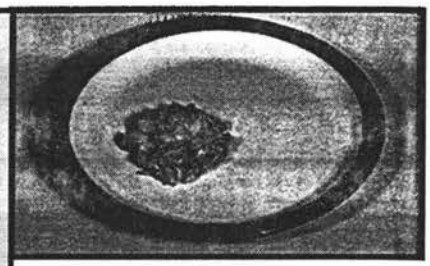
51. Fish cake, fish fingers or fish pie



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

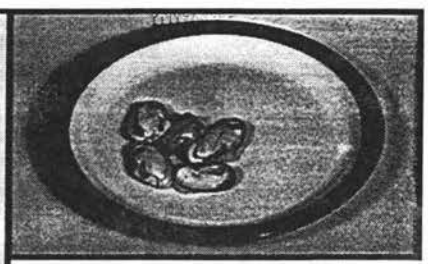
Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

52. **Tinned fish,** eg. tuna or salmon



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

53. **Shell fish,** eg. mussel, paua or crabmeat



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

54. **Other item of the 'Eggs, meat, poultry and fish' group** If you often have another item from this group, not listed - give the name and tick a box to show how often you eat it

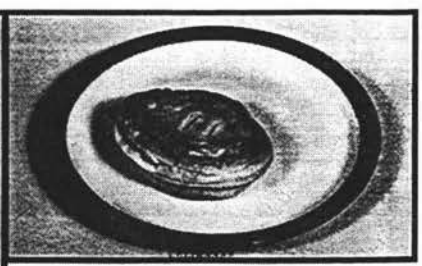
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

55. Which of the following **fats** were regularly used to cook your **meat, poultry or fish?** *(mark all that are used)*

- ☐ Don't know
- ☐ Margarine
- ☐ Butter
- ☐ Lard, dripping
- ☐ Kremelta type fat
- ☐ Canola oil
- ☐ Corn oil
- ☐ Olive oil
- ☐ Safflower oil
- ☐ Sunflower oil
- ☐ Other vegetable oil

Pies, fastfoods, sausages

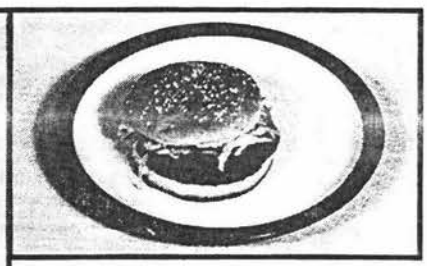
56. **Meat pie**



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

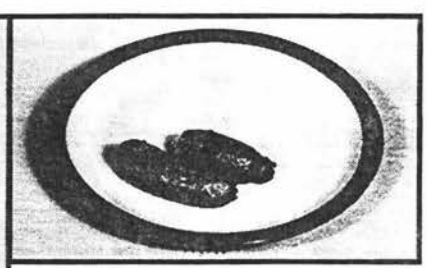
Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

57. Burgers



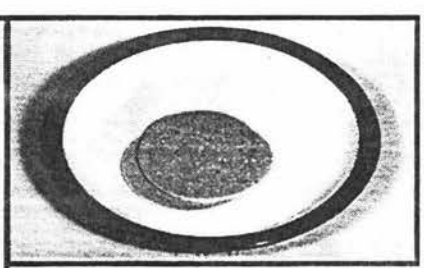
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

58. Sausages (all types)



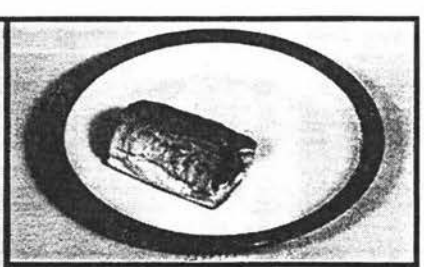
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

59. Luncheon, ham and chicken



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

60. Sausage rolls



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

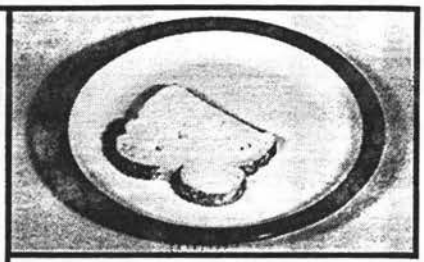
61. Other item of the 'Pies, fast foods, sausages' group If you often have another item from this group, not listed - give the name and tick a box to show how often you eat it ☐

Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

Bread and Cereals

62. Bread, including toast and bread rolls



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

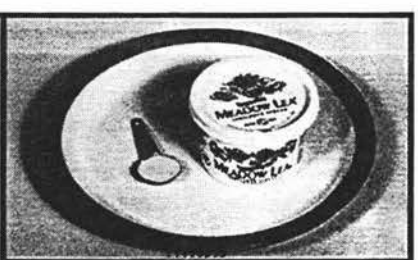
62a. What **type of bread** do you **usually** eat? (tick one box)

- ☐ white
- ☐ wholemeal
- ☐ mixed grain

62b. How often do you have **butter** on your bread?

- ☐ rarely or never
- ☐ ¼ of the time
- ☐ ½ of the time
- ☐ most of the time

62c. How often do you have **margarine or margarine blend** on your bread?



- ☐ rarely or never
- ☐ ¼ of the time
- ☐ ½ of the time
- ☐ most of the time

62d. Which type of **margarines** do you **usually** have?

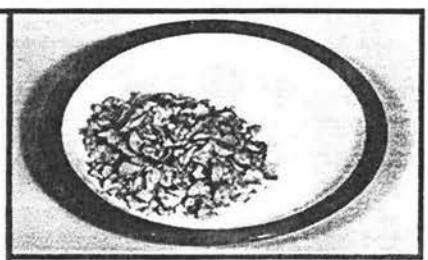
- ☐ Polyunsaturated margarine, eg. Miracle, Meadowlea, Flora, Sunrise
- ☐ Canola margarine, eg. Gold'n Canola, Vraise Canola, Canola Harvest, Country Crock
- ☐ Olive oil, margarine, eg. Olivio, Olivani, Oliveta
- ☐ Blend of butter and margarine, eg. Countrysoft, Dairysmooth
- ☐ Don't know

Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

62e. Is the **margarine** you usually have **reduced fat** or **lite**?

- ☐ Yes
- ☐ No
- ☐ Don't know

63. Breakfast cereal



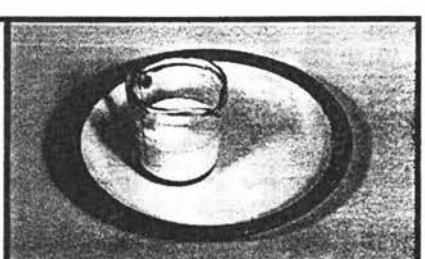
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

63a. What type of cereal do you usually have? *(tick one box)*

- ☐ Weetbix type
- ☐ Cornflakes type
- ☐ Rice bubbles
- ☐ Cocopops
- ☐ Muesli
- ☐ Multi-grain typ
- ☐ Porridge
- ☐ Other (Please give name) _____

63b. Was **milk** added to your **cereal**?

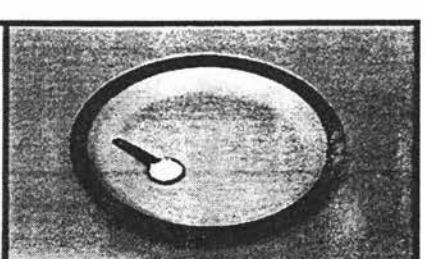
☐ Yes ☐ No



What **kind** of **milk** was usually added?

