DIETARY INTAKE AND ANTHROPOMETRIC MEASUREMENTS OF NEWLY ARRIVED AND LONGER RESIDENT MAINLAND CHINESE WOMEN IN AUCKLAND

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Kai Hong Tan

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ABSTRACT

Objective: To produce baseline data on the food consumption patterns, dietary intakes and anthropometric measurements of Mainland Chinese women living in Auckland and reveal any changes in these measurements after immigration. The impacts on health of dietary change were assessed.

Subjects: Fifty-five subjects originating from Mainland China, aged between 20 to 45 years, with 25 newly arrived (having lived in New Zealand for less than two years) in the 2-year group and 30 longer resident Chinese (having lived in New Zealand for more than four years) in the 4-year group.

Methods: Data collection included a socio-economic questionnaire, anthropometric measurements and dietary intake record. Anthropometric measurements included body weight, height, skinfolds, waist circumference, hip circumference and blood pressure. BMI and Waist/Hip ratio were also calculated. A single 24-hour recall and two days of weighed diet records were used to assess dietary intake.

Results: All the mean anthropometric measurements were higher in the 4-year group than in the 2-year group. Except for the differences of waist and hip circumference, all differences did not achieve statistical significance. Study subjects had lower BMI levels than New Zealand women and their Mainland Chinese counterparts. According to the New Zealand classification, study subjects had a lower prevalence of overweight (13%), but a higher prevalence of W/H ratio excess than that in New Zealand women (49%, 25% respectively). The study subjects had a better blood pressure profile than New Zealand women. More than 90% of the subjects fell into the normal blood pressure range. None of the subjects had high blood pressure.

In this study, there were no significant differences in nutrient intake between the two study groups. Median energy of all the subjects was 6965kJ, protein 71.2g (with the protein energy ratio of 17%), lipid 68.6g (with the lipid energy ratio of 36.8%),

carbohydrate 182g (with the carbohydrate energy ratio of 43.9%), fiber 16.2g, cholesterol 324g, total vitamin A 541ug, calcium 488mg and iron 12.5mg per day. Alcohol intake was very low. Excessive fat/energy ratio, low carbohydrate/energy ratio, inadequate intakes of calcium, and high intakes of sodium were the main nutritional problems in the study subjects. Study subjects had a lower sodium intake, but higher calcium and fiber intake than their Chinese counterparts, whereas, calcium intakes of the study subjects were much lower than that of New Zealand women. The fatty acid profile was better than New Zealand women, with higher polyunsaturated fatty acid and lower saturated fatty acid intakes. Iron nutritional status requires further research.

In the present study, food patterns in the 2-year group were similar with those in the 4-year group, except for the lower consumption of rice and its products in the 2-year group. Compared to the Chinese counterparts, study subjects ate less cereal, vegetables, salted vegetables, organ meats and oils, but more legume, fruits, poultry and dairy food.

Conclusion: It is important for migrant Chinese to maintain their traditional dietary habits. Furthermore, there is a need to develop obesity indicators that are appropriate for different races and to monitor the trend of dietary intake and anthropometric change in this population with time.

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CHAPTER 1. INTRODUCTION

A relationship between diet and health is generally accepted. Food intake is thought to influence the risk of developing cardiovascular disease, diabetes mellitus, hypertension, hyperlipidaemia and some cancers (Hsu-Hage et al, 1993). The prevalence of coronary heart disease in China is among the lowest in the world (The WHO MONICA Project, 1988). This may be partly a result of a diet more favorable towards cardiovascular health. The Chinese diet is generally considered low in fat and cholesterol, and high in carbohydrate and fiber. However, several studies have documented changes in the food habits of various Chinese immigrant populations (Grivetti & Paquette, 1978; Yang & Fox, 1979; Wang et al, 1994; Hsu-Hage et al, 1995). The process of acculturation has resulted in increasing meat and animal fat consumption. Indeed, the prevalence of coronary heart disease varied widely among immigrant Chinese populations in different countries, but all showed the same trend: higher than the original Chinese population. Migrant Chinese populations experience an increased risk of coronary heart disease (CHD).

With the liberalization of immigration policies in the middle of 1980s, a large number of Chinese immigrated to New Zealand. The 1996 estimate of the ethnic Chinese population in New Zealand nationwide was near 95,000 (Ip, 1996; Ng, 1999). However, comparatively little is known about their dietary patterns and health needs. In this study, we assessed dietary intakes, body composition and blood pressure in a sample of Mainland Chinese women resident in New Zealand, to provide insight into dietary trends and their potential impact on health status.

CHAPTER 2. LITERATURE REVIEW

2.1 Food Habits in China

2.11 Foodstuffs

China is a big country with great varieties of foodstuffs. It is extremely heterogeneous. Different areas may differ widely in what people eat, drink, and smoke. However, the most important components of the daily diets are grains and cereals, which provide most of the daily energy intake. Rice is the major cereal staple for southern and eastern China, but in several northern and central regions rice consumption is replaced by the consumption of wheat and coarse grains including corn, millet, sorghum, etc (Vern & Francis, 1977; Chen et al, 1990).

In China, soybean is considered one of the five sacred grains, along with rice, wheat, barley, and millet, which are essential to the Chinese diet and civilization. Among cereal and other legume species, the soybean has the highest protein content and higher oil content. Soybean and its products, such as tofu and soymilk, are very popular in China. They are inexpensive, nutritious and versatile. They can be served as a meat or cheese substitute. Yet compared with meat or cheese, they have a much lower energy value because of their higher protein/fat ratio. They are also cholesterol-free, lactose-free, and lower in saturated fat. Tofu is considered a 'health, low fat food' in China. All of these advantages have caused soybeans to become more important than any animal food as a protein and calcium provider in China.

The most popular meat in China is pork (Vern & Francis, 1977). Compared to any other country, China today has by far the largest number of pigs, 331 million, or roughly 40 percent of all the world's pigs. Its annual pork production is over 16 million tons, which is 27 percent of all the pork produced in the world (Wittwer, et al, 1987). Currently, per capita red meat consumption in China has reached 35.4 kg, with pork taking 60-84.7%

(Ge 1996; Xiong et al, 1999). In addition to pork as the main meat, there is considerable use of lamb in the North. Since Muslims never eat pork, lamb is always their main meat. Very little beef is available because of minimal grazing land.

Vegetable use is extensive, with the more common ones being soybeans and other leguminous plants, *bok choy* and all members of the cabbage or Brassica family. Fruits and nuts are eaten frequently, and persimmons, pomegranates, peaches, pears, apples, grapes, Chinese dates, chestnuts, walnuts, and peanuts are popular (Simoons, 1991). Consumption and variety of fruits and vegetables depend upon geographic location and season.

Production and consumption of selected foodstuffs in China in 1986 is shown in Table 2.1.

2.12 Beverages

Tea is universal in China and is served at most meals and at other times. There are many kinds of tea. The essential forms of tea, however, are black or fermented, oolong or semifermented, green or unfermented, scented and "brick" tea which is steamed and compressed into a solid or semi-solid product of some sort (Anderson, 1988). The Chinese believe ordinary teas, as well, to be effective in promoting health and well being. Tea drinking is said to lessen thirst, eliminate fatigue and depression, create a sense of well being, encourage alertness and clarity of thought, and contribute to longevity. It is also said to have specific physiological benefits, including aiding digestion, increasing the flow of blood in the body, hastening the removal of alcohol and other harmful substances from the body, acting to relieve pain in the limbs and joints, countering anemia, enhancing disease resistance, helping to keep skin youthful, impeding tooth decay and giving zest to the eyes. Though tea is China's national drink and most people consume it in amounts far greater than in the Western world, those amounts vary considerably from person to person.

Alcoholic beverages are also commonly used in ritual offerings, and consumed at meals and on festive occasions. The drink is usually served in small cups and sipped rather than drunk. In China, alcohol is most commonly served with meals. The Chinese normally do not drink alcoholic beverages alone or without the accompaniment of food. Many of the best-known white liquors in China use sorghum as the sole ingredient. Other ingredients include corn, rice, barley, sweet potatoes, and manioc.

2.13 Meal Patterns

Most Chinese eat three meals a day. Generally, people eat porridge or millet gruel as the main food for breakfast and steamed rice or boiled noodles or plain steamed bread (mantou) as the main foods for both lunch and dinner. Meat, fish, eggs, chicken, duck, and vegetables are non-staple foods. Chinese families usually have meals together and all household members share dishes at the dining table. Food is not served in individual portions; instead, everyone picks up mouthfuls of food from the plates on the table (Anderson EN & Anderson ML, 1977; Newman, 1999). The Chinese do not drink water with their meals. The usual meal begins and/or ends with hot soup. The number of dishes relates to the number of diners and dollars. Everyone eats different amounts from the common dish.

2.14 Cooking Methods

China has a very long history of cooking. Chinese prefer stirfrying - ingredients are made or cut small and thin and stirred rapidly in very hot oil, searing them quickly. This is done so that the vegetables stay crisp and keep their bright color and healthful vitamins.

Besides stir-frying, steaming and boiling are the main cooking methods. The rice is boiled; so are the vegetables, either in soup or watery boil-up with varying amounts of meat or fish.

Vegetables are cooked before being consumed. Salt, soy sauce, ginger, green onions, garlic, pepper, pickled black soybeans, and cooking oil are the other things added to the food during cooking.

Different regions of China have their own special styles of cooking. Some say there are four culinary regions, named for the points of a compass: south around Guangdong, east in and near Shanghai, west around Sichuan and Hunan, and north in Beijing and environs. People from Shanghai and environs prefer their foods red-cooked. They add some sugar and sometimes vinegar when preparing the dishes and all their foods are a little bit sweeter than those eaten by their southern, western, or northern neighbors. Those from western areas such as Sichuan and Hunan like their main dishes more piquant than do Chinese from other regions, and use a lot of fagara, a dried Sichuan peppercorn flower. Guangdong dishes are light, less spicy and less oily than those of other areas. The western region has little access to internal waterways or the coastline, so they eat little fish.

2.2 Dietary Patterns of Chinese Living in China

Food patterns reported in the 1992 National Nutrition Survey in urban China are shown in Table 2.2 and 2.3. The average intake of cereals was 405g (consisting of rice 223g, wheat flour 165g and other grains 17g); vegetables 327g; fruits 80g; meats 100g (61 percent of which was pork); milk, egg and fishery products 36, 29 and 44g respectively; oil 37g and salt 13g. The intake of cereals and tubers was higher in the low-income group than that in the medium and high-income groups. The intake of animal foods, fruits, vegetable oil, sugar and alcohol was lower in the low-income group than that in the medium and high-income groups (Ge, 1996).

Milk consumption in China is very low; even in the cities where milk is available; it is mostly consumed by children and the elderly. Cheese and dairy products have never been highly acceptable in the traditional Chinese diet. The national average for milk consumption was reported as being only 11 kg per capita per year for all the urban population (Chen, 1997). The situation was somewhat different in large cities, where middle-class families, through Western influence, came to consume a certain amount of milk and butter (Simoons 1991).

One possible explanation for the failure of the Chinese to consume dairy products is that dairy products are simply too expensive to produce in China in comparison with alternative foods, such as soybean and pork products. The Chinese lack of interest in dairy food is almost certainly, in part, a result of the fact that the soybean provides the same sorts of nutrition more economically. Instead of milk, soybean milk is widely popular. Another reason is that a high percentage of Chinese have symptoms such as intestinal gas, distension, flatulence, cramps, and diarrhea when they consume dairy foods. This is known as lactose resistance and is caused by an insufficiency of the enzyme lactase in the small intestine. They are unable to hydrolyse the lactose. Since the disaccharide is not absorbed, it acts as an osmotic load, causes an outpouring of fluid into the small intestine, provoking increased gastrointestinal motility, and gives rise to severe discomfort, water intake, and diarrhoea (Davis & Bolin, 1967; Chung & McCil, 1968; Bayless & Christopher, 1969; Bolin et al, 1979; Elliott WH & Elliott DC, 1997).

The per capita consumption of alcohol in China is very low by Western standards. Most Chinese drink tea rather than alcoholic beverages, except on special occasions, and most Chinese women are teetotalers. One possible explanation of the low Chinese liquor consumption is that after drinking even small quantities of liquor the faces of the Chinese may flush, and they may become confused and talk loudly. A deficiency of aldehyde dehydrogenase is common in Chinese populations (Mizoi et al, 1989). When people with aldehyde dehydrogenase deficiency drink alcohol, acetaldehyde accumulates, and they suffer adverse reactions such as facial flushing, nausea and dizziness.

2.3 Nutritional Status of Chinese and Chinese Women in China

Results of dietary surveys showed that the diets of all Chinese shared the common characteristics of high carbohydrate content, mainly from starch, and relatively low fat content (18% to 31% of total energy intake). The proportion of saturated fat was low, only 19% of total fat. Mean daily intake of cholesterol was 300 mg in Chinese men (Tao et al, 1989).

Another dietary survey of Hong Kong Chinese indicated that features of the diet included a percentage fat less than 30% of the total calorie intake, saturated fat intake less than 10% of calories, and cholesterol less than 43 mg/1000 kJ. Soy, legumes, green tea were frequently consumed in this population (Woo et al, 1997).

Data from the 1992 National Nutrition Survey in urban China is shown in Table 2.4. On average, the energy intake was 10011 kJ per day, accounting for 99.8% of the Chinese Recommended Dietary Allowances (RDA). The average protein and fat intake was 75g and 78g respectively. The intake of nicotinic acid and ascorbic acid was adequate, the intake of thiamine was fair, and that of retinol equivalent and riboflavin was low. The inadequate intakes of retinol and riboflavin were also shown in some nutrition surveys conducted in local areas of China (Ma et al, 1992; Zhang et al, 1992)

A deficiency of calcium was rather common, with intakes around 400-500 mg/day, accounting for only 50% of the RDA. Since many Asians are lactose malabsorbers, few Chinese consume dairy products.

The apparent iron intake was adequate, however, iron deficiency and iron deficiency anemia were the most common nutritional deficiency problems, particularly of women and children in China, with a prevalence of 23.5% and 11.4% respectively in urban China (Ge, 1996). Plant foods are the main sources of iron in the Chinese diet. Because the absorption of iron from plant food is poor, the amount of absorbed iron does not meet the requirements of the body. In China, poor dietary quality rather than iron intake seems to be the key determinant of impaired iron status (Ge, 1996; Tatala et al, 1998; Du et al, 2000).

Salt intake in China varied geographically, ranging from 13-17 g per person in the north to 11-15 g in the south (Chen, 1997). The salt intake by Chinese was very high by Western standards.

Cholesterol intake was not analyzed in Ge 's article. Results from another study showed the cholesterol intake was around 400-500 mg per day (Chen, 1997).

In the 1992 National Nutritional Survey, women's data was not presented separately. In a survey conducted in China in 1993-1995 by Zhang to study the health and nutritional status of Chinese women in urban China. Fifty women from each of the three cities: Beijing, Shanghai and Nanning (thus 150 in total) volunteered (not random sampling). The results (Table 2.5) were indicative of the nutritional status of adult women in urban areas in continental China. Compared to the Chinese RDA, the women in Zhang's study had adequate energy, protein, vitamin E and iron intakes. However, their intake of calcium, vitamin A, thiamin and riboflavin were insufficient. The observation showed a comparable situation to that in the 1992 National Nutritional Survey (Ge, 1996).

2.4 Anthropometry of Chinese Women Living in China

Data from the 1992 National Nutritional Survey showed that women in urban China had an average weight of 55.8 kg, height 155.8cm and Body Mass Index 22.9kg/m^2 (Ge, 1996). Body measurements of urban females by age in the 1992 National Nutritional Survey are presented in Table 2.6. Results showed that height decreased with age, but weight showed an adverse trend. Body stature also showed a strong geographic gradient, with the biggest individuals residing mostly in northern China. The tallest group of women was 13 cm taller on average than the shortest group of women (Chen et al, 1990). The average BMI for urban women was higher than that for rural women (22.9

and 21.8), and higher in high-income groups than in low- income. The proportion of BMI less than 18.5 in urban women was eight percent, the proportion of BMI greater than 25 in urban women was 25.1%

The situation was somewhat different in large cities. In Zhang's study (Zhang, et al, 1997), women in the three large cities in China had a average weight of 55.6 kg; height 158.4cm and BMI 21.4kg/m^2, all measurements being lower than the average measurements in the1992 National Nutritional Survey. The proportion of BMI greater than 25 was seven percent, far below the value in 1992 National Nutritional Survey. The prevalence of erythrocytopenia (criterion: $< 3.80\times10^6$ RBC/mm^3) was one percent. Nutritional status was better in the large city population.

2.5 The Incidence of Cardiovascular Disease and Cancer Mortality in China and in Western Countries

A relationship between diet and health is generally accepted. Food intake is thought to influence the risk of developing cardiovascular disease, diabetes mellitus, hypertension, hyperlipidaemia and some cancers (Hsu-Hage et al, 1993). International comparisons indicated that the occurrence of coronary heart disease varies greatly from one country to another. The prevalence in China was among the lowest in the world. Average annual mortality rates for cardiovascular diseases in men in Beijing (40/100,000) were one tenth of those in Scotland (401/100,000). In women, the highest coronary heart disease mortality was found in the Glasgow (132/100,000), whereas in Beijing it was only 28/100,000 (Sun & Chen, 1994). Mortality rates for coronary heart disease in Hong Kong were lower than in Britain and the USA. Levels of classic risk factors for coronary heart disease were also very low in China (Harland et al, 1997; WHO MONICA Project, 1988).

In 1994, mortality due to non-communicable diseases accounted for 66% of the total mortality in China. Over 90% of the non-communicable disease mortality was attributed to cancer, cardiovascular diseases, chronic respiratory diseases, digestive and urogenital diseases. Of these, thirty-eight percent of the mortality was attributed to cardiovascular diseases, and 22% to cancer (Chen 1997).

In New Zealand, cardiovascular disease is the leading cause of death. Despite the rapid decline in rates of cardiovascular disease mortality, this disease still accounted for 40% of total mortality in 1996. Cancer, with 27% of deaths, is the second most common cause of death (New Zealand Ministry of Health, 1999[1]). Twenty-two percent of males and 18% of females had high blood pressure. Twenty-three percent of the New Zealand population had total cholesterol levels higher than 6.5mmol/L (New Zealand Ministry of Health, 1999[2]).

2.6 Reasons for the Lower Mortality Rates of Coronary Heart Disease in China

The current view suggests that diets high in energy density, total fat, saturated fatty acids, and cholesterol, low in fiber and the ratio of polyunsaturated to saturated fatty acids, are associated with increased plasma lipids and incidence of coronary heart disease (Yudkin, 1992; Ashton, 1993).

The relationships between nutrient intake and serum lipids in Chinese and Americans were described by Chen. The study described a Chinese diet where fat provided on average only 15 percent of the calories (Table 2.7), where plasma cholesterol was on average only 127 mg/dl and where coronary heart disease caused only about one percent of all deaths in middle age. On the other hand, in an American diet, fat provided on average 39% of total energy, whereas, plasma cholesterol was on average 212 mg/dl in Americans (Chen et al, 1990).

Tao also described the relationship between lipid intake and coronary heart disease in his study (Tao et al, 1989). The age adjusted rate for heart disease death in China in 1986 was 28 percent compared to 37 in U.S., and the mortality rate of coronary heart disease in China in 1986 was six percent compared to 16 percent in U.S. However, the diet of the North American men contained a considerably high percentage (40%) of energy from fat, with a high proportion (37%) of saturated fat. Mean daily intake of cholesterol was up to 500 mg or more in U.S. men. While the diet of the Chinese men contained relatively little fat, which made up 18 percent to 31 percent of total energy intake. The proportion of saturated fat was low, only 19 percent of total fat. Mean daily intake of cholesterol was 300 mg.

Chinese have a high consumption of soy and green tea. Frequent consumption of soy and green tea appeared to have a protective role in cardiovascular disease and certain types of cancer (Yang & Wang 1993; Kritchevsdy et al, 1995; Kohlmeier et al, 1997; Wagner et al, 2000).

Teas are rich in antioxidant flavonoid compounds (Cook & Samman, 1996). The intake of dietary antioxidants has been shown to be inversely associated with carotid intima-media thickness, a marker of subclinical atherosclerosis (Kritchevsdy et al, 1995). Human epidemiology and animal studies suggested that tea drinking might reduce the risk of cardiovascular disease by reducing blood cholesterol as well as the concentrations of low-density lipoprotein. On the other hand, laboratory studies have demonstrated inhibitory effects of tea preparations and tea polyphenols against tumor formation and growth. This inhibitory activity is believed to be mainly due to the antioxidative and possible antiproliferative effects of polyphenolic compounds in green and black tea. These polyphenolics may also inhibit carcinogenesis by blocking the endogenous formation of N-nitroso compounds, suppressing the activation of carcinogens, and trapping of genotoxic agents (Yang & Wang 1993).

High levels of soy protein and soy fiber found in the Chinese diet have been shown to have a vascular protective effect (Anthony et al, 1998) and be associated with a more favourable lipid profile (Lo & Cole, 1990; Woo & Lau, 1990; Woo et al, 1997; Truswell, 1995). Soy fiber contains both cellulosic and non-cellulosic dietary fiber, and can lower plasma total cholesterol and low density lipoprotein (LDL) cholesterol. Potential mechanisms by which soy protein might prevent atherosclerosis include a beneficial effect on plasma lipid concentrations, antioxidant effects, antiproliferative and antimigratory effects on smooth muscle cells, effects on thrombus formation, and maintenance of normal vascular reactivity (Anthony et al, 1998). Soy protein consumption improves plasma lipid concentrations by reducing both cholesterol, and LDL cholesterol concentrations and the delivery of LDL cholesterol to all arterial sites (Lichtenstein, 1998; Wong et al, 1998; Wagner et al, 2000).

Moreover, the increased consumption of soy and its products may displace foods relatively high in saturated fat and cholesterol from the diet and hence have an indirect blood cholesterol-lowering effect.

2.7 The Nutrition Transition in China

Over the past 20 years, the rapid economic development and agricultural reform in China has resulted in a greatly increased food supply and increased per capita income. The lives of people have improved. Concurrently, the dietary pattern in China has been moving steadily toward a larger quantity of animal products and a higher fat intake, which are typical of the "affluent" diet in industrialized countries. This changing dietary pattern may have contributed to the emergence of diet-related chronic diseases such as obesity and coronary heart disease in China.

Data from the 1989 China Health and Nutrition Survey showed that between 1978 and 1989, consumption of meat, edible oils, sugar, eggs, fish and fruit increased. In contrast, consumption of cereal and vegetable increased firstly, and then remained constant (Pinstrup-Anderson et al, 1991). Table 2.8 describes the intakes of energy and macronutrients in urban China during this period. Intake of energy, protein and fat in the urban population has increased. The change in fat intake was particularly marked.

The diet showed a reduction in the contribution of cereals to the total energy intake. Before the period 1990-1992, cereal contributed 60-70% of total energy in urban households. Since that time, at least 75% of urban households have reduced cereal energy intake to below 60% of total energy. Meat consumption by urban households increased substantially; 75% of the households in the urban area have increased their meat consumption by at least 20% (Chen, 1997). Fat energy ratio in the diet has dramatically increased. Fat provided over 30% of the total energy intake in 75 % of the urban households, while in the richest 25% of households, it went up to 35-39% (Popkin et al, 1993; Chen, 1997).

With a marked shift in the structure of the diet, problems of overnutrition are also emerging. The distribution of the BMI data of the 1982, 1989 and 1992 Chinese Nutritional Surveys is presented in Table 2.9. During the period from 1982 through 1991, there was a decline in the proportion of urban adults classified as underweight (with a BMI less than 18.5) and normal weight (with a BMI between 18.5-25). However, the proportion of those classified as overweight (with a BMI greater than 25) increased (Popkin et al, 1993; Ge et al, 1994; Popkin et al, 1995).

Results from the Health and Nutrition Survey conducted in China in 1989 and 1991 indicated that there was a slight decline in the proportion of women classified as underweight. The proportion of women with normal body weight decreased, and the proportions of those classified as overweight increased (Table 2.10). The proportions of overweight women increased in the high and middle-income categories particularly (Popkin et al, 1993).

2.8 Dietary Patterns and Body Measurements in Immigrant Chinese

Studies comparing the health of migrants with that of the home and host population have documented that migrants make lifestyle changes away from that of the home country toward that of the country of settlement. Dietary changes usually occur more rapidly than other cultural characteristics when groups migrate. Indeed, several studies have documented changes in the food habits of various Chinese immigrant groups living in different parts of the world:

1. Grivetti conducted a study in 1978 (Grivetti & Baquette, 1978) where the first-generation Chinese Americans were asked about their consumption of traditional and nontraditional foods available in the US, when living in China and after living in the US. When comparing reported diets before and after respondents arrived in the United States, several trends emerged:

- First, there was a decline in the diversity of the animal products regularly consumed in the United States when compared with previous dietary patterns followed in China. Before arrival in America, nine foods were consumed one or more times per week by at least 40% of respondents: beef, chicken, crab, duck, ham, oysters, pork, prawns, and squid. After arrival in America, however, only six items fitted the same category, and two were nontraditional foods: beef, chicken, ham, hamburger, hotdog, and pork. Frequency of use for beef and chicken remained relatively constant in both China and America, but other foods of animal origin exhibited sharp increases or decreases in consumption frequency. For example the use of seafood (crab, oysters, prawns, shark fin, squid) and duck exhibited a sharp decrease.

- More than 50% of the respondents had never eaten hard cheese, cottage cheese, sour cream or yoghurt in China. After immigration to America, however, most dairy products exhibited higher intake frequencies when compared with dietary patterns practiced in China.

- The frequency of rice consumption declined after immigration. Steamed breads, characteristic of China were also chosen less by Chinese immigrants. There was a sharp increase in both hot and cold cereal use at breakfast.

- Different kinds of vegetables and fruits had different patterns. Consumption of broccoli, lettuce, potato, squash, and zucchini increased. In contrast, intake of bok choy, green onions, lotus root, mushrooms, tree ears, and water chestnuts decreased. The largest consumption increase was of apples and peaches while the largest decrease was of lychees, mandarins, oranges, persimmons, pineapples, and watermelon.

- Use of beverages with meals also revealed differences between the patterns of China and practices after arrival in America: only 33% of the respondents stated they drank beverages with meals in China, compared with 73% in America.

2. In 1979, a questionnaire had been designed to assess changes in food habits in a group of first generation immigrant Chinese adults living in Nebraska. It was reported that more Chinese ate 'American style' breakfasts and lunches. Dinner, for most subjects, however, generally remained Chinese-style. They also found that immigrants from Taiwan made fewer changes in food habits than those from China or Hong Kong (Yang & Fox, 1979).

3. The incidence of coronary heart disease appeared to increase as Chinese migrated from China to the U.S. (Pinnelas et al, 1992). In 1994, Sun conducted a study to compare the potential dietary risk factors for coronary heart disease in Chinese and Chinese American middle school students. Chinese American adolescents living in the U.S. and Chinese adolescents living in China share the same genetic background. Therefore comparison of their dietary habits may be beneficial in testing the influence of environment on coronary heart disease incidence. The results showed that Chinese students living in China consumed less meat, dairy products, fat, sweets and snacks, and fast food, and consumed more fruits, vegetables, and starch. These differences may help to explain the differences of the incidence of coronary heart disease between Chinese Americans living in the U.S. and Chinese living in China.

4. In a comparative study of Singaporean Chinese and Chinese Americans (Wang et al, 1994), results showed that Singaporean Chinese ate fish and grain products more often than Chinese Americans, while Chinese Americans consumed processed meats, dairy products and snack foods more frequently. Mean frequency of consumption of low fat, traditional Chinese foods, such as rice porridge, fish ball, soya milk, dried salted fish, was higher among the Singaporean Chinese, while typical 'American' foods, including cheese, milk and beef, were consumed more often among the Chinese Americans. Certain food items, such as carbonated drinks, cookies, bread, tofu, Chinese teas and French fries, were consumed with the same mean frequencies in both groups.

   Further, body composition comparisons suggested that Chinese Americans had a higher mean BMI but a lower mean Triceps skinfold (TSF) than Singaporean Chinese.

5. Food intake patterns of adult Melbourne Chinese were studied in 1988 and 1989. Results showed that the educated professional and those with a longer length of stay in Australia were more acculturated towards Australia style. They ate in an Australian way by replacing some traditional Chinese foods, such as rice, pork, leafy green and cruciferous vegetables, soups and tea, with 'new foods', such as wheat products, red meats and coffee. Women ate more traditional Chinese food than men (Hsu-Hage et al, 1995).