- ☐ Standard milk/dark blue
- ☐ Light blue
- ☐ Trim (green)
- ☐ Extra calcium
- ☐ Soy milk

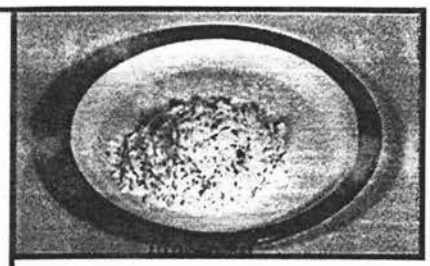
63c. Was **sugar, honey or syrup** added to your cereal?



☐ Yes ☐ No

Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

64. Rice



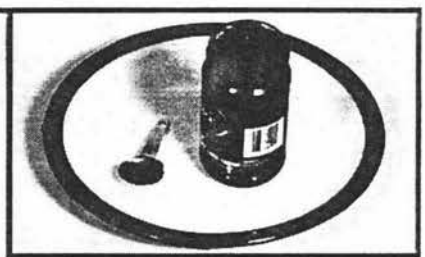
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

65. Other Bread and Cereals If you often have another item from this group, not listed - give the name and tick a box to show how often you eat it

Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

Spreads, sauces

66. Jam or honey

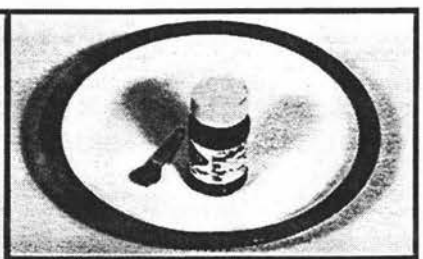


Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

67. Nutella

Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

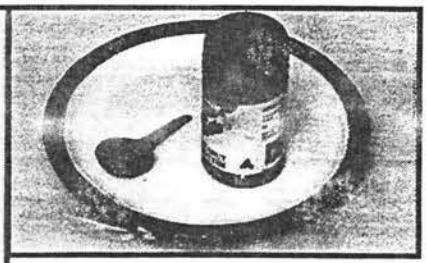
68. Marmite or Vegemite



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

69. Peanut butter

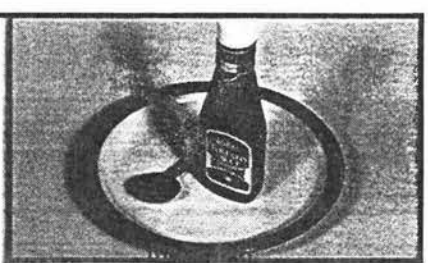


Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

70. Mayonnaise or salad dressing

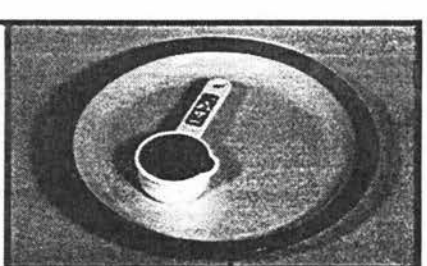
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

71. Tomato sauce or ketchup



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

72. Gravy



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

73. Other item of the 'Spreads, sauces' group

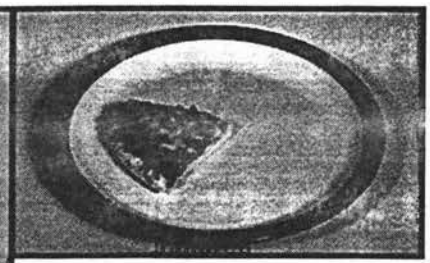
If you often have another item from this group, not listed - give the name and tick a box to show how often you eat it _____

Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

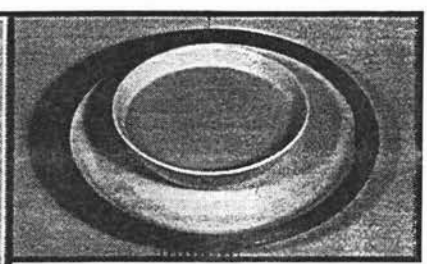
Convenience meals/snacks

74. Pizza



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

75. Soup



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

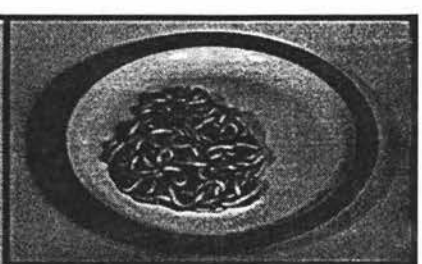
75a. What type of soup do you usually have? *(tick one box)*

- ☐ Tomato soup
- ☐ Vegetable soup
- ☐ Cream soup
- ☐ Ham and pea soup
- ☐ Other soup

76. Noodles

Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

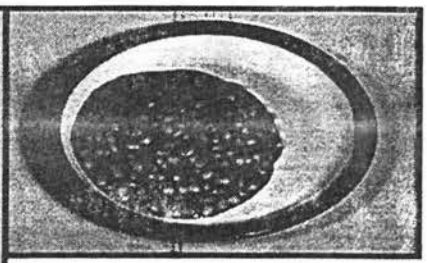
77. Tinned spaghetti with tomato sauce



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

78. Baked beans



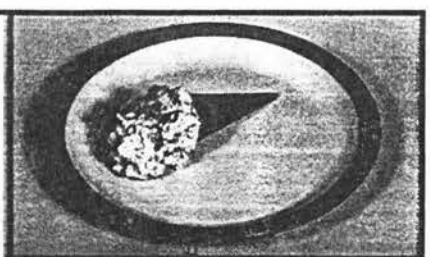
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

79. Other item of the 'Convenience meals/snacks' group If you often have another item from this group, not listed - give the name and tick a box to show how often you eat it _____

Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

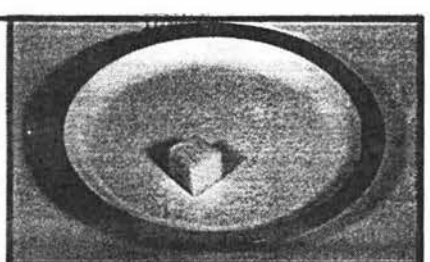
Dairy

80. Ice cream



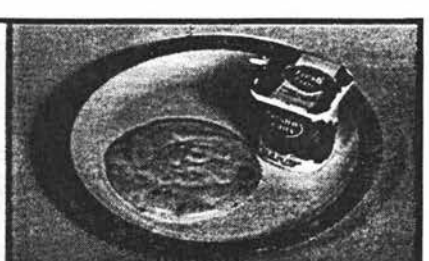
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

81. Cheese, eg. cheddar, colby, etc.



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

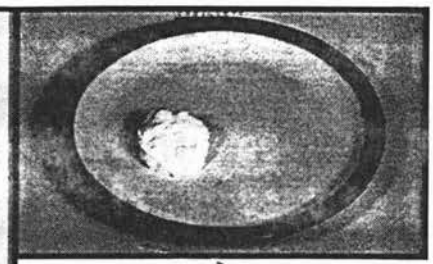
82. Yoghurt or Dairy food (all types)