6. The influence of vascular risk factors on atherosclerosis was studied among the Chinese populations living in PanYu, a rural village in Southern China, HongKong and Sydney (Woo et al, 1999). Compared with rural Chinese, the subjects living in Hong Kong and Sydney, consumed fewer vegetables, less green tea and more dairy products.

In general, consumption of traditional Chinese foods, such as rice, grain, pork, duck, leafy greens decreased among the immigrant Chinese populations. On the other hand, consumption of some 'Western foods', such as milk, cheese, cold cereal, beef, increased. The process of acculturation has resulted in increasing meat and animal fat consumption. Although changes of food patterns in migrant Chinese have been widely studied, there have been few studies on changes in nutrient intake and nutritional status of migrant Chinese.

2.9 Migrant Chinese Populations Experience an Increased Risk of Coronary Heart Disease.

Many studies indicate that migrant Chinese have an increase in risk of cardiovascular disease:

1. Gerber and Madhaven found that Chinese in the USA had higher levels of mortality from coronary heart disease than Chinese in China, and that the risk of coronary heart disease increased with the length of residence in the USA (Gerber & Madhavan, 1980).

2. Chinese migrants to Australia have low cardiovascular mortality rates during their first ten years of residence, but their mortality rates rise thereafter (Young, 1986).

3. Chinese in Singapore had higher levels of coronary heart disease and higher prevalences of hypertension and hypercholesterolaemia than Chinese in China (Hughes et al, 1989).

4. Li et al found that the prevalence of coronary heart disease in the Mauritius Chinese was 19.1% in men and 34.5% in women—five times higher than that in Beijing (Li et al, 1992).

5. For every age group examined, Asian-born Chinese living in New York had higher total cholesterol levels than both urban and rural Chinese in Shanghai (Pinnelas et al, 1992).

6. Adult Melbourne Chinese had a cardiovascular risk profile comparable to all Australians (Hsu-Hage et al 1993).

7. The prevalence of treated hypertension in the Chinese immigrant women was similar to that among their Australian counterparts (Hsu-Hage et al, 1993). Furthermore, it was shown that Melbourne Chinese had plasma total cholesterol or triglyceride levels similar to the Australia norm.

8. Prevalence of glucose intolerance in Chinese resident in Newcastle was compared to that of the European population in 1996. The prevalence of glucose intolerance in Chinese men and women, was similar to or higher than that in local European men and women, and intermediate between levels found in China and those in Mauritius (Unwin et al, 1997).

9. In Da Quing, an industrial city in the north west of China, the prevalence of diabetes in 1986 in both men and women aged 30-64 years was 1.6%. By contrast, in Chinese men and women of the same age in Mauritius, the prevalence of diabetes in 1987 was 16% and 10.1% respectively (Dowse et al, 1990; Unwin et al, 1997).

10. Westernized Chinese individuals in Hong Kong, Sydney, and San Francisco, California, were found to have thicker inner walls in their carotid arteries than study participants in Pan Yu, a town in Guangdong Province in southern China (Woo et al, 1999).

It is hypothesized that an increase in cardiovascular risk in Chinese after migration is attributable to changing life-style and dietary practices.

2.10 Chinese Immigration Status in New Zealand

The Chinese settled in New Zealand early in 1866 (Vasil & Yoon, 1996). Many of them were from the Guangdong Province in southern China. They were farmers at home, eking out a subsistence existence with great difficulty. They were neither wealthy nor well educated and skilled. At that time, the majority of the Chinese worked as gold-seekers in Otago and the West Coast. Nearly all were males of Cantonese rural origin. Since the government instituted the 'open door' immigration policy, in the late 1980s, there has been a new wave of Chinese immigrants into New Zealand from all over Asia (Tay, 1996). Between 1986 and 1991, the number of Chinese migrants was 10,590, whereas, between 1992-1994, the number of Chinese migrants increased to 14,223 (Vasil & Yoon, 1996). An achievable point system was introduced at the same time under the "General Category" of immigration, called 'skills' categories. It was designed to attract highly educated, skilled professionals and relatively wealthy entrepreneurs (Ho et al, 1997; Ng, 1999). Immigrants were chosen by New Zealand for their qualifications, expertise, age, health and wealth. The great majority of immigrants from Mainland China came under the 'skills' categories (79%) (Friesen & Ip, 1997). As a result, the new Chinese migrants were generally highly educated young urban dwellers, in contrast to earlier migration streams, which were typified by less education and were of rural origin.

Today, the Chinese have become the largest non-Polynesian, non-European ethnic community in New Zealand. The 1996 estimate of the ethnic Chinese population in New Zealand nationwide is near 95,000 (Ip, 1996; Ng, 1999), around three percent of New Zealand's total population, with the long-established Chinese forming less than a fifth of the Chinese total. Seventy percent of the Chinese live in Auckland (Ho et al, 1997).

2.11 Dietary surveys on New Zealand Chinese

Although there are near 95,000 Chinese in New Zealand, comparatively little is known about their dietary patterns, health and health needs. Diets of adult Chinese living in New Zealand have not been studied. Hence there are no answers to the following questions:

- Are there any dietary changes among this population after immigration?
- Do they have an increase in cardiovascular risk, like the migrant Chinese populations living in other Western countries?

2.12 Aims of the Study

Migrant populations are particularly sensitive to the food culture and new foods available in their adopted country (Hopkins et al, 1980; Axelson, 1986; Powles et al, 1990). Food culture and food supplies in China are very different to those in New Zealand. This may affect the food choices and dietary intakes of Mainland Chinese living in New Zealand.

Women rather than men were selected in this study, because traditionally, women in China are nonsmokers and are not habitual drinkers. Two social habits that could possibly affect dietary customs. In the Chinese family, women normally prepare the meal. Women are perceived to be the major agents of change of food habits within households. The housewife, as a gatekeeper, controls the flow of food into the household.

It is clear that female sex steroid hormones affect body fat distribution in women. With menopause, visceral fat mass increases, with fat being laid down around the vital organs (Haarbo et al, 1991). Thus, body composition in premenopausal women is very different from that in postmenopausal women. Therefore, women aged between 20 to 45 years, who were all premenopausal, were selected.

The aims of this study are:

1. To compare the socioeconomic factors, lifestyles, nutrient intakes, dietary patterns, anthropometric measurements and health of Mainland Chinese women living in Auckland less than two years and more than four years.

2. To provide baseline data on the dietary patterns, nutrient intakes and the anthropometric measurements of Mainland migrant Chinese women in Auckland.

3. To compare the lifestyles, nutrient intakes, dietary patterns, anthropometric measurements and health of all the study subjects with Mainland Chinese women living in urban China, urban migrant Chinese women and New Zealand women of a similar age.

4. To determine whether nutrient intakes, dietary patterns and anthropometric measurements have changed after immigration in the study groups.

5. To identify any nutritional imbalance and health care needs in the study population.

Table 2.1. China's Production and Consumption of Selected Agricultural Products in 1986

Items	Production (kiloton/year)	Apparent Consumption per capita (kilogram/year)
Rice	120390	116
Wheat	86330	91
Coarse Grain	76450	70
Ruminant Meat	1010	1
Nonruminant Meat	17540	17
Dairy Products	4620	5
Sugar	5430	7

Source: Anderson, 1990

Table 2.2. Food Consumption Patterns in Urban Areas of China (g/Reference Man/Day)

Food Items	Amount
Rice/Products	223
Wheat/Products	165
Other Cereals	17
Starch Tubers	46
Dry Legumes	3
Legume Products	11
Dark Colour Vegetables	98
Light Colour Vegetables	221
Salted Vetgetables	8
Fresh Fruit	80
Nuts	3
Pork	61
Other Meats	17
Organ Meat	6
Poultry	16
Milk/Products	36
Eggs/Products	29
Fish and Shellfish	44
Vegetable Oil	32
Animal Fat	5
Cakes and Dessert	13
Sugar, Starch	8
Salt	13
Pastes, Soy Sauce	16
Other Foods	21
Alcohol (V%)	3

Source: Ge, 1996

Table 2.3. Food and Nutrient Intakes of Urban Chinese as Percentages of Total Energy

Items	Percentage
Energy by Food	
Cereals	57
Beans/Peas	2
Tubers	2
Animal Food	15
Empty Calories	14
Others Food	10
Energy By Nutrients	
Protein	13
Fat	28
Protein by Food	
Cereals	49
Beans/Peas	6
Animal Food	32
Other Food	14
Fat	
Animal Food	39
Plant Food	61

Source: Ge, 1996

Table 2.4. Nutrients Intake as a Percentage of the Chinese Recommended Dietary Allowances in Urban China

Nutrients	Amount of Intake	Percentage of RDA %
Energy (kJ)	10011	100
Protein (g)	75	99
Fat (g)	78	
Carbohydrate (g)	341	
Fiber (g)	12	
Retinol (ug)	277	
Ret. Eq (ug)	606	74
Thiamin (mg)	1	86
Riboflavin (mg)	0.9	69
Niacin (mg)	17	128
Ascorbic Acid (mg)	96	162
Vitamin E (mg)	37	362
Potassium (mg)	1886	
Sodium (mg)	7259	
Calcium (mg)	458	53
Phosphorus (mg)	1077	
Magnesium (mg)	339	
Iron (mg)	26	184
Manganese (mg)	7	
Zinc (mg)	13	89
Copper (mg)	3	
Selenium (ug)	52	104

Source: Ge, 1996

Table 2.5. Nutrient Intakes by Chinese Women in Urban China

Nutrients	Amount	Chinese RDA
Energy (kJ)	7424	6688-8778
Protein (g)	57	55-65
Fat (g)	75	-
Fat energy ratio (%)	38	20-25
Carbohydrate (g)	218	-
Crude fiber (g)	9	-
Total A Eq (ug)	544	800
Thiamin (mg)	0.6	1.0-1.2
Riboflavin (mg)	0.8	1.0-1.2
Vitamin C (mg)	66	60
Vitamin E (mg)	31	10-12
Sodium (mg)	3398	-
Potassium (mg)	1521	-
Calcium (mg)	439	800
Phosphorus (mg)	921	-
Iron (mg)	24	12-18

Source: Zhang et al, 1997

Table 2.6. Height and Weight of Urban Females in China by Age

Age	Height (cm) (Mean± SD)	Weight (kg) (Mean± SD)
20-	157.2± 8.0	53.0± 8.7
30-	156.8± 7.0	55.9± 10.0
40-	156.3± 6.0	58.1± 9.9
50-	154.8± 6.4	58.3± 10.3

Source: Ge, 1996

Table 2.7. Indicators of the Plant and Animal Food Content of Chinese and American Diets

	China	US
Dietary Intakes		
Total Dietary Fibre (g/day)	33	11
Starch (g/day)	371	120
Plant Protein (% of total protein)	89	30
Fat (% of calories)	15	39
Calcium (mg/day)	544	1143
Retinol (retinol equivalence/day)	278	990
Total Carotenoids (retinol equivalence/day)	836	429
Vitamin C (mg/day)	140	73
Plasma Constituents		
Cholesterol (mg/dl)	127	212
Triglycerides (mg/dl)	97	120
Total Protein (g/dl)	5-6	6-8

Source: Chen et al, 1990

Table 2.8. Dietary Intake of Energy, Protein and Fat in Urban China between 1978-1988 (per capita per day)

Year	Energy (kJ)	Protein (g)	Fat (g)
1981	8728	60	61
1982	8849	61	64
1983	9163	63	70
1984	9137	62	70
1985	8661	61	65
1986	9096	64	71
1987	8970	62	72
1988	9054	63	71

Source: Pinstrup-Anderson et al, 1991

Table 2.9. Percentage of Individuals in Different Body Mass Index Categories in Chinese Studies (Urban Adult Subjects of 20-45 years)

Year	Percentage of Body Mass Index in These Categories		
	<18.5	18.5-25	≥25
1982	11.6	78.8	9.7
1989	10.1	77.9	12.0
1992	9.0	76.1	14.9

Source: Ge, 1996

Table 2.10. Percentages of Study Population in Different Weight Categories, China Health and Nutrition Survey, 1989 and 1991 (Women)

Weight Category	1989	1991	Change
Underweight	9.2	8.4	-0.8
Normal Weight	79.0	78.5	-0.5
Overweight	7.4	8.8	+1.4*
Severely Overweight	4.3	4.3	0.0

Note: Weight categories were defined as follows: underweight, BMI less than or equal to 18.5; normal weight, BMI between 18.6 and 25; overweight, BMI greater than 25.0 but less than 27.0; severely overweight, BMI greater than or equal to 27.0.
*Significant change from their corresponding values in 1989; $P < 0.05$.
Source: Popkin et al, 1995.

CHAPTER 3. METHODS

3.1 Human Ethics Application

Ethical approval was obtained from The Massey University Human Ethics Committee and The North Health Ethics Committee. In accordance with its policies, informed consent to participate was obtained from every subject before initiating the survey. The consent forms were also written both in English and in Chinese. Volunteers could choose either version of the consent form to sign. The experimental protocol was fully explained to the volunteers. All volunteers could withdraw from the study at any time up to the completion of data collection at visit two. The information provided by the participants was anonymous and remained confidential. Each volunteer was told she would receive a summary of the study results as well as a brief analysis of her individual nutrient intake, body composition, and blood pressure results at the end of the study.

3.2 Subject Recruitment

3.21 The Eligibility Criteria for Volunteers

The eligibility criteria for the Chinese volunteers in this study were as follows:

- Only subjects originating from Mainland China were selected. Those from Hong Kong, Taiwan, Singapore and Malaysia were not included.
- Volunteers were aged between 20-45 years.
- Those with physiological or medical problems that could affect their dietary patterns, such as pregnancy, breast-feeding, thyroid problems, diabetes, chronic use of steroid medication, renal failure, and liver disease, were excluded.

- Within Auckland city, there are four areas with higher concentrations of Chinese people: Pakuranga, Eden, Remuera, and Roskill (Ip, 1996). Selected subjects should represent different districts of the city.

3.22 Study Publicity

Subjects were recruited in response to publicity aimed at the Chinese community. The study was advertised via the following Chinese networks, written both in English and Chinese:

- AM 990, a Chinese radio station. The study was advertised through the community notice board programme;
- Triangle TV. This was popular among Asian audiences, as many Asian and Pacific programs were available on this channel. For example, a Chinese program was screened in the afternoon and every Saturday night;
- Chinese newspapers. There are more than six Chinese newspapers in the greater Auckland area;
- Chinese supermarkets and groceries;
- Chinese restaurants;
- Chinese churches;
- Chinese notice boards in public libraries;
- Plunket Center where there was a Chinese nurse.

Women who were interested in volunteering contacted the researcher by phone. A set of information sheets, such as a concise outline of the study, a detailed description of the study including the rights of volunteers, and confidentiality measures used in the study, had been prepared. All the information sheets were written both in English and Chinese. The women were sent the information sheets and consent form, along with a stamped addressed envelope to return the consent form. Volunteers who returned the completed consent form were enrolled in the study.

3.3 Data Collection Programme

Data collection included a socio-economic questionnaire, anthropometric measurements and dietary intake records. Data on dietary intake was obtained by using 24-hour recall and food weighing methods. Each subject required two visits.

3.31 Visit One

In visit one, each volunteer completed a questionnaire and a 24-hours recall on her dietary intake. The weighed diet record was explained and body measurements and blood pressure were taken. The whole visit required around one hour.

3.32 Between Visit One and Visit Two

Each volunteer was asked to weigh and record all food, drink and condiments consumed during two complete non-consecutive days.

3.33 Visit Two

The completed two-day weighed diet record was collected. The record was checked for errors and omissions at this visit to ensure the data collected was complete. Blood pressure was measured and recorded for the last time. This visit required around 20 minutes.

3.4 Questionnaires

The general questionnaire covered the following topics:

- Age
- Region of origin
- Duration of residence
- Education
- Occupation
- Household Income
- Tenure of dwelling
- Size and composition of household
- Marital status
- Employment status and occupation of husband/partner
- Life style

    Smoking habits

    Alcohol consumption

    Weight change after immigration

    Activity change after immigration

    Consumption of nutritional supplements and/or herbs

    Oral contraceptive use

The reasons for including these topics are discussed below.

China is a huge country. People in different region of China have different lifestyles, food habits and body sizes (Ge, 1996). Region of origin of the subject would help in assess whether food patterns, nutrient intakes and body measurements varied with region in the study subjects.

Duration of residence was shown to affect the food choices within a migrant population (Hsu-Hage et al, 1995). Result showed that those with a longer length of stay in Australia were more acculturated towards the Australian style. In this study, the impact of residence duration on food patterns, nutrient intakes and body measurements was assessed.

Level of education is widely used as an indicator of socioeconomic status. Results from the Chinese National Nutritional Study indicated that nutrient intakes and anthropometries differed with education level (Ge, 1996). In this study, this information would provide not only the education levels of the study subjects but also it's effect on food choice and nutritional status.

Household income is clearly a key indicator of socioeconomic status, being a major determinant of living standards. In order to indicate the true economic situation of the study subjects, additional questions were asked about occupation, household ownership and number of bedrooms in their dwelling. These questions provided an indicator of "wealth" and social status and could be used to estimate the true economic situation of the study subjects.

Family composition and number of children provide information on eating patterns. Three generations living in a house is common in a Chinese family. Because the aged population tended to keep to traditional Chinese eating patterns, the food choices might be affected when the study subjects lived with their parents.

Smoking is known to cause a wide range of major health problems. In this study, the relationship between smoking status and socioeconomic factors, such as family income, educational level and age will be analyzed. Besides smoking habits, the alcohol consumption of the study subjects and socio-economic characteristics of those consuming the alcohol will be assessed.

Regular moderate physical activity can improve health and wellbeing. The relationship between activity change and weight change after immigration in this population will be investigated.

The questionnaires were bilingual, with Chinese and English set side by side. The preliminary questionnaire was piloted on ten Chinese women in the same age group as the subjects. Their feedback was used to improve the clarity and layout of the questionnaire. A final test on two subjects revealed no problems.

3.5 Assessment of Dietary Intake

3.51 Twenty-four-hour Recall

Respondents were asked to remember and report all the foods and beverages consumed during the preceding 24-hour period. In order to help the subjects estimate portion sizes, measuring cups, spoons of different size, some household measures such as a Chinese rice bowl, glass, and cup were used. Otherwise natural serving sizes, such as the average weight of a piece of fruit, or a slice of bread were used. In order to help the respondent remember all foods consumed throughout the day, the interview was structured with specific probes, such as how foods were prepared, what type of cooking oil was consumed, and what beverage and snacks were eaten.

3.52 Weighed Diet Record

Between Visit One and Visit Two, subjects were asked to weigh and record all food, drink and condiments consumed during two complete non-consecutive days. One weekday and one weekend were recommended. The participants were fully informed of the study purpose, and reminded to prepare ordinary foods and not to change their food habits. All the foodstuffs, dishes and their amounts were recorded meal by meal. Recipes of all composite dishes consumed were also recorded in order to convert them to ingredients consumed. Salter scales, accurate to ± 5 grams, were provided to weigh the food and drink.

Simple foods could be directly weighed and recorded, such as a piece of ham, cheese, cake, or bread. After a meal the amount of any leftover edible food had to be weighed or estimated and subtracted from the amount originally recorded. As food weight changes after being cooked, subjects were asked to indicate if the food was raw or cooked, and the preparation method. Sugar, oil and spreads were recorded in terms of teaspoon, tablespoons or cups. Types of milk used, such as whole milk, trim milk, calcium-extra milk, and, types of fat spread, cooking oil were also recorded.

Chinese families usually have meals together and all household members share dishes at the dining table. Food is not served in individual portions. Usually, there are three to four mixed dishes on the dine table. The number of dishes relates to the number of diners and dollars. Everyone eats different amounts from the common dish. In order to measure the amount of the mixed dishes consumed by the subject, volunteers were asked to weigh the raw ingredients, which would be consumed by the whole family, before cooking. However, household members did not always share the dishes evenly. Volunteers were asked to estimate the portion of the dish they consumed, such as a quarter of the dish. Then, intake by the subject of the raw ingredients in the mixed dish was calculated proportionally.

Cooking oil and soy sauce consumption by the subject was estimated on the basis of a one- month-consumption pattern: the amount of cooking oils and/or soy sauce consumed by the whole family in a month divided by the total number of person-days.

The food weighed record included data on both foods consumed at home and away from home. Food consumption and waste had to be estimated when weighing was not possible.

3.53 Assessment Using the Twenty-four-hour Recall and Weighed Diet Record

There is no ideal method for assessing food or nutrient intakes. None of the current methods are devoid of systematic errors, or prevent alterations in the food habits of the subjects. A single 24-hour recall combined with two-day weighed diet records was used in this study. The advantages and disadvantages of the 24-hour recall and weighed diet record are summarized as follows:

Twenty-four-hour Recall:

Advantages:

- Literacy of the respondent is not required.
- There is relatively little burden on the respondents, so that compliance is generally high.
- In contrast to diary methods, dietary recalls occur after the food has been consumed, so there is less potential for the assessment method to interfere with dietary behavior.
- The method is quick and relatively inexpensive.

Disadvantages:

- The success of the 24-hour recall depends on: the subject's memory, the ability of the respondent to convey accurate estimates of portions sizes consumed, the degree of motivation of the respondent, and the persistence of the interviewer (Acheson et al., 1980).
- The flat slope syndrome may be a problem in the 24-hour recall method (Gersovitz et al, 1978). In this syndrome, individuals appear to overestimate low intakes and underestimate high intakes – sometimes referred to as 'taking a good diet'.

Weighed Diet Record

Advantages

This is the most precise method available for estimating usual food and nutrient intakes of individuals. The problem of omission is lessened and the foods are described more fully. The measurement of amounts of food consumed at each occasion should provide more accurate portion sizes than if the respondents were recalling portion sizes of foods eaten previously.

Disadvantages:

- Respondents are required to be motivated, numerate and literate.
- Research indicates that there is a significant increase in incomplete records as more days of records are kept, and the validity of the collected information decreases in the later days of a seven-day recording period in contrast to collected information in the earlier days (Gersovitz et al, 1978). Typically, no more than three or four consecutive days are included (Thompson & Byers, 1994).
- Respondents may change their usual eating pattern to simplify the measuring or weighing process, or, alternatively to impress the investigator (Pekkarinen, 1970; Gibson, 1990).

The principal use of single 24-hour recall is to describe the average dietary intake of a group (Thompson & Byers, 1994). However, data from a single 24-hour recall should not be used to estimate the proportion of the population that has adequate or inadequate diets (Thompson & Byers, 1994). This is because of the true distribution of usual diets is much narrower than is the distribution of daily diets. There is variation in usual intake not only between people but also from day to day for each person. To determine the proportion of the population 'at risk' of inadequate intakes, the food consumption of each subject must be measured over more than one day. Study subjects were all aged between 20-45 years, motivated and numerate, and mostly well qualified. Therefore, a two day weighed diet record combined with a single 24-hour recall was used in this study. Though not ideal, the two different methods were used to reduce respondent burden.

3.6 Anthropometric Measurements

Body measurements including measurement of weight, height, skinfolds, waist circumference, hip circumference and blood pressure, were taken. Specific training in anthropometric measurement techniques was provided at the beginning of the survey. These measurements were all made by the researcher. All measurements were made in accordance with the procedures set out in 1996 by United State Department of Health and Human Service (U.S. Department of Health and Human Service, 1996).

3.61 Height

Height was measured with participants wearing light clothing and without shoes. It was measured to the nearest tenth of a centimeter using a metal tape fixed on the wall by means of a vertical plate. A horizontal plate on the same device was placed over the subject's head. The subject stood with back, buttocks, and heels together pressed to the wall. Height was measured three times.

3.62 Weight

Weight was measured in light indoor clothing without shoes. A Tanita digital balance scale (model 1609), accurate to $\pm$ 0.025 kilogram, was used to measure weight. The scale was put on a hard and flat floor. The subject stood still over the center of the platform with body weight evenly distributed between both feet. Weight was recorded to the nearest 100 grams and measured twice.

The height and weight measurements were used to obtain body mass index. Body mass index was calculated as weight (in kg) divided by square of height (in m^2).

3.63 Skinfolds:

Body fat can be estimated by measuring the thickness of the subcutaneous fat layer at different sites of the body using a skinfold caliper. Typically two to seven sites are selected for skinfold measurement. In the present study, skinfold thickness was measured at the biceps, triceps, subscapular, and suprailiac sites by using a Holtain skinfold caliper. The skinfold measurement was taken by pinching up the skin and subcutaneous fat layers away from the underlying muscle. All measurements were made on the right side of the body and repeated at each site until three measurements within 0.5 millimeter of each other were obtained.

The following skinfolds were measured:

- Triceps Skinfold:

Triceps skinfold thickness was measured at the midpoint of the right upper arm (posterior). To find the midpoint of the upper arm, the subject's right arm was bent at the elbow at a 90-degree angle, with the upper arm held parallel to the side of the body. The distance between the acromion (the bony protrusion on the posterior of the upper shoulder) and the olecranon process of the elbow (tip of the elbow) was measured and the midpoint was marked with a pen. Then, the subject stood with right arm hanging loosely by her side. The examiner grasped a vertical pinch of skin and subcutaneous fat between thumb and forefinger about one centimeter above the previously marked midpoint and placed the skinfold caliper on the skinfold at the midpoint marked previously. A reading was taken as soon as the jaws of the caliper come into contact with the skin and the dial reading stabilized.

- Biceps Skinfold

This measurement was similar to the triceps skinfold measurement being the thickness of a vertical fold on the front of the upper left arm, directly above the center of the cubital fossa, at the same level as the triceps skinfold. The front-side midpoint could be found by drawing a horizontal line across the posterior midpoint marked before.

- Subscapular Skinfold

This was measured just below and laterally to the angle of the left shoulder blade, with the shoulder and left arm relaxed. Placing the subject's arm behind the back may assist in the identification of the site. The skinfold is grasped at the marked site with the fingers on top, thumb below, and forefinger in the site at the lower tip of the scapular. The skinfold should angle 45° from horizontal, in the same direction as the inner border of the scapular. Reading was taken as soon as the jaws of the caliper come into contact with the skin and the dial reading stabilizes.

3.64 Body Circumference

- Waist Circumference

Waist circumference was measured to the nearest millimeter at the midpoint between the lower costal margin and the superior iliac crest, over the greater trochanters of the hips. Subjects should stand erect with the abdomen relaxed, arms at the sides, feet together and with their weight equally divided over both legs. Waist circumference was measured with the waist unclothed. A nonstretch tape was used with a device to ensure that constant tension was applied.

- Hip Circumference

The hip is defined anteriorly at the level of the symphysis pubis and posteriorly at the maximal protrusion of the gluteal muscles with the tape held in a horizontal plane (Bjorntorp, 1987; Lapidus et al, 1984; Rush et al, 1997). A nonstretch tape was used again. The subject should stand in an upright position with arms at the side and feet together. The hip circumference was measured over the subject's underwear. Measurements were to the nearest millimeter.

The waist and hip circumferences were used to calculate the waist-to-hip ratio.

3.65 Blood Pressure

Sitting blood pressure was measured twice on the right arm with a standard mercury sphygmomanometer. Pressures should be recorded in the sitting position and there should be at least two to three minutes of rest before the blood pressure is measured. The arm should be at mid-chest level and be relaxed and supported when the pressure was being taken.

The level of the mercury column was raised approximately 30 millimeter above the point at which the pulse disappeared. The column was then reduced slowly. The Korortkoff phase I and V were recorded for systolic and diastolic pressure, respectively, and were expressed to the nearest two mmHg. The pressure was dropped to zero between recordings (The National Heart Foundation of New Zealand Scientific Committee, 1977). Two measurements were taken five minutes apart, with the subject resting in the sitting position.

Normal blood pressure was defined as average blood pressure less than 140/90 mmHg and not taking antihypertensive medication. Cut-off hypertension was defined as average systolic blood pressure greater and equal to 160 mmHg and /or average diastolic blood pressure greater and equal to 95 mmHg or current use of antihypertensive medication (New Zealand Ministry of Health[2], 1999).

3.7 Data Processing

3.71 Questionnaire Data Coding

All the answers were coded using the appropriate code. There were several questions that allowed "write-in" responses. In the case of questions that had an "other, specify" category (for example, Question 2), each "write-in" response was examined and coded back to an existing code if applicable. The volunteer's birthday was used to determine decimal age by using the Conversion Table of Date to Decimal Years.