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

83. Cream



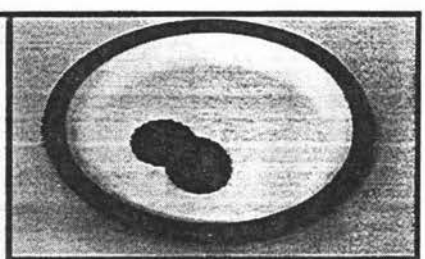
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

84. Other item of the 'Dairy' group (not milk drinks) If you often have another item from this group, not listed - give the name and tick a box to show how often you eat it _____

Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

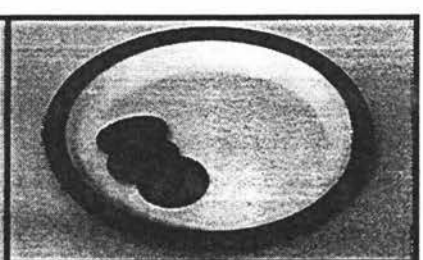
Biscuits/cakes

85. Chocolate coated or cream filled biscuits



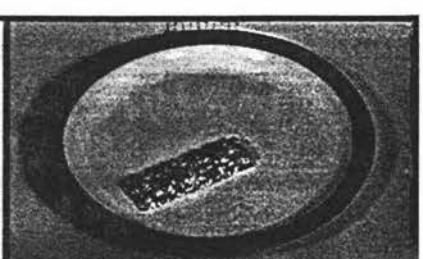
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

86. Biscuits, eg. plain, chocolate chip, semi-sweet, ginger nut, shortbread



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

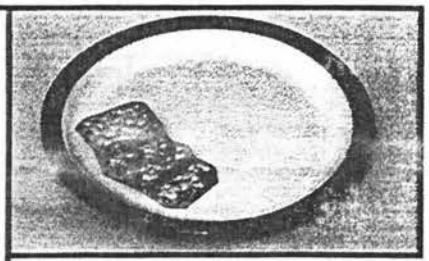
87. Muesli bars



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

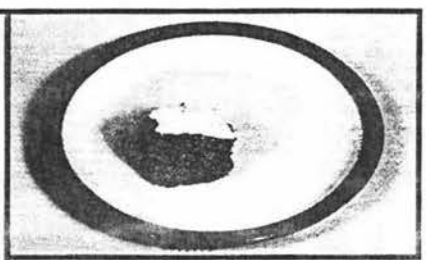
Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

88. Crackers or crispbreads



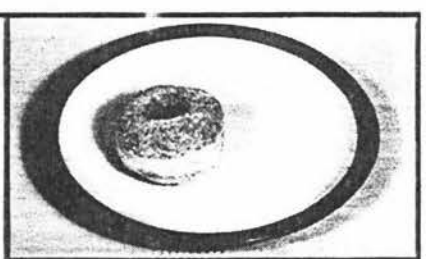
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

89. Cake



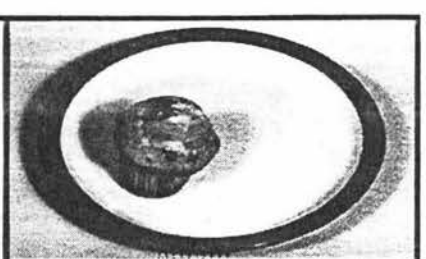
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

90. Doughnuts or croissants



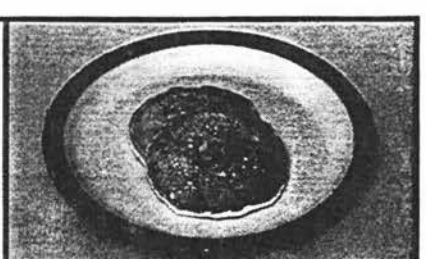
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

91. Scones, muffins or sweet buns



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

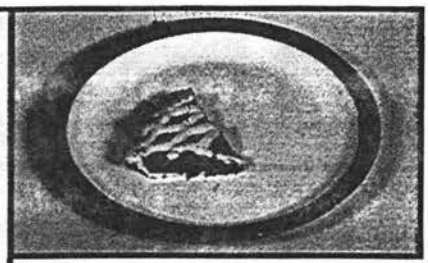
92. Pancake or pikelets



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

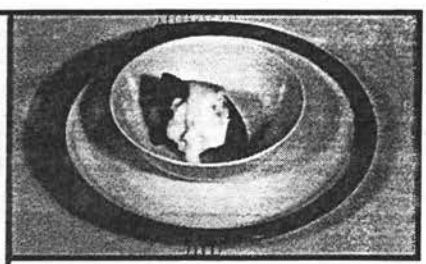
Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

93. Fruit pie, fruit crumble or tart



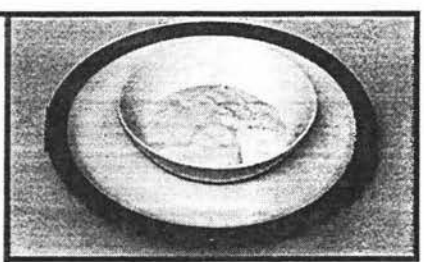
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

94. Pudding, eg. sponge pudding or steamed pudding



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

95. Custard or custard puddings



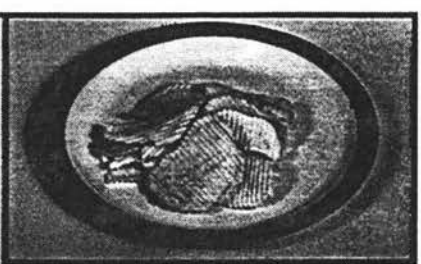
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

96. Other item of the 'Biscuits/cake' group If you often have another item from this group, not listed - give the name and tick a box to show how often you eat it

Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

Snacks and sweets

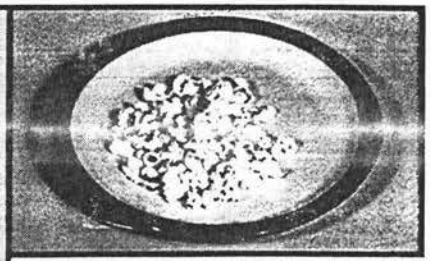
97. Potato crisps, corn snacks or chips, eg. burger rings, rashuns, etc



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

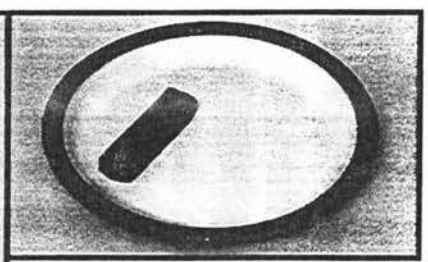
Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

98. Popcorn



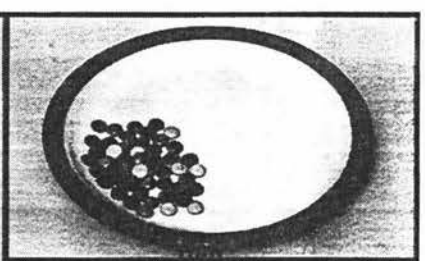
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

99. Chocolate, eg. Moro bar



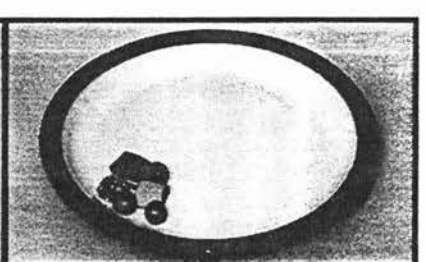
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

100. Candy coated chocolate, eg. pebbles



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

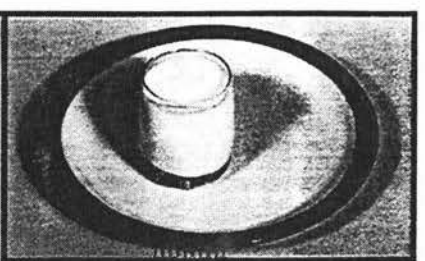
101. Other sweets



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

Milks

102. Milk (not flavoured)



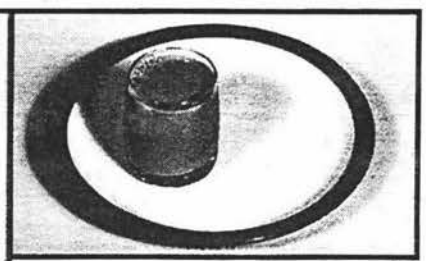
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

102a. What **kind of milk** do you usually drink?