3.72 Anthropometry Data

The average of the three records was calculated for each measurement. Body mass index and waist to hip ratio were also calculated.

3.73 Dietary Intake Data

Dietary intake data was entered in the FoodWorks (1999 Xyris Software Aus Pty Ltd) programme. As most of the Chinese food items were not available in FoodWorks, a database of Chinese food nutrients had to be set up before starting data entry.

Nutrient values of each of the Chinese food items were derived from the following food composition tables: Chinese Food Composition Table (Institute of Nutrition and Food Hygiene, Chinese Academy of Preventive Medicine, 1991), and USDA data (USDA web site). Values for cholesterol, monounsaturated fatty acid, polyunsaturated fatty acid, and saturated fatty acid of some Chinese foods were not available in the Chinese Food Composition Table. In all these cases, we used the values in USDA database. If the USDA database did not include the food, we chose a similar New Zealand food in the Fat and Fatty Acids Composition Table (Quigley et al, 1995), and used the nutrient values for that food. Around 50 items of Chinese food were added to the FoodWorks database. The sources of nutrient data were identified in the Chinese food database.

Before entering the dietary intake data, the weight of food consumed had to be converted to the weight of the edible portion, as most Chinese dishes contain bones, such as fried chicken, steamed whole fish, barbecue spare ribs, etc.

Mean nutrient intakes per day were calculated by averaging intakes for the three days.

In addition, foods were grouped into 15 categories: rice and its products; wheat and its products; legumes and their products; vegetables and tubers; salted vegetables; fruits; pork and its products; other meats (lamb, beef, etc); organ meats; poultry and its products; egg and its products; fish and shellfish; cooking oil and spreads; snacks and sweet products and dairy foods. Again, in every food category, the mean of food intake per day was calculated by averaging intakes over the three days.

3.74 Data Entry

All the coded questionnaire data, average anthrometric values and energy and nutrient intake data were entered into Excel.

3.8 Statistical Analysis

Means, standard deviations, medians, upper quartile and lower quartile were calculated as representative parameters. Calculations were performed on a personal computer using the statistical analysis programs Excel and MINITAB (1998 release 12).

The two-tailed t-test was employed to detect possible significant differences between means of nutrient intakes, anthropometric measurements and food patterns in the two groups. The 0.05 level was chosen for statistical significance.

The Pearson's correlation coefficient was used to assess the relationship between nutrient intakes, anthropometric measurements and several socioeconomic factors. Relationship between activity change and weight change was tested using the Chi-squared test. One-way-Anova was undertaken to assess the relationships between nutrient intakes, anthropometric measurements and selected socioeconomic factors. Correlation and linear regression models were used to test the association between selected anthropometric values and selected nutrient intakes.

CHAPTER 4. RESULTS

4.1 Socioeconomic and Lifestyle Characteristics of the Study Participants

The study began in February 2000 and data was collected between March 2000 and July 2000. Only two subjects responded to the publicity and contacted us directly. Most subjects were recruited by personal contact via relatives or friends. A total of 55 women between the ages of 20 and 45 years completed the study, with 25 women in the group that had been in New Zealand less than two years (2-year group), and 30 in the group that had been in New Zealand more than four years (4-year group). The study population was representative of Auckland Chinese living in the east, west, north and south Auckland regions. Every volunteer completed the study. None of them withdrew from the study at any stage. The response rate was 100%. Length of stay in Auckland ranged from six months to 13 years.

Table 4.1 summarizes the general characteristics while Tables 4.2a-c describe the socioeconomic characteristics of the study participants. Life style behaviors of the study subjects are shown in Table 4.3.

4.2 Anthropometric Characteristics of the Study Participants

Table 4.4 describes the subjects' anthropometric measurements. The distribution of weight, skinfolds, circumference of waist and hip, and blood pressures for the 2-year group and the 4-year group, are shown in Figures 4.2-4.9. The anthropometry values were also compared according to the subject's region of origin (see Table 4.5).

In New Zealand, four distinct BMI categories are used to define body fatness level: thin is defined as a BMI less than 20; normal weight as a BMI between 20-24.9; overweight as a BMI greater than 25 but less than 30; and obese as a BMI greater than or equal to 30 (Gibson, 1990; New Zealand Ministry of Health[2], 1999). Table 4.6 shows the numbers and percentages of the study subjects in different BMI categories.

There is no consensus on the body mass index cutoff points to define obesity in the populations of developing countries. In China, the definitions of underweight, overweight, and severely overweight are based on a combination of various body mass index criteria that are currently in use (Royal College of Physicians, 1983; Hoffmans et al, 1988; Waaler, 1984; Gibson, 1990; Popkin et al, 1995). These criteria were largely based on actuarial analyses or long-term epidemiologic studies conducted in North America and Europe that indicated the weight range for each height category that is associated with the lowest mortality. Hence, the body mass index range of 20 through 25 is considered to be the optimal or healthy weight range. The body mass index cutoff point of 18.5 has been routinely used to define underweight, and the body mass index cutoff point of 25.0 has been used extensively as a criterion for overweight (Shetty & James, 1994). In addition, it has been proposed that a body mass index of 27.0 or greater is significantly associated with increased health risks. The numbers and percentages of the study population in different weight categories according to the Chinese standard are shown in Table 4.7.

It has been proposed that a waist/hip ratio of 0.8 or greater is significantly associated with increased health risks. Detailed waist/hip ratio results are shown in Table 4.8.

Table 4.9 shows the numbers and percentages of the study subjects in different blood pressure categories.

It has been proposed that an increased waist circumference is independently associated with increased health risk. Woman who has a waist circumference greater than 88cm has an increase risk of type two diabetes and cardiovascular disease (WHO, 1997). Table

4.10 shows the numbers and percentages of the study subjects in different circumference of waist categories.

4.3 Nutrient Intake Analysis

To decrease respondent burden, two different methods of assessment of dietary intake were used in this study. Differences between energy, protein, fat and carbohydrate intake obtained from the 24-hour recall and the mean of the two days of weighed diet records for each subject were assessed using the student t-test. No significant difference was found between intake of any of these dietary components as assessed by either method (Table 4.11a-d). It was thus decided to combine the nutrient intakes obtained by these two methods to provide a more representative idea of individual intake.

Dietary energy sources and macronutrient intakes are shown in Table 4.12. No significant difference was found between groups in any of these variables. Vitamin and mineral intakes are summarized in Table 4.13. No significant difference between vitamin and mineral intake in the 2-year group and the 4-year group was found. Lipid intakes and proportions of fatty acid are shown in Table 4.14. Again, no significant difference was found in lipid intake between either group.

When the participants from the two groups were combined, median energy was 6965kJ, protein 71.2g (with the protein energy ratio of 17%), lipid 68.6g (with the lipid energy ratio of 36.8%), carbohydrate 182g (with the carbohydrate energy ratio of 43.9%), fiber 16.2g, cholesterol 324g, total vitamin A 541ug, calcium 488mg and iron 12.5mg per day. Ratio of saturated fatty acid: monounsaturated fatty acid: polyunsaturated fatty acid is 39:27:34. Alcohol intake was very low.

In China, sodium intake differs according to region of origin. People in North China have higher sodium intakes than people in South China (Ge, 1996). In this study, the sodium intakes of subjects coming from North China and subjects coming from South

China were compared. The mean sodium intake of subjects coming from North China was 4608mg per day, and 3711mg per day in South China subjects. The difference was almost significant (P=0.073).

4.4 Food Patterns of the Study Participants

Foods consumed were classified as belonging to one of the following 18 categories: rice/products; wheat/flour/products; legume/products; vegetables/tubers; salted vegetables; fruits; pork/products; other meat; organ meats; poultry/products; eggs/products; fish/shellfish; cooking oils/spreads; snack/ sweet products, dairy foods; fast foods; soft drink and chips. The weight of food in each category was compared to assess the food consumption patterns in each group. Table 4.15 shows the food patterns of the study subjects.

4.5 Statistical Relationship Analysis

A series of correlation analyses were undertaken to assess the relationship between nutrient intakes and socioeconomic factors. Several socioeconomic factors, such as income level, education level, whether living with mother etc, were selected to examine the associations with fat, saturated fatty acid, monounsaturated fatty acid, cholesterol, sugar, fiber, vitamin A, vitamin E, vitamin C, calcium, iron and sodium intake. No significant associations were found between these factors.

Table 4.16 presents the correlation coefficients between fat intake and BMI, Waist/Hip ratio. In the 2-year group, the correlation coefficient measuring the association between fat energy ratio and the Waist/Hip ratio was highly significant.

Age was not linked with BMI and blood pressure in this study. Furthermore, relationships between activity change and weight change, blood pressure and sodium intake were assessed. No link was found in either group.

Table 4.1. Characteristics of Study Subjects by Group

	Number of Subjects and Percentage of Total		
	2-year Group (n=25)	4-year Group (n=30)	All (55)
Age			
20<Age	3 (12%)	-	3 (5%)
20≤Age<25	2 (8%)	-	2 (4%)
25≤Age<30	4 (16%)	3 (10%)	7 (13%)
30≤Age<35	10 (40%)	15 (50%)	25 (45%)
35≤Age<40	5 (20%)	11 (37%)	16 (29%)
Age≥40	1 (4%)	1 (3%)	2 (4%)
Education Level (Tertiary Training)			
Yes	17 (68%)	27 (90%)	44 (80%)
No	8 (32%)	3 (10%)	11 (20%)
Region of China			
North	6 (24%)	7 (23%)	13 (24%)
South	19 (76%)	23 (77%)	42 (76%)

Table 4.2 (a). Socioeconomic Status of Study Subjects by Group

Groups	2-year Group (n=25)	4-year Group (n=30)
<u>Employment Status</u>		
Has a full time job	2 (8%)	14 (47%)
Has a part time job	5 (20%)	1 (3%)
On benefit	2 (8%)	1 (3%)
Neither in paid work nor on benefit	16 (64%)	14 (47%)
Retired	-	-
<u>Occupation</u>		
Legislators, senior officials, managers	-	-
Professionals	2 (8%)	5 (17%)
Technicians and associate professionals	1 (4%)	3 (10%)
Clerks	-	1 (3%)
Service, shop, market	4 (16%)	4 (13%)
Skilled ag or fish	-	-
Craft and related trades	-	-
Plant and machine operators, assemblers	-	2 (7%)
Elementary occupations	-	-
NA	18 (72%)	15 (50%)
Student	15 (60%)	6 (20%)
Housewife	3 (12%)	9 (30%)
<u>Total Income</u>		
Income < \$15,000	8 (32%)	5 (17%)
\$15,000≤ Income <\$30,000	10 (40%)	9 (30%)
\$30,000≤ Income <\$45,000	5 (20%)	11 (37%)
\$45,000≤ Income <\$60,000	1 (4%)	4 (13%)
Income ≥\$60,000	1 (4%)	1(3%)

Table 4.2 (b). Socioeconomic Status of Study Subjects by Group (Continued)

Groups	2-year Group (n=25)	4-year Group (n=30)
Type of Benefit		
Family support	-	-
Unemployment benefit	5 (20%)	3 (10%)
DPB	-	-
ACC	-	-
Sickness or invalids benefit	-	-
Student allowance	2 (8%)	5 (17%)
Other government benefits	-	-
NZ superannuation	-	-
Total	7 (28%)	8 (27%)
House Ownership		
Yes	7 (28%)	17 (57%)
No	18 (72%)	13 (43%)
Living with Husband /Partner		
Yes	18 (72%)	22 (73%)
No	7 (28%)	8 (27%)
Employment Status of Husband/Partner		
Has full time employment	10 (40%)	18 (60%)
Has part time employment	5 (20%)	2 (7%)
On benefit	1 (4%)	-
Neither in paid work nor on benefit	3 (12%)	9 (30%)
Retired	-	-

Table 4.2 (c). Socioeconomic Status of Study Subjects by Group (Continued)

Groups	2-year Group (n=25)	4-year Group (n=30)
<u>Occupation of Husband/Partner</u>		
Legislators, senior officials, managers	3 (12%)	3 (10%)
Professionals	1 (4%)	3 (10%)
Technicians and associate professionals	2 (8%)	5 (17%)
Clerks	2 (8%)	2 (7%)
Service, shop, market	5 (20%)	6 (20%)
Skilled Ag and fish	-	-
Craft and related trades	-	1 (3%)
Plant and machine operators, assemblers	2 (8%)	-
Elementary occupations	-	-
NA	10 (40%)	10 (33%)
Student	4 (12%)	6 (20%)
Househusband	1 (4%)	3 (10%)
<u>Number of Children</u>		
0	11 (44%)	2 (7%)
1	10 (40%)	20 (68%)
2	4 (16%)	7 (23%)
3	-	1 (3%)
<u>Living with Parents</u>		
Yes	9 (36%)	13 (43%)
No	16 (64%)	17 (57%)

Table 4.3 Life Style Behavior of the Study Subjects by Group

Groups	2-year Group (n=25)	4-year Group (n=30)
Smoking Habit		
Yes	-	-
No	25 (100%)	30 (100%)
Drinking Habits		
Yes	-	2 (7%)
No	25 (100%)	28 (93%)
Weight Change After Immigration		
No difference	7 (28%)	10 (33%)
Increase > 5kg	6 (24%)	15 (50%)
Increase < 5kg	9 (36%)	5 (17%)
Increase, amount not known	1 (4%)	-
Decrease > 5kg	-	-
Decrease < 5kg	2 (8%)	-
Decrease, amount not known	-	-
Activity Level		
In China > In New Zealand	15 (60%)	26 (87%)
In China = In New Zealand	10 (40%)	4 (13%)
In China < In New Zealand	-	-
Consumes Nutritional Supplements		
Yes	4 (16%)	9 (30%)
No	21 (84%)	21 (70%)
Consumes Herbs Regularly		
Yes	2 (8%)	8 (27%)
No	23 (92%)	22 (73%)
Having Oral Contraceptives		
Yes	-	-
No	25 (100%)	30 (100%)

Table 4.4. Anthropometric Characteristics of the Study Subjects by Group

	Mean				SD		Median		UQ		LQ	
Groups	2-year	4-year	P value	All	2-year	4-year	2-year	4-year	2-year	4-year	2-year	4-year
Age (Years)	30.6	34.6	0.004*	32.8	6.2	3.5	32.6	33.7	34.1	36.4	26.8	32.7
Body Weight (kg)	53.7	56.6	0.078#	55.3	6.0	6.0	52.5	55.1	56.5	60.5	49.7	52.0
Height (cm)	158.1	160.0	0.128	159.2	4.5	4.5	158.2	160.2	160.3	163.7	156.1	157.1
Body Mass Index (kg/m2)	21.5	22.1	0.340	21.8	2.5	2.3	20.8	22.1	23.0	23.2	20.1	20.2
Skinfolds												
Triceps (mm)	18.9	20.7	0.297	19.9	5.4	7.2	17.7	19.0	23.5	26.5	15.8	15.1
Biceps (mm)	9.2	10.6	0.168	10.0	3.0	4.5	8.9	9.4	10.7	13.8	6.7	7.0
Subscapular (mm)	22.2	24.3	0.320	23.4	7.0	8.2	24.1	22.3	28.5	30.2	17.5	17.3
Circumference												
Waist (cm)	70.6	76.8	0.003*	74.0	7.0	7.6	69	75.4	74.7	81.3	65.8	71.7
Hip (cm)	88.6	92.6	0.038*	90.8	9.0	4.4	90.3	92.5	91.3	95.8	87.6	88.9
Ratio of Waist/Hip	0.81	0.83	0.368	0.82	0.13	0.06	0.77	0.82	0.80	0.87	0.75	0.79
Blood Pressure												
Systolic (mmHg)	99	104	0.113	101	11	12	98	101	105	111	91	97
Diastolic (mmHg)	68	72	0.102	70	8	10	65	70	74	79	61	62

* The difference between the two cohorts has statistical significance, using the two tailed t-test.
# The difference between the two cohorts bordering on significance, using the two-tailed t-test.