- ☐ Standard milk (dark blue)
- ☐ Trim (green)
- ☐ Soy milk
- ☐ Low fat (light blue)
- ☐ Extra calcium

103. Flavoured milk



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

104. Milk shake

Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

105. Milo powder, Quik or Drinking chocolate

Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

105a. With this drink did you use?

- ☐ All milk
- ☐ 1/2 milk
- ☐ 1/4 or less milk

Was **sugar** added?

- ☐ Yes
- ☐ No

Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

Infant milks

106. Was your child fed **breast milk** daily in the last 4 weeks?

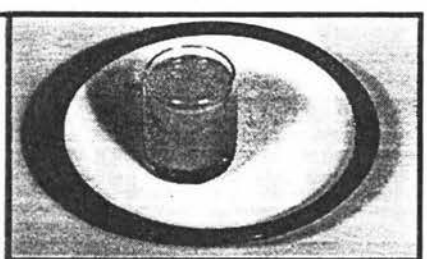
☐ Yes ☐ No

107. Was your child fed **Infant formula** daily in the last 4 weeks?

☐ Yes ☐ No

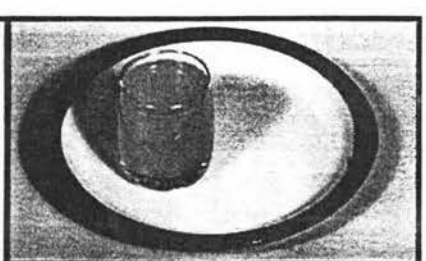
Other drinks

108. **Juice,** eg. fresh orange juice, Just Juice, Freshup, Pams, Ribena diluted



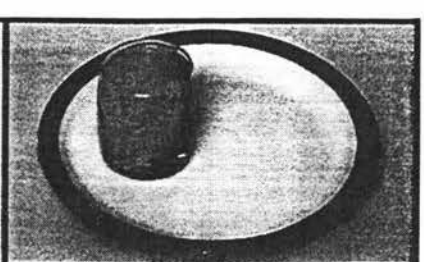
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

109. **Powdered fruit drink,** eg. Refresh, Raro



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

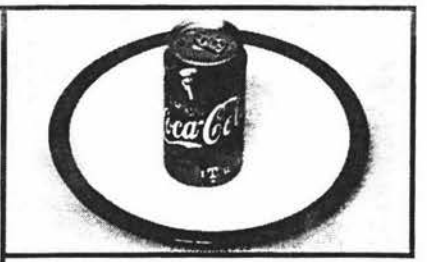
110. **Fruit drink concentrate, cordial**



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

111. Coca cola or other cola drinks

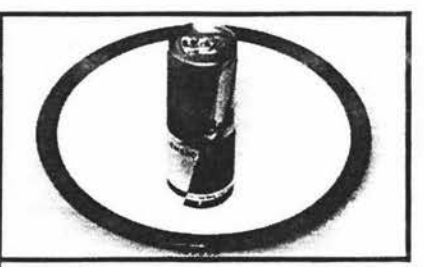


Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

112. Mountain Dew

Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

113. 'Energy' drinks, eg. V, E_2, Red Bull

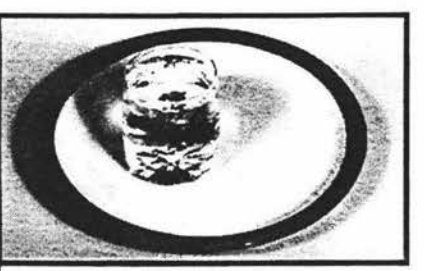


Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

113a. If you have **'energy' drinks**, which **type** do you usually have? (tick one box)

- ☐ V
- ☐ E2
- ☐ Lift
- ☐ Red Bull
- ☐ Liquid B
- ☐ Ikon
- ☐ Bullrush
- ☐ Other (Please name) _____

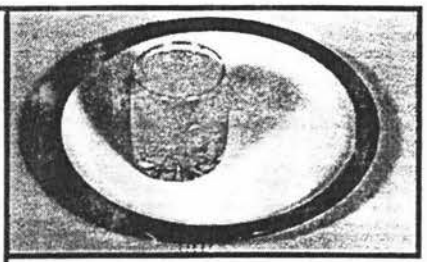
114. Soft drinks, eg. lemonade, orange



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

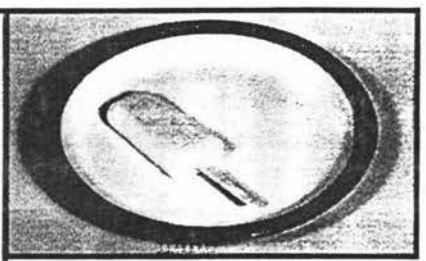
Put a tick ☑ in the box which best tells HOW OFTEN you eat the food.

115. Sports drinks, eg. Gatorade, Powerade



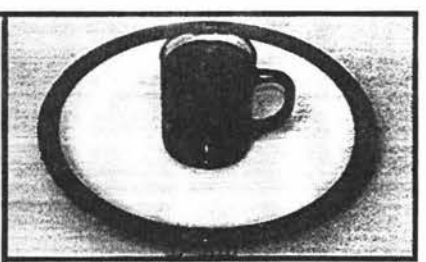
Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

116. Ice blocks



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

117. Tea



Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

117a. Was milk added to your tea?

☐ Yes ☐ No

Was **sugar** added?

☐ Yes ☐ No

118. Other item of the 'Other drinks' group If you often have another item from this group, not listed - give the name and tick a box to show how often you eat it

Never or less than once a month	1-3 times a month	1-2 times a week	3-4 times a week	5-6 times a week	Once a day	2 or more times a day
☐	☐	☐	☐	☐	☐	☐

Dietary supplements

1. During the past month have you taken any vitamins or minerals?
   ☐ Yes ☐ No

2. If **YES**, what do you take fairly regularly? (Choose from the list of dietary supplement types below).

	Number of tablets							
Supplement type	None	1-3 per week	4-6 per week	1 per day	2 per day	3 per day	4 per day	5+ per day
Multivitamin mineral	☐	☐	☐	☐	☐	☐	☐	☐

Supplement name:

	Number of tablets							
Supplement type	None	1-3 per week	4-6 per week	1 per day	2 per day	3 per day	4 per day	5+ per day
Vitamin C	☐	☐	☐	☐	☐	☐	☐	☐

Supplement name:

	Number of tablets							
Supplement type	None	1-3 per week	4-6 per week	1 per day	2 per day	3 per day	4 per day	5+ per day
Haliborange	☐	☐	☐	☐	☐	☐	☐	☐

Supplement name:

	Number of tablets							
Supplement type	None	1-3 per week	4-6 per week	1 per day	2 per day	3 per day	4 per day	5+ per day
Vitamin A	☐	☐	☐	☐	☐	☐	☐	☐

Supplement name:

Supplement type	Number of tablets							
	None	1-3 per week	4-6 per week	1 per day	2 per day	3 per day	4 per day	5+ per day
Iron	☐	☐	☐	☐	☐	☐	☐	☐

Supplement name:

Supplement type	Number of tablets							
	None	1-3 per week	4-6 per week	1 per day	2 per day	3 per day	4 per day	5+ per day
Zinc	☐	☐	☐	☐	☐	☐	☐	☐

Supplement name:

Supplement type	Number of tablets							
	None	1-3 per week	4-6 per week	1 per day	2 per day	3 per day	4 per day	5+ per day
Calcium	☐	☐	☐	☐	☐	☐	☐	☐

Supplement name:

Supplement type	Number of tablets							
	None	1-3 per week	4-6 per week	1 per day	2 per day	3 per day	4 per day	5+ per day
Omega 3 fatty acids	☐	☐	☐	☐	☐	☐	☐	☐

Supplement name:

Supplement type	Number of tablets							
	None	1-3 per week	4-6 per week	1 per day	2 per day	3 per day	4 per day	5+ per day
Herbal/Homeopathic	☐	☐	☐	☐	☐	☐	☐	☐

Supplement name:

	Number of tablets							
Supplement type	None	1-3 per week	4-6 per week	1 per day	2 per day	3 per day	4 per day	5+ per day
Other (1)	☐	☐	☐	☐	☐	☐	☐	☐

Name: _____

	Number of tablets							
Supplement type	None	1-3 per week	4-6 per week	1 per day	2 per day	3 per day	4 per day	5+ per day
Other (2)	☐	☐	☐	☐	☐	☐	☐	☐

Name: _____

	Number of tablets							
Supplement type	None	1-3 per week	4-6 per week	1 per day	2 per day	3 per day	4 per day	5+ per day
Other (3)	☐	☐	☐	☐	☐	☐	☐	☐

Name: _____

Thank you very much for filling out this questionnaire.

Please take a moment to fill in any questions you have skipped.

Appendix 9 Anthropometric Measurement

Massey University

Nutritional Status of Migrant Mainland Chinese Children in Auckland

Growth and Development of Child

May I measure your child? **Code:** _____

Measure

1. Height of child (without shoes) _____cms.
   _____cms.
   _____cms.

   Mean Height:
   _____cms.

2. Weight of child (without shoes) _____kgs.
   _____kgs.
   _____kgs.

   Mean Weight:
   _____kgs.

3. Triceps skinfold of child _____cms.
   _____cms.
   _____cms.

   Mean Triceps skinfold:
   _____cms.

4. Subscapular skinfold of child _____cms.
   _____cms.
   _____cms.

   Mean Subscapular skinfold:
   _____cms.

5. Upper arm circumference of child _____cms.
   _____cms.
   _____cms.

   Mean Upper arm circumference:
   _____cms.

6. Elbow width _____cms.
   _____cms.
   _____cms.

   Mean Elbow width: _____cms.

Appendix 10 Demographic, Medical Status, Lifestyle and Activity Questionnaires

Nutritional Status of Migrant Mainland Chinese Children in Auckland

Life Style Questions

Questions to Parent

I would like you to tell me about your life style.

我希望您能告诉我一些关于您们的生活方式。

E1. Who do the food shopping most of the time in your family?

☐ Mother
☐ Father
☐ Grandfather
☐ Grandmother
☐ Other (specify) _____

E1. People who do shopping
Mother = 1
Father = 2
Grandfather = 3
Grandmother 4
Other = 6
NA = 8
DK = 9

E2. Who prepare the meals most of the time in your family?

☐ Mother
☐ Father
☐ Grandfather
☐ Grandmother
☐ Other (specify) _____

E2. People preparing meal
Mother = 1
Father = 2
Grandfather = 3
Grandmother 4
Other = 6
NA = 8
DK = 9

E3. On a scale of 1-5 with 1 being not very important and 5 of vital importance, when buying food for your children how important are each of the following:

E3. Importance when buying the food

Is the food healthy? 1 2 3 4 5 O O O O O	**Healthy** NA = 8 DK = 9	☐
Will the child eat it? 1 2 3 4 5 O O O O O	**Child will eat it** NA = 8 DK = 9	☐
E4. On a scale of 1-5 with 1 being not important and 5 very important, when buying food for your children how much influence does the child have in deciding what to buy for each of the following:	E4. **Influence of child's decision** NA = 8 DK = 9	
Dairy products/milk/ yoghurt/cheese 1 2 3 4 5 O O O O O	**Dairy products**	☐
Fruit and vegetables 1 2 3 4 5 O O O O O	**Fruit and vegetables**	☐
Breads, cereals, pasta, rice 1 2 3 4 5 O O O O O	**Cereals**	☐
Meat, fish, chicken, egg, dried beans/peas/lentil 1 2 3 4 5 O O O O O	**Food rich in protein**	☐
Snack foods & drinks 1 2 3 4 5 O O O O O	**Snack & Snack**	☐
Takeaways 1 2 3 4 5 O O O O O	**Takeaways**	☐
E5. On a scale of 1-5 with 1 being not important and 5 very important, when thinking of the food nutrition for your child, how important are the each following:	**E5. Importance of food beliefs**	
(a) Chinese traditional medicine 1 2 3 4 5 e.g. "hot" and "cold" O O O O O	**(a) Chinese medicine** NA = 8 DK = 9	☐

And, how do you know your child is in "hot" condition?

Which food do you restrict your child to eat when he/she is in "hot" condition?

Which food do you encourage your child to eat when he/she is in "hot" condition?

How do you know your child is in "cold" condition?

Which food do you restrict your child to eat when he/she is in "cold" condition?

Which food do you encourage your child to eat when he/she is

in "cold" condition?

_____

_____

(b) Modern nutrition knowledge e.g. vitamins and minerals	1 2 3 4 5 O O O O O	**(b) Modern nutrition** NA = 8 DK = 9 ☐

E6. When you buy any food for your child, do you consider your budget?

E6. Consideration of budget

☐ Often
☐ Sometimes
☐ Never
☐ Don't know

Often = 1
Sometimes = 2
Never = 3
Don't know = 9
NA = 8
DK = 9 ☐

E7. On a scale of 1-5 with 1 being not important and 5 very important, when buying "Western" food for your child how important is does it have for each of the following:

E7. Influence of Western food

NA = 8
DK = 9

Convenience for shopping	1 2 3 4 5 O O O O O	**Convenience** ☐
Easier preparation	1 2 3 4 5 O O O O O	**Preparation** ☐
To become part of New Zealand society	1 2 3 4 5 O O O O O	**Acculturation** ☐

Massey University

Nutritional Status of Migrant Mainland Chinese Children in Auckland

Physical Activity

Questions to Parent

I would like to know your child's energy expenditure, could you please tell me something about your child's activity status, that is the time he/she spend sleeping, sitting, walking and running etc.?

我想知道您的孩子的能量消耗状况，您是否能告诉我一些关于您孩子的活动状况，譬如他她一天睡多少时间，有多少时间用在坐，走和跑等等？

F1. In the last 4 weeks, how many days each week did (child) usually play outside after school?