Table 4.5. Mean Anthropometric Characteristics of the Study Subjects by Region of Origin

Anthropometric Characteristics	North China (n=13)	South China (n=42)	P Value
Body Weight (kg)	54.6	55.5	0.679
Height (cm)	161.7	158.4	0.021*
Body Mass Index (kg/m^2)	20.9	22.1	0.120
Skinfolds			
Triceps (mm)	18.8	20.2	0.490
Biceps (mm)	9.0	10.2	0.335
Subscapular (mm)	19.6	24.5	0.043*
Circumference			
Waist (cm)	72.1	74.6	0.324
Hip (cm)	91.3	90.6	0.774
Ratio of Waist to Hip	0.79	0.83	0.234
Blood Pressure			
Systolic (mmHg)	101	101	0.956
Diastolic (mmHg)	73	69	0.099

* Statistically significant

Table 4.6. Study Subjects in Different Weight Categories (New Zealand Classification)

Groups		Body Mass Index Range			
		<20	20-24.9	25-29.9	≥30
2-year Group	Number of Subjects	6	17	2	-
	Percentage (%)	24	68	8	-
4-year Group	Number of Subjects	6	19	5	-
	Percentage(%)	20	63	17	-
All	Number of Subjects	12	36	7	-
	Percentage (%)	22	65	13	-

Table 4.7. Study Subjects in Different Weight Categories (Chinese Classification).

Groups		Body Mass Index range			
		<18.5	18.5-25.0	25.1-26.9	≥27
2-year Group	Number of Subjects	2	21	1	1
	Percentage (%)	8	84	4	4
4-year Group	Number of Subjects	-	25	5	-
	Percentage(%)	-	83	17	-
All	Number of Subjects	2	46	6	1
	Percentage (%)	4	84	11	2

Table 4.8. Distribution of Study Subjects in Different Waist/Hip Circumference Ratio Categories

Groups		Waist/Hip Circumference Ratio	
		<=0.8	>0.8
2-year Group	Number of Subjects	18	7
	Percentage (%)	72	28
4-year Group	Number of Subjects	10	20
	Percentage(%)	33	67
All	Number of Subject	28	27
	Percentage (%)	51	49

Table 4.9 Distribution of Study Subjects in Different Blood Pressure Categories

Groups	Distribution		
Systolic Pressure (mmHg)	Normal	$120 \leq BP < 145$	$BP \geq 145$
2-year group	24 (96%)	1 (4%)	-
4-year group	27 (90%)	3 (10%)	-
All	51 (93%)	4 (7%)	-
Diastolic Pressure (mmHg)	Normal	$90 \leq BP < 95$	$BP \geq 95$
2-year group	25 (100%)	-	-
4-year group	29 (97%)	1 (3%)	-
All	54 (98%)	1 (2%)	-

Table 4.10 Distribution of Study Subjects in Different Circumference of Waist Categories

Circumference (Cut-off Value)	2-year (n=25)	4-year (n=30)	All (n=55)
≤88cm	25 (100%)	28 (93%)	53 (96%)
>88cm	-	2 (7%)	2 (4%)

Table 4.11 (a) Individual Differences between the Two Methods in Energy, Protein, Fat and Carbohydrate Intakes

Nutrient	Energy		Protein		Fat		Carbohydrate	
Method	24-hour Recall	Mean of Two Day Weighed Diet Record	24-hour Recall	Mean of Two Day Weighed Diet Record	24-hour Recall	Mean of Two Day Weighed Diet Record	24-hour Recall	Mean of Two Day Weighed Diet Record
201	1433	1608	49	85	67	57	161	191
202	1510	1220	88	35	73	53	127	152
203	1896	1892	78	92	84	110	210	134
204	1322	1960	54	74	59	112	145	166
205	2744	2585	86	128	121	144	328	196
206	1787	1638	43	44	61	51	270	254
207	1144	1331	63	54	59	56	91	154
208	1608	1678	100	80	70	54	147	220
209	1250	1283	44	92	62	43	128	133
210	1668	1873	70	86	64	73	205	197
211	2093	1164	109	37	88	56	218	130
212	1495	2129	33	83	73	89	179	251
213	2174	3356	79	148	93	197	260	246
214	1963	1638	93	64	95	62	185	208
215	974	1435	28	87	55	71	93	113
216	1385	1332	69	53	34	57	204	153
217	1346	1539	56	60	40	66	191	177

Table 4.11 (b) Individual Differences between the Two Methods in Energy, Protein, Fat and Carbohydrate Intakes (Continued)

Nutrient	Energy		Protein		Fat		Carbohydrate	
Method	24-hour Recall	Mean of Two Day Weighed Diet Record	24-hour Recall	Mean of Two Day Weighed Diet Record	24-hour Recall	Mean of Two Day Weighed Diet Record	24-hour Recall	Mean of Two Day Weighed Diet Record
218	1459	1530	28	43	75	55	171	219
219	1925	2235	93	87	126	100	107	249
220	1573	2209	63	90	71	88	171	267
221	1371	1663	56	64	55	65	165	207
222	1024	1472	46	65	59	56	78	176
223	1363	1642	55	99	66	53	139	194
224	1387	1463	57	67	54	51	170	187
225	1709	2226	75	76	66	97	205	264
401	1754	1582	102	85	90	81	136	129
402	1182	2060	59	123	35	107	160	155
403	1643	2013	66	94	58	109	218	166
404	1702	1554	60	77	83	75	183	144
405	1671	2135	74	78	51	91	231	254
406	1521	1464	103	87	55	51	154	165
407	2048	1785	65	58	101	70	223	234
408	1037	1168	42	63	27	50	159	117
409	1656	771	70	38	68	21	193	109

Table 4.11 (c) Individual Differences between the Two Methods in Energy, Protein, Fat and Carbohydrate Intakes (Continued)

Nutrient	Energy		Protein		Fat		Carbohydrate	
Method	24-hour Recall	Mean of Two Day Weighed Diet Record	24-hour Recall	Mean of Two Day Weighed Diet Record	24-hour Recall	Mean of Two Day Weighed Diet Record	24-hour Recall	Mean of Two Day Weighed Diet Record
410	1095	2510	59	84	29	85	151	349
411	1196	1448	46	60	36	54	153	182
412	1796	902	61	29	82	38	204	112
413	1232	1497	32	62	49	61	168	177
414	2626	1487	77	61	82	76	397	143
415	1568	1427	96	44	54	49	166	204
416	1481	1348	84	58	55	46	165	177
417	1816	1209	38	56	101	55	192	123
418	623	2086	38	74	25	119	63	179
419	1521	1373	69	58	72	57	151	157
420	1530	1941	65	79	52	88	202	210
421	1069	1962	61	92	29	91	141	196
422	1900	2198	68	78	80	91	228	266
423	988	2041	33	77	28	89	153	236
424	3182	2534	182	138	144	133	293	199

Table 4.11 (d) Individual Differences between the Two Methods in Energy, Protein, Fat and Carbohydrate Intakes (Continued)

Nutrient	Energy		Protein		Fat		Carbohydrate	
Method	24-hour Recall	Mean of Two Day Weighed Diet Record	24-hour Recall	Mean of Two Day Weighed Diet Record	24-hour Recall	Mean of Two Day Weighed Diet Record	24-hour Recall	Mean of Two Day Weighed Diet Record
425	2097	1891	103	87	97	73	207	225
426	2419	2437	107	129	118	128	235	196
427	1285	1889	25	64	51	56	184	286
428	1408	1623	72	59	77	75	106	180
429	688	1541	43	73	21	55	82	190
430	2304	1642	84	54	93	51	287	245
P Value	0.11		0.15		0.16		0.30	

Table 4.12. Dietary Energy Sources and Macronutrient Intake by Group

	Mean			SD		Median			UQ		LQ	
Nutrients	2-year	4-year	P value	2-year	4-year	2-year	4-year	All	2-year	4-year	2-year	4-year
Energy (kJ)	7199	7088	0.803	1744	1519	6927	7014	6956	7925	7833	6020	6008
Energy (kcal)	1720	1693	0.803	417	363	1655	1676	1664	1893	1872	1438	1435
Protein (g)	72.5	73.3	0.888	19.5	23.1	73.2	69.0	71. 2	81.1	80.4	58.9	60.2
Total fat (g)	75.5	71.5	0.560	27.8	22.2	61.6	70.5	68.6	85.2	80.5	57.8	53.2
Carbohydrate (g)	189	190	0.877	40	42	193	180	182	203	226	160	157
Alcohol (g)	0.4	0.4	0.902	1.2	0.8	0.1	0	0	0.2	0.3	0	0
Total Sugars (g)	59.7	59.3	0.958	28.7	26.8	59.9	54.0	56.4	65.3	73.8	45.5	38.6
Starch (g)	94.1	102	0.246	22.6	27	101	104	103	108	114	79.5	78.4
Fiber (g)	16.8	17.1	0.813	4.5	5.6	16.6	15.5	16.2	20.1	20.8	13.6	13.4
Energy from Protein %	17.3	17.5	0.785	3.1	3.4	17.1	16.7	17.0	18.2	19.9	16.0	14.9
Energy from fat %	38.1	36.9	0.431	5.6	5.6	37.1	36.8	36.8	40.4	42.3	34.4	31.1
Energy from Carbohydrate %	42.5	43.4	0.598	6.4	6.7	43.3	45	43.9	45.5	47.4	39.6	38.6
Energy from Alcohol %	0.1	0.2	0.855	0.5	0.3	0	0	0	0.1	0.1	0	0

Table 4.13. Vitamin and Mineral Intake by Group

	Mean			SD		Median			UQ		LQ	
Nutrients	2-year	4-year	P value	2-year	4-year	2-year	4-year	All	2-year	4-year	2-year	4-year
Thiamin (mg)	1.2	1.2	0.745	0.7	0.8	1.0	1.1	1.1	1.3	1.4	0.8	0.9
Riboflavin (mg)	1.4	1.2	0.399	0.8	0.4	1.1	1.3	1.2	1.5	1.5	0.9	1.0
Niacin (mg)	13.9	12.6	0.279	5.4	3.6	12.6	12.0	12.4	16.1	15.4	11.2	10.8
Vitamin C (mg)	135	135	0.969	81	71	124	115	119	196	186	76.5	84.2
Vitamin D (ug)	2.2	2.1	0.811	1.3	2.3	1.7	1.1	1.6	3.4	2.5	1.1	0.7
Vitamin E (mg)	10.3	9.1	0.287	4.7	3.4	9.1	8.1	8.9	11.1	11.8	8.4	6.8
Vitamin B_6 (mg)	1.2	1.1	0.352	0.3	0.3	1.1	1.1	1.1	1.3	1.4	0.9	0.8
Vitamin B_{12} (mg)	4.6	4.1	0.649	5.2	3.7	2.7	2.4	2.6	4.7	4.7	2.1	1.8
Total Folate (ug)	191	199	0.684	76	76	175	211	198	233	254	134	138
B-Carotene Eq (ug)	3662	3126	0.536	3139	3201	2569	2338	2531	4807	3679	1932	1357
Retinol (ug)	814	363	0.236	1990	509	225	235	225	344	362	176	186
Total A Eq (ug)	1222	723	0.214	2026	722	585	509	541	1056	805	387	298
Sodium (mg)	3744	4073	0.446	1465	1677	3539	3683	3584	4296	5501	2912	2862
Potassium (mg)	2489	2441	0.792	742	611	2433	2511	2469	2859	2921	2034	1989
Magnesium (mg)	266	271	0.776	75.6	60.8	269	284	272	297	310	239	223
Calcium (mg)	496	537	0.493	239	203	439	532	488	678	664	333	351
Phosphorus (mg)	1053	1097	0.582	286	299	995	1096	1054	1158	1288	872	845
Iron (mg)	14.2	13.3	0.556	6.7	4.5	13.3	12.3	12.5	17.8	15.1	9.9	10.7
Zinc (mg)	9.6	10.1	0.430	2.6	2.3	8.9	9.7	9.4	12.6	11.7	7.9	8.3
Manganese (ug)	3523	4056	0.103	1254	1127	3270	4095	3670	3933	4479	3056	3346
Copper (mg)	1.3	1.3	0.985	0.3	0.3	1.3	1.2	1.3	1.5	1.4	1.1	1.1
Selenium (ug)	60.9	57.4	0.698	25.8	38.3	51.4	46.8	49	80.8	66.3	44.2	33.4

Table 4.14. Lipid Intake and Percentages of Fatty Acid Intake by Group

	Mean			SD		Median			UQ		LQ	
Nutrients	2-year	4-year	P value	2-year	4-year	2-year	4-year	All	2-year	4-year	2-year	4-year
Total Fat (g)	75.5	71.5	0.560	27.8	22.2	61.6	70.5	68.6	85.2	80.5	57.8	53.2
SFA[1] (g)	25.1	23.1	0.373	8.9	7.7	20.7	21.2	20.7	30.5	27.6	17.1	17.9
MUFA [2](g)	27.3	26.1	0.645	9.5	9.9	24.8	23.9	24.8	31.4	32.3	21.3	18.8
PUFA[3] (g)	20.2	18.5	0.534	11.5	8.9	17.5	16.8	17.0	24.9	22.2	11.6	12.5
Cholesterol (mg)	321	324	0.925	133	158	325	313	324	389	415	251	207
Fat as MUFA %	38.4	38.3	0.925	4.8	5.1	39.0	38.4	38.9	41.5	40.9	36.1	34.8
Fat as PUFA %	26.6	27.3	0.757	6.9	8.1	26.5	27.4	26.7	29.7	30.5	22.9	22.7
Fat as SUFA %	34.9	34.4	0.704	4.7	5.2	35.6	34.3	34.4	37.0	37.2	32.5	31.1

1 SFA: Saturated Fatty

2 MUFA:Monounsaturate Fatty Acid

3 PUFA: Polyunsaturated Fatty Acid

Table 4.15 Food Consumption Patterns of the Study Subjects (g/day)

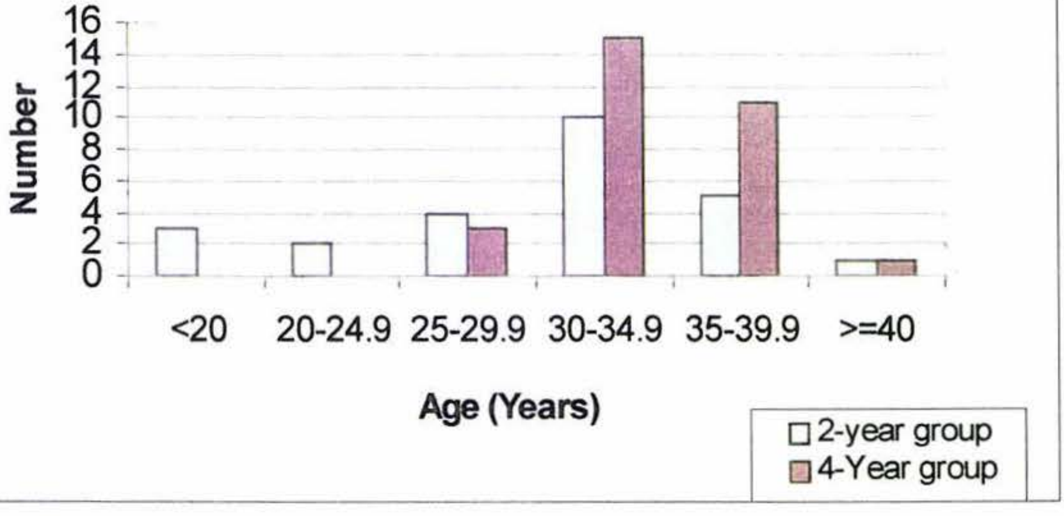
Food Categories	Mean 4-year Group (n=30)	Mean 2-year Group (n=25)
Rice/products	142	118
Wheat/flour/products	81	83
Legume/products	28	24
Vegetables, tubers	313	284
Salted vegetables	2	6
Fruits	268	278
Pork/products	55	58
Other meats (lamb, beef, etc)	21	32
Organ meats	3	9
Poultry/products	54	48
Egg/products	39	34
Fish/shellfish	58	58
Cooking oils/spread	17	21
Snack/sweet products	24	28
Dairy food	125	143
Fast food	61	34
Soft drink	12	47
Chips	0.6	4.8

Table 4.16 Correlation between Fat, Sodium Intake and Selected Anthropometric Values

Index	r		
	2-year Group	4-year Group	All
Fat Energy Ratio &			
Body Mass Index	0.324	0.197	0.038
Waist/Hip Ratio	0.387*	0.032	0.199
Sodium Intake &			
Systolic Blood Pressure	0.146	0.133	0.112
Diastolic Blood Pressure	0.206	0.125	0.017

*P<0.01

Figure 4.1 Age Distribution of the Study Subjects



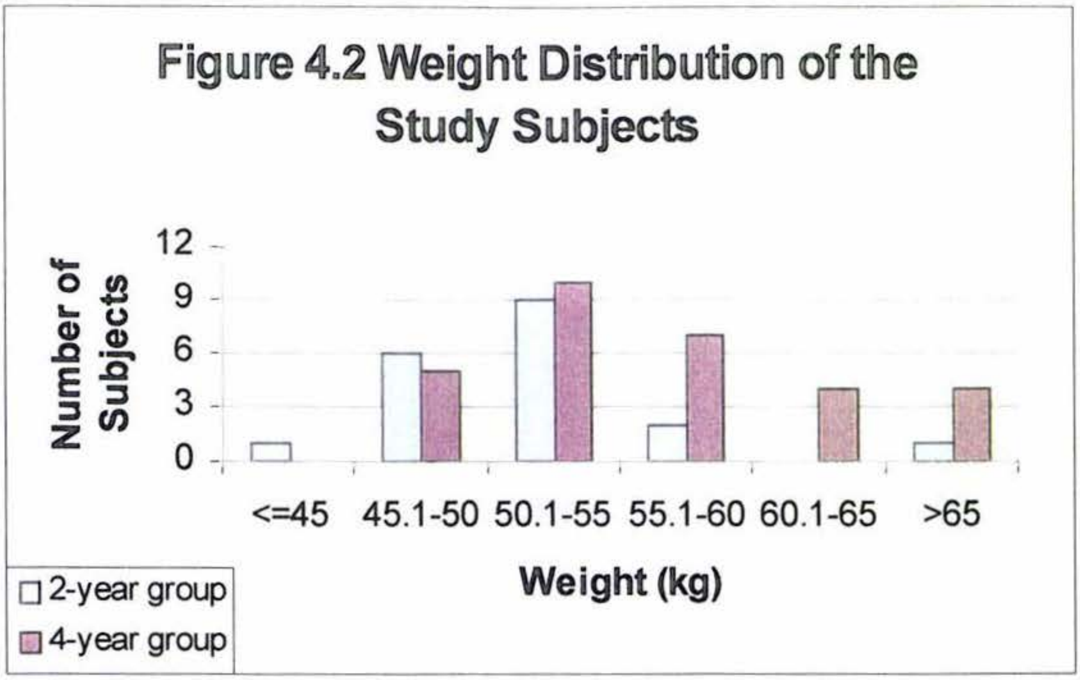


Figure 4.2 Weight Distribution of the Study Subjects

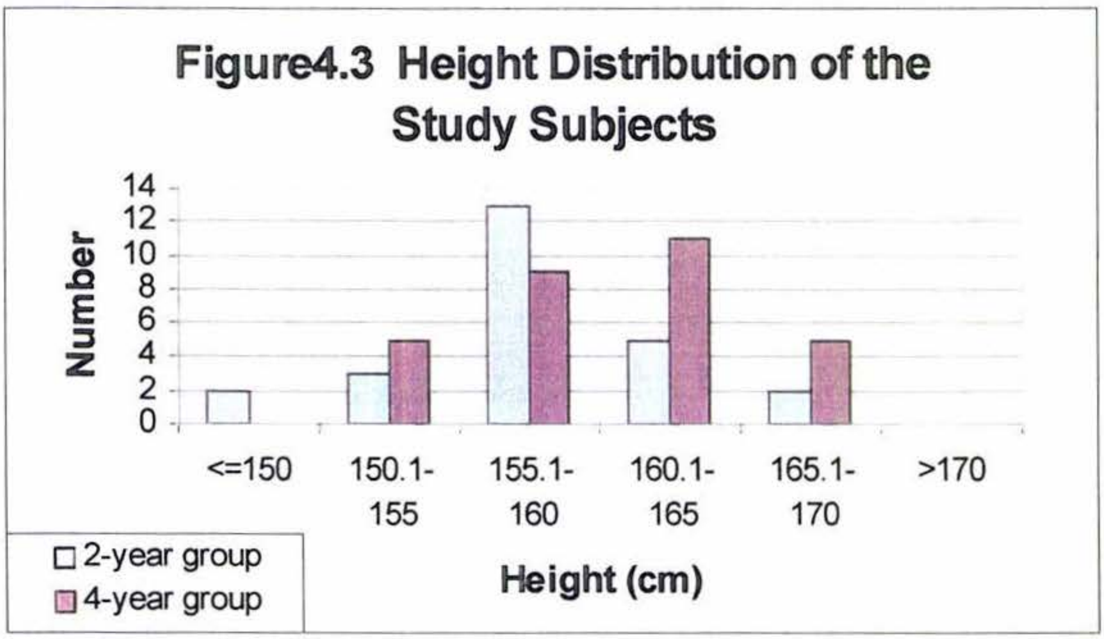


Figure4.3 Height Distribution of the Study Subjects

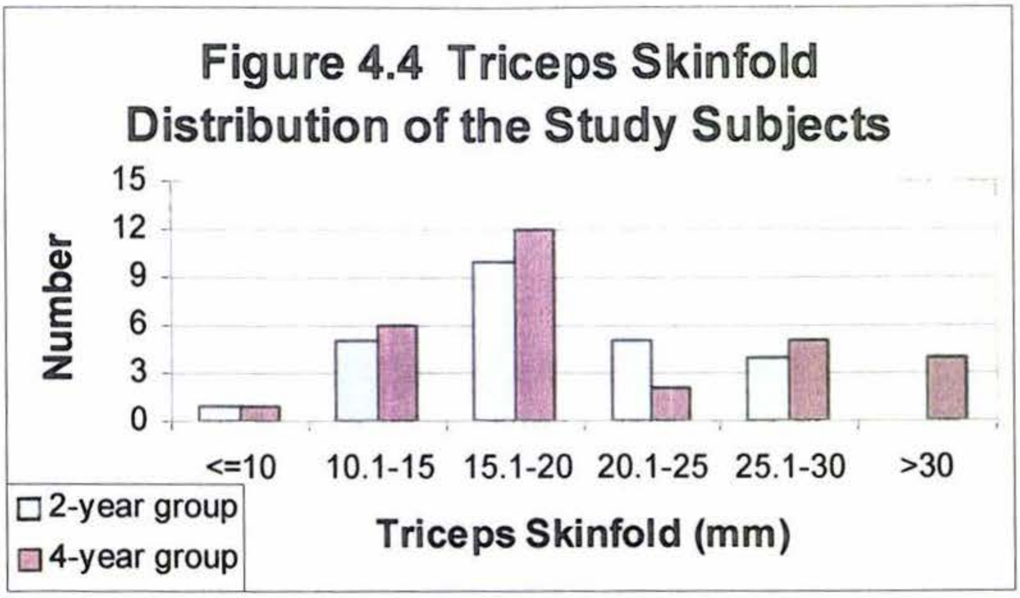


Figure 4.4 Triceps Skinfold
Distribution of the Study Subjects
15
12
9
6
3
0
Number
<=10
10.1-15
15.1-20
20.1-25
25.1-30
>30
2-year group
4-year group
Triceps Skinfold (mm)

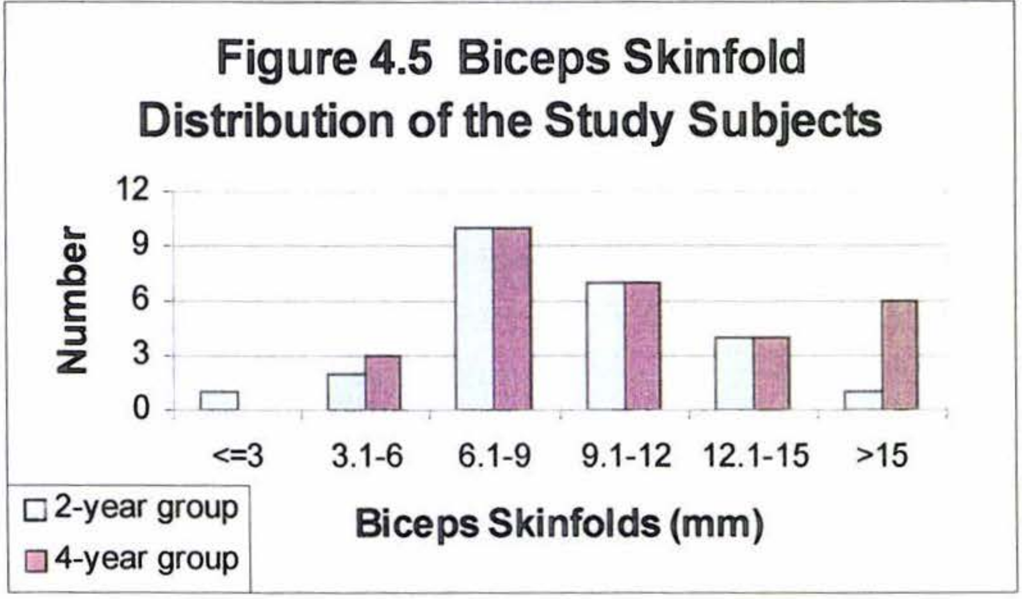


Figure 4.5 Biceps Skinfold
Distribution of the Study Subjects
12
9
6
3
0
Number
<=3
3.1-6
6.1-9
9.1-12
12.1-15
>15
2-year group
4-year group
Biceps Skinfolds (mm)