	Days/week	**F1. Days playing outside**
(a) During the week:	☐	**(a) During the week**
		1 day/week = 1
		2 days/week = 2
		3 days/week = 3
		4 days/week = 4
		5 days/week = 5
		0 day/week = 6
		NA = 8 ☐
		DK = 9
	Days/week	**(b) During the weekend**
(b) During the weekend:	☐	1 day/week = 1
		2 days/week = 2
		0 day/week = 3
		NA = 8 ☐
		DK = 9

F2. How many hours in average did (child) play outside each day?

Average hours/day

(a) During the week: ☐

Average hours/day

(b) During the weekend: ☐

F2. Hours each day

< 2 hours = 1

2 - < 4 hours = 2

≥ 4 hours = 3

NA = 8

DK = 9

(a) During the week ☐

(b) During the weekend ☐

F3. How long does it usually take your child to travel to school from home?

O Less than 5 minutes

O 5 - 15 minutes

O 16 –30 minutes

O 31 minutes – 1 hour

O More than 1 hour

F3. Time from home to school

Less than 5 minutes = 1

5 - 15 minutes = 2

16 –30 minutes = 3

31 minutes – 1 hour = 4

More than 1 hour = 5

NA = 8

DK = 9 ☐

F4. In the last 4 weeks, how did you usually travel to school?

O On foot

O By bicycle

O By bus

O By car

O By train

O By motorcycle

O Other (specify) _____

F4. Way to school

On foot = 1

By bicycle = 2

By bus = 3

By car = 4

By train = 5

By motorcycle = 6

Other = 7

NA = 8

DK = 9 ☐

F5. In the last 4 weeks, how did your child usually travel home from school?	**F5. Way home**
O On foot	On foot = 1
O By bicycle	By bicycle = 2
O By bus	By bus = 3
O By car	By car = 4
O By train	By train = 5
O By motorcycle	By motorcycle = 6
O Other (specify) _____	Other = 7
	NA = 8 ☐
	DK = 9
F6. (a) In the last 4 weeks, has your child taken part in organized sports before or after school during the week, or at the weekend?	**F6. Sports and physical activities** **(a) Organized sports**
O Yes	Yes = 1
O No	No = 2
	NA = 8 ☐
IF "Yes":	NK = 9
Sports (do not include school-time activities):	<1 hour = 1
	1 - 2 hours = 2
_____ hours/week	2-3 hours = 3 ☐
	> 3 hours = 4
_____ hours/week	NA = 8 ☐
	DK = 9
And, (b) has your child taken part in physical activities before or after school during the week, or at the weekend?	**(b) Physical activities**
O Yes	Yes = 1
O No	No = 2
IF "Yes":	NA = 8
Activities (do not include school-time activities):	DK = 9 ☐

_____ hours/week

_____ hours/week

_____ hours/week

<1 hour = 1
1 - 2 hours = 2
2-3 hours = 3
> 3 hours = 4
NA = 8
DK = 9

F7. In the last 4 weeks, what time did your child usually get out of bed in the morning?

(a) During the week: ☐

(b) During the weekend: ☐

F7. Time getting out of bed

Early than 7:00 = 1
7:00 – 7:29 = 2
7:30 – 7:59 = 3
Late than 8:00 = 4
NA = 8
DK = 9

(a) During the week ☐

(b) During the weekend ☐

F8. In the last 4 weeks, what time did your child usually go to bed at night?

(a) During the week: ☐

(b) During the weekend: ☐

F8. Time going to bed

Early than 20:00 = 1
20:00 – 20:29 = 2
20:30 – 20:59 = 3
Late than 21:00 = 4
NA = 8
DK = 9

(a) During the week ☐

(b) During the weekend ☐

F9. In the last 4 weeks how many days each week did your child usually spend watching TV/videos at home?

Days/week

(a) During the week: ☐

Days/week

(b) During the weekend: ☐

F10. On average how much time each day does your child usually spend watching TV/videos?

Average hours/day

(a) During the week: ☐

Average hours/day

(b) During the weekend: ☐

F9. Days watching TV/videos

(a) During the week

1 day/week = 1
2 days/week = 2
3 days/week = 3
4 days/week = 4
5 days/week = 5
0 day/week = 6
NA = 8
DK = 9

☐

(b) During the weekend

1 day/week = 1
2 days/week = 2
0 day/week = 3
NA = 8
DK = 9

☐

F10. Time watching TV/video

< 1 hours = 1
1 – < 2 hours = 2
2 – < 4 hours = 3
≥ 4 hours = 4
NA = 8
DK = 9

(a) During the week

☐

(b) During the weekend

☐

F11. In the last 4 weeks how many days each week did your child usually spend playing computer or video games at home?

Days/week

(a) During the week: ☐

Days/week

(b) During the weekend: ☐

F12. On average how much time each day does your child usually spend playing computer or video games?

Average hours/day

(a) During the week: ☐

Average hours/day

(b) During the weekend: ☐

F11. Daysplaying computer or video games

(a) During the week

1 day/week = 1
2 days/week = 2
3 days/week = 3
4 days/week = 4
5 days/week = 5
0 day/week = 6
NA = 8
DK = 9

☐

(b) During the weekend

1 day/week = 1
2 days/week = 2
0 day/week = 3
NA = 8
DK = 9

☐

F12. Time playing computer or video games

0 hours = 1
0 – 1 hours = 2
> 1 hour = 3
NA = 8
DK = 9

(a) During the week

☐

(b) During the weekend

☐

Massey University

Nutritional Status of Migrant Mainland Chinese Children in Auckland

Medical Conditions

Questions to Parent

I would like you to tell me about your child's health.

我希望您能告诉我您的孩子的健康状况。

G1. Does your child have a long term (>6 months) medical condition or disability?	**G1. Long term medical condition/disability**
O Yes	Yes = 1
O No	No = 2
	NA = 8
IF "Yes":	DK = 9 ☐
What kind of disease did your child get?	
_____	Asthma = 1
	Diabetes = 2
_____	Heart condition = 3
	Digestive problem = 4
_____	Kidney problem = 5
	Other = 6
	NA = 8
	DK = 9 ☐
G2. Has your child been admitted to hospital in last 12 months?	**G2. Hospital admittance**
O Yes	Yes = 1
O No	No = 2
IF "Yes":	NA = 8
Please specify reasons:	DK = 9 ☐

_____

_____

G3. Is your child currently taking any pills or medicines prescribed by a doctor?

O Yes

O No

IF "Yes":

Please specify reasons:

_____

_____

G3. Prescribed pills or medicines taking

Yes = 1

No = 2

NA = 8

ND = 9

Massey University

Nutritional Status of Migrant Mainland Chinese Children in Auckland

Eating Pattern

Questions to Child

I would like to know when your child eats. Could you please allow me ask your child some questions?

我想知道您的孩子进食的时间。您可不可以允许我问您的孩子一些问题？

H1. Do you usually eat the breakfast?	**H1. Breakfast**
O Yes	Yes = 1
O No	No = 2
O Don't eat breakfast	Don't eat = 3
	NA = 8
	DK = 9 ☐
H2. Do you usually eat something on the way to school?	**H2. Eating on way to school**
O Yes	Yes = 1
O No	No = 2
	NA = 8
	DK = 9 ☐
H3. Do you usually eat food while you are at school?	**H3. Eating at school**
O Yes	Yes = 1
O No	No = 2
	NA = 8
If "yes":	DK = 9 ☐
Which of the following times, do you usually eat or drink?	

O Morning break	Morning break = 1
O Lunch time	Lunch time = 2
O Afternoon break	Afternoon break = 3
	NA = 8
	DK = 9
H4. Do you usually eat something on the way home from school?	**H4. Eating way home**
O Yes	Yes = 1
O No	No = 2
	NA = 8
	DK = 9
H5. Do you usually eat at home straight after school?	**H5. Eat straight after school**
O Yes	Yes = 1
O No	No = 2
	NA = 8
	DK = 9
H6. Do you usually eat the evening meal?	**H6. Evening meal**
O Yes	Yes = 1
O No	No = 2
O Don't eat evening meal	Don't eat = 3
	NA = 8
	DK = 9

Massey University

Nutritional Status of Migrant Mainland Chinese Children in Auckland

General Background

Questions to Parent

Because diet is related to the home situation, I would like you to tell me about the members in your family who live in New Zealand.

因为饮食与家庭相关，我希望您能告诉我一些您的居住在纽西兰的家庭成员的情况。

Family Unit in New Zealand

I	II	III		VI		V
Relationship to the child	**Age(Children only)**	**Occupation (Adults only)**		**Occupation status (e.g. full time or part time. Adults only)**		**Time for living in New Zealand**
		New Zealand	**China**	**New Zealand**	**China**	
Child (1)						

A1. How many people are there in your family including you and your child? (ENTER THE RELATIONINSHIP TO CHILD IN COLUMN I, SUBJECT TO BE THE FIRST ENTRY)	**A1. Family no.** Respondent = 1 Father = 2 Mother = 3 Brother = 4 Sister = 5 Grandfather = 6 Grandmother = 7 NA = 8 DK = 9
A2. What are the ages of your child's brother(s)/sister(s) if he/she has any in New Zealand? (ENTER IN COLUMN II)	**A2.Age of brother(s)/ Sister(s)** < 1 year = 1 1 – 2 years = 2 ≥ 3 years = 3 NA = 8 DK = 9
ASK FOR ALL ADULTS IN FAMILY	
A3	**A3.**
(a) What is _____'s occupation at present? (ENTER IN COLUMN III)	**(a) Occupation** NA = 8 DK = 9
What did _____ do when _____ was in China? (ENTER IN COLUMN III)	
(b) Does _____work full time or part time at present? (ENTER IN COLUMN VI)	**(b) Occupation Status** Full time = 1
Did _____ work full time or part time when _____ was in China? (ENTER IN COLUMN VI)	Part time = 2 NA = 8 DK = 9

A4. How long has _____ been in New Zealand?

(ENTER IN COLUMN V)

O Less than 6 months

O 6 months ~ 2 year

O More than 2 years

A4. Time of being in New Zealand

< 6 months = 1

6 months - < 2 year = 2

2 - < 3 years = 3

3 - < 4 years = 4

≥ 4 years = 5

NA = 8 DK = 9

A5.

(a) How many years of high school did the child's father complete?

_____

_____

A5. Education

(a) Years of school for father

Less than 5 years = 1

5 – 6 years = 2

NA = 8

DK = 9

(b) How many years of high school did the child's mother complete?

_____

_____

(b) Years of school for mother

Less than 5 years = 1

5 - 6 years = 2

NA = 8

DK = 9

A6.

(a) Has the child's father done further education or training since he left school?

O Yes O No

Specify _____

_____

A6. Tertiary training

(a) Father's

Yes = 1

No = 2

NA = 8 DK = 9

Working Train = 1

Polytech = 2

University = 3

Other = 4

NA = 8 DK = 9

(b) Has the child's mother done further education or training since she left school?

O Yes O No

Specify _____

_____

(b) Mother's

Yes = 1
No = 2
NA = 8 DK = 9

Working Train = 1
Polytech = 2
University = 3
Other = 4
NA = 8
DK = 9

Appendix 11 Feedback to Participants

Albany Campus

Food Institute of Food, Nutrition and Human Health

Results from the Nutrition Survey of Migrant Mainland Chinese Children

Dear _____

We are very appreciative of your recent contribution to our nutrition survey of migrant Chinese children. The results for your child are listed below, and an explanation and recommendations are attached.

If you have any questions concerning your child's results we suggest you contact us or ask his/her regular doctor. Your child's doctor will be aware of your child's overall health.

1. Body Measurements

Height (cm): _____

Weight (kg): _____

Body Mass Index (BMI)*: _____

*Body Mass Index

- Body Mass Index or BMI is an indicator of weight relative to the height of your child.

- According to the standard BMI charts for children, your child is

O Under weight

O Normal weight

O Overweight

O Obese

2. Nutrient Intake

Energy (kJ/day): _____

Energy from fat (%): _____

Energy from carbohydrate (%): _____

Protein (g/day): _____

Dietary fibre insoluble (g/day): _____

Iron (mg/day): _____

Calcium (mg/day): _____

Vitamin C (mg/day): _____

Vitamin A Eq (μg/day): _____

Folate (μg/day): _____

Remember to check the explanation and recommendations attached. If you have any concern about these results please feel free to ring me.

Thank you again for you help.

Yours sincerely

Jie Hua Lu

Albany Campus

Food Institute of Food, Nutrition and Human Health

中国大陆移民儿童营养调查结果

尊敬的_____家长：

非常感谢您们对我们的中国移民儿童营养调查的支持！以下是您们的孩子的结果，我们还另附上一份解释和建议。

如果您们对孩子的结果有任何疑问，请联系我们或孩子的医生，医生会知道您们孩子的健康状况。

1. 体格发育状况

身高(cm)：_____

体重(kg)：_____

体质指数(BMI)*：_____

*体质指数：

体质指数或BMI可指示与身高相应的体重。

根据儿童BMI标准图，您们的孩子

O 消瘦

O 体重正常

O 超重

O 肥胖

2. 营养素摄取状况

能量(MJ/日)：_____

来自脂肪的能量(%)：_____

来自碳水化合物的能量(%)：_____

蛋白质(g/日)：_____

膳食纤维(g/日)：_____

铁(mg/日)：_____

钙(mg/日)：_____

维生素C(mg/日)：_____

维生素A 视黄醇当量 (μg/日): _____

叶酸(μg/日) : _____

请记住核对所付的解释和建议。如果您们对结果有疑问，请随时致电我。

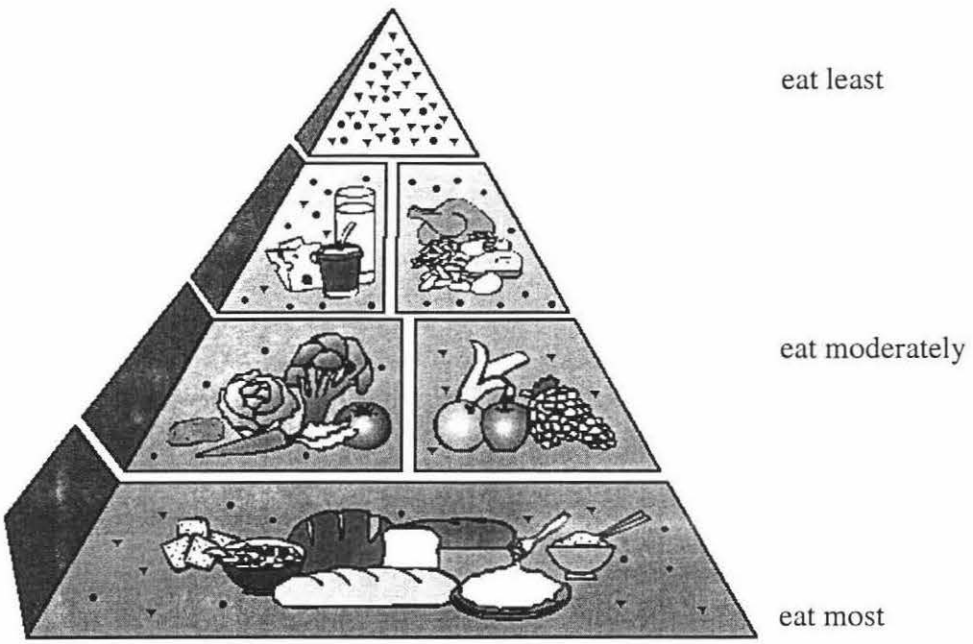
再次感谢您们的帮助！

此致，

敬礼！

卢洁华

Nutrient Recommendations



Protein

- Children require protein for the maintenance of body tissues, changes in body composition and growth of new tissues.
- Recommended dietary intake: 27-38 g/day for boys and 27-39 for girls, or 1.0 g/kg/day.

Fat

- Fat is an important source of energy for active children who require energy-dense foods for growth. Fat is an essential component of the diet as it provides essential fatty acids and fat-soluble vitamins.
- Essential fats are omega-3 and omega-6 fatty acids, which must be obtained from the diet, as they can not be produced by the body. Omega-3 plays an important role in the brain and vision. Leafy vegetables, vegetable oils, fish and seafood contain omega-3, while omega-6 can be found in vegetable oils and meat.

- High fat intake is associated with obesity and can be a risk factor for cardiovascular disease.
- Recommended dietary intake: 30-35 percent of the total energy should come from fat.

Dietary Fibre

- There is good evidence that a diet rich in the complex carbohydrates, in which dietary fibre is found, benefits body health.
- The insoluble fibre content is from wheat bran, cereals and some vegetables. This fibre can not be completely digested and some of it passes through the body. Insoluble fibre helps prevent bowel disease.
- High-fibre diets are not recommended for young children as the bulkiness of high-fibre foods make it difficult for children to eat enough to meet their energy requirements. It is suggested that a gradual increase in dietary fibre be recommended (recommended dietary intake for adults is 25-30 g/day).

Iron

- Iron is used for the formation of blood and for carrying oxygen in the blood. Iron needs are greatest during periods of rapid growth such as childhood. Failure to obtain an adequate iron intake can result in iron deficiency anemia.
- Recommended dietary intake: 6-8 mg/day.

Calcium

- Calcium is necessary for strong bones and teeth, just as lime is necessary for strong concrete. Calcium is continually deposited into bone cells, like the cement that holds together the particles of stone and sand in a chunk of concrete.
- Bone is in a growth phase during childhood, and calcium needs are high at this time.
- Recommended dietary intake: 800 mg/day for boys and 900 mg/day for girls.

Vitamin C

- Children need vitamin C for the formation of collagen in the blood vessels, bones, teeth and connective tissue. It is also needed for wound healing and the absorption of iron from cereals.
- Recommended dietary intake: 30 mg/day.

Vitamin A

- Children need vitamin A for the function of vision, a healthy skin and many other physiological processes.
- Recommended dietary intake: 250 – 700 Retinol EQ (μg)/day.

Folate

- Folate is a kind of vitamin that is necessary for growth and may play some role in preventing heart disease.
- Recommended dietary intake: 150 μg/day.

Eating Recommendations for Healthy Children

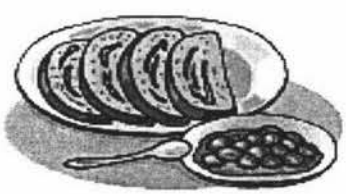
Children need to eat lots of different food to get energy, stay healthy and grow.
(The serving size used here is as the same as the helping size in the interview)

Vegetables and Fruit

- Vegetables and fruit have carbohydrates (sugar and starch), fibre, vitamins and minerals.
- Eat at least three servings of vegetables and two servings of fruit each day.

Breads and Cereals

- Breads, cereals, pasta and rice are high in carbohydrates and fibre.
- Breads and cereals make good snack foods for this group of children. Choose some whole grain breads and cereals.
- Eat at least five servings every day.

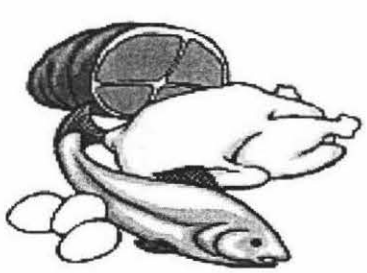


Milk and Milk Products

- Children need milk and milk products for protein and calcium.
- Eat at least two to three servings every day.

Lean Meats, Chicken, Seafood, Eggs and Dried Peas, Beans and Lentils

- These foods have protein, vitamins and minerals, including iron and zinc.
- Children need iron. Lean red meats, seafood and chicken have lots of iron.
- Eat at least one serving everyday.

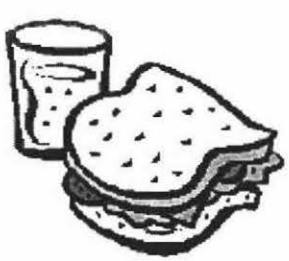


Eat Enough Food for Activity and Growth

- Children need food to get energy for living, growing and for activity. The more active children are, the more energy they need.
- Offer drinks and snacks often when your child is being active.
- Encourage overweight children to be more active. Give them three meals each day, and snacks that are low in fat and sugar.

Mini Meals and Snacks are OK

- As they grow children eat different amounts of food.
- Children may be very hungry after physical activity, or when they get home from school.
- Give them snacks low in salt and sugar.



- Snack suggestions:

*Sandwiches – peanut butter, banana, cheese, jam or honey.

*Bread rolls, crackers and muffins.

*Fruit – fresh or frozen (fun in summer).

*Cereals – choose those low in fat and sugar.

*Yoghurt, cubes of cheese or milk.

*Chinese type – noodles, steamed bun, and dumpling.

New Foods

- Involve children in buying and choosing food and getting meals ready.
- Children are curious about different ethnic foods. Talk about new foods they learn about at school.

Drink Plenty Every Day

- Children need plenty to drink to keep their body working. They need to drink more when they are active and when it's hot.
- Children need small drinks often. Keep offering drinks as children may forget to drink when they are busy.
- Water is best.
- Tannins in tea and coffee prevent iron in food from being absorbed. Serve water or fruit juice rather than tea and coffee.

Offer Treats Now and Then

- Treat foods are different from snack foods. Children need snacks every day, but keep treat foods for specials time.

- Treat foods include sweets and lollies, chippies, chocolates, sweet biscuits, fruit leathers and roll-ups, muesli bars, cream and fizzy drinks.
- Foods that are high in fat, salt or sugar are best left for occasional treats.

Takeaways

- Most takeaways are high in fat, salt and sugar.
- Have takeaways on special occasions and not as an everyday food.

Opportunity to Be Physically Active

- All children benefit from regular physical activity.
- Encourage children to be physically activity.
- Physical activity can include organised sports, playing games, mowing lawns, family walks, rollerblading, skateboarding, bicycling, swimming and family visits to playgrounds. The activity needs to be appropriate for the age of the child.