Figure 4.6 Subscapular Skinfold Distribution of the Study Subjects

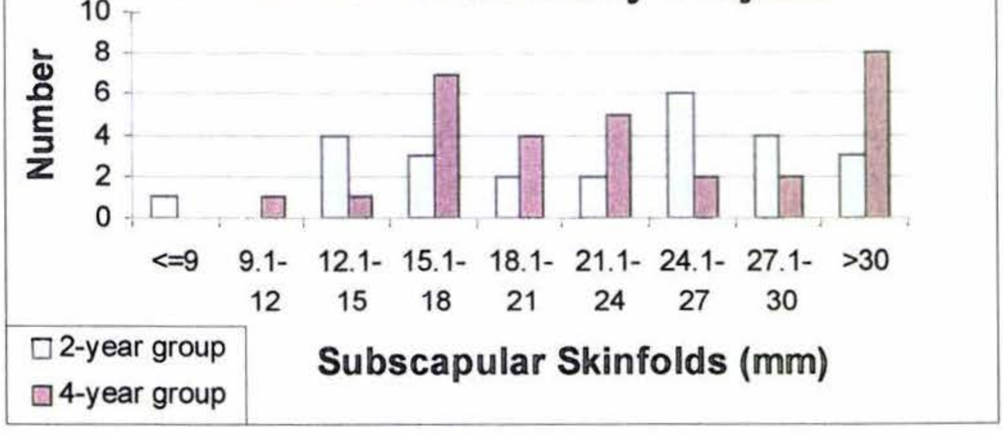
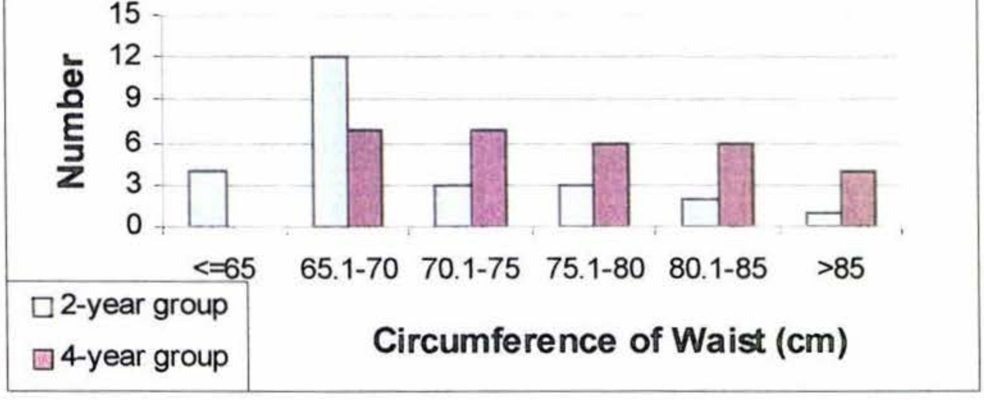


Figure 4.7 Waist Circumference Distribution of the Study Subjects



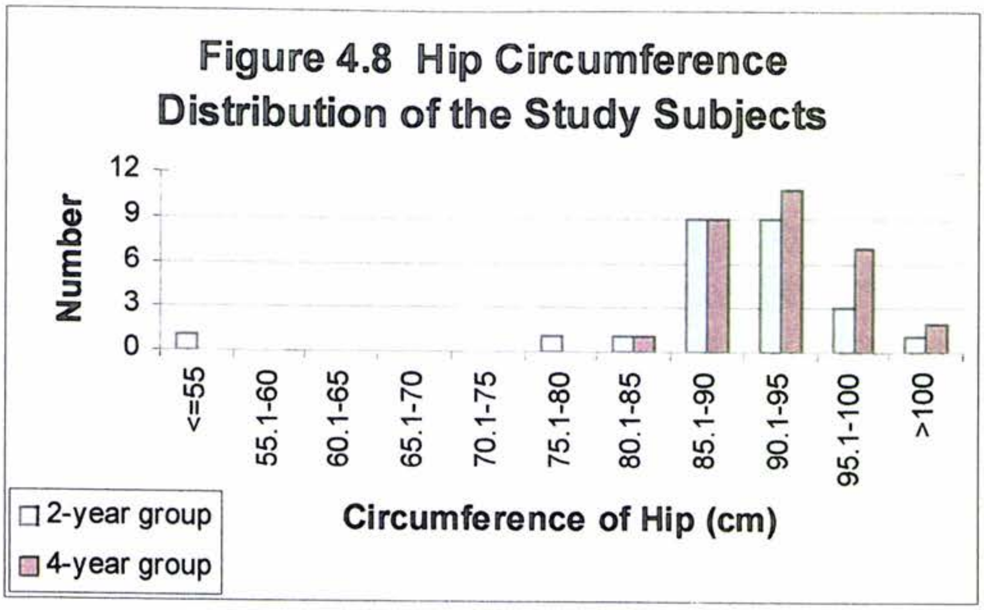


Figure 4.8 Hip Circumference Distribution of the Study Subjects

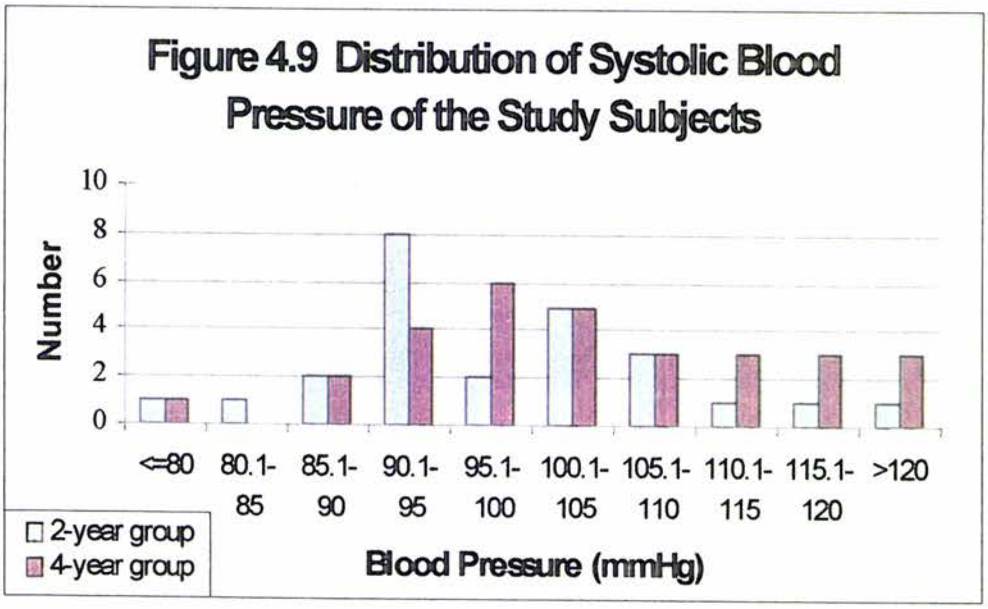


Figure 4.9 Distribution of Systolic Blood Pressure of the Study Subjects

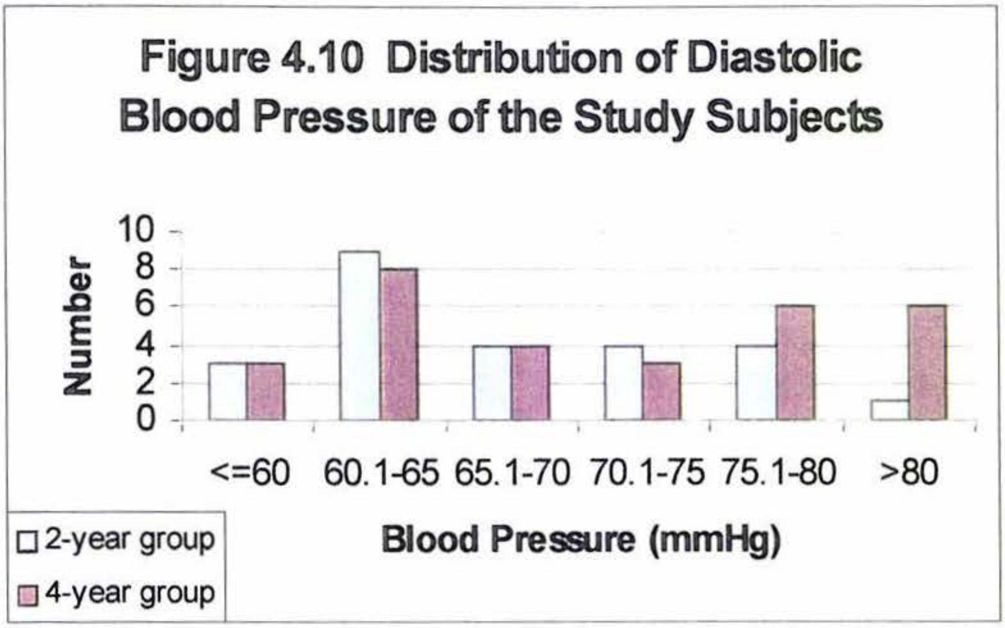


Figure 4.10 Distribution of Diastolic Blood Pressure of the Study Subjects
Number
10
8
6
4
2
0
<=60
60.1-65
65.1-70
70.1-75
75.1-80
>80
2-year group
4-year group
Blood Pressure (mmHg)

CHAPTER 5. DISCUSSION – CONSIDERATION OF THE STUDY RESULTS ALONE

5.1 Responses to Publicity for Volunteer Required

To recruit subjects, a publicity campaign using radio, television, newspapers and posters was aimed at the Chinese community. Only two subjects responded to the publicity and contacted us directly. Most subjects were recruited by personal contact via relatives or friends who came for study, although some of them had already known of the study from the publicity. This response pattern differed to that in Western cultures. Chinese are from conservative traditional backgrounds with many rules and restrictions which limit their actions and behavior. They are either embarrassed, unsure, or fear volunteering may lead to unnecessary trouble as a consequence. However, helping somebody who needs help is what they are happy to do. So, most of the subjects took part in the study for the purpose of helping each other.

5.2 Background Characteristics of the Study Participants

5.21 Background Characteristics of the New Chinese Immigrants

- Age and Qualification

Within the last decade of the 20th century, the great majority of immigrants who entered New Zealand from the Mainland China came under the 'skills' categories (79%), where skills, education, and youth counted most. Since immigrants were chosen by New Zealand for their qualifications and expertise, their education levels were already much higher than the national average. Friesen and Ip conducted research in 1997 on the profile of New Chinese New Zealanders. Over 61% of the respondents in Friesen's survey had Bachelor degrees. Only 0.6% did not have a secondary education (Friesen &

Ip, 1997). In the present study, 80 percent of the participants had tertiary qualifications, a similar pattern to Friesen & IP's result. Women in the 4-year group had a higher education level than those in the 2-year group (Table 4.1).

According to the migration policy, most Chinese from Mainland China qualified to migrate when they were in their late 20s or early 30s. So their modal cohort was around 30 years (Friesen & Ip, 1997). In the present study, nearly half of the subjects were in the 30 to 35 age ranges, which is in agreement with this observation. Subjects in the 2-year group were younger than those in the 4-year group (Figure 4.1). In contrast to the earlier migrants from Mainland China, the new Chinese migrants were highly educated and young.

More than 75% of the subjects in both groups came from South China

- Employment

Compared to the 2-year group subjects, the 4-year group had better employment status (Table 4.2a). In the 4-year group, nearly half of the subjects were in full time employment, and more than 25% of them worked as professionals. Whereas, in the 2-year group, only eight percent of the subjects were in full time employment, and 12% of them worked as professionals.

The overall picture showed that the new Chinese immigrants were well qualified but under-employed. The same situation had been reported by several researchers (Lidgard, 1996; Friesen & Ip, 1997;): where of former professionals, only 26% remained professionals. Twenty-nine percent of technicians said that they were still technicians, while 25% of them became managers. Overall, the occupational expectations of highly qualified professionals were much less likely to be met than those of less-specialized para-professionals. The mismatch of qualification and employment is a strong indication that many of the new Chinese immigrants are likely to feel under-valued and demoralized. Lidgard (Lidgard, 1996) concluded that, "When a country fails to make use of the qualifications and skills of new settlers it is wasting a valuable resource". At the end of the study, nearly 25% of the study subjects and their families left New Zealand. Australia and countries in east south Asia were the most popular countries they chose to go to. Some of them returned to Mainland China to work.

Another point worth noting is that many new Chinese immigrants had returned to school for further training. Many well-qualified migrants were studying to gain further qualifications as they felt that this would be the only way for them to obtain work as professionals in New Zealand (Lidgard, 1996). Eighty-three percent of the unemployed women were students in the 2-year group, and, 40% in the 4-year group. More subjects in the 4-year group had returned to work with their new qualification after a 2 to 3-year training.

- Income Level:

The 4-year group subjects were also better off financially (Table 4.2a,b). In the 2-year group, the largest percentage of families was in the \$15,000 to \$30,000 per annum category (40%), whereas, in the 4-year group, the largest percentage of families was in the \$30,000 to \$45,000 per annum category (36.7%). Nearly half of the subjects owned houses in the 4-year group. Only a quarter of the subjects in the 2-year group were house owners. This was the result of the 4-year group having better employment status than the 2-year group subjects. The percentage of subjects receiving benefits was similar in both groups.

- Family Composition

The 4-year group subjects had more children than the 2-year group subjects, with 90% and 56% of the 4-year subjects and 2-year subjects respectively having one to two children. Percentages of subjects living with husbands in the two groups were similar, nearly 75% (Table 4.2c).

Forty percent of the study subjects lived with their parents; a special family structure that differs from most New Zealander's. This may be accounted for partly by tradition. A family, which includes three generations, is a typical Chinese family. A statistics report (Statistics New Zealand, 1995) in 1991 indicated that Asian parents and parents-in-law were more likely to live with their children rather than live alone or in retirement homes. Forty percent of all Asians over 64 years of age were living in extended family dwellings. On the other hand, it was difficult for the aged population to be independent. They were less fluent in the English language, less mobile, and less adaptable to the New World, so had to live with their children. Another survey on food intakes of Melbourne Chinese (Hsu-Hage et al, 1995) indicated that food intake was related to age: the aged population tending to keep to traditional Chinese eating patterns. We thought that the food pattern would be affected when the study subjects lived with their parents, and analyzed the relationship between nutrient intake and the family size. However, no link was found.

5.22 Lifestyle Behaviors of the Study Participants

- Smoking and Alcohol Consumption:

Smoking has been identified as the major cause of preventable death in developed countries. Smoking has been linked to increased rates of some cancers (lung, mouth, pharynx, oesophagus, larynx, pancreas and kidney), heart disease, stroke, and chronic respiratory diseases (Doll, 1998; World Health Organization 1997). In the present study, none of the subjects smoked (Table 4.3). Only two subjects, accounting for 3.6% of the total, drank alcoholic beverages (Table 4.3). This was probably attributed to the high education level of the study subjects

- Consumption of Dietary Supplements

In the present study, 16% of the 2-year group subjects and 30% of the 4-year group subjects consumed nutrition supplements regularly (Table 4.3). Eighteen percent of the participants consumed Chinese medicine and/or herbs regularly. The higher percentage of subjects consuming supplements in the 4-year group might partly be due to the 4-year group subjects being better off financially. No subjects used oral contraceptives.

- Activity Change and Body Weight Change:

Most of the subjects reported activity decreases (60% and 87% respectively) after immigration (Table 4.3). In China, in part because of the extensive use of bicycles for transportation to and from work, physical activity, even in office workers, is performed more regularly than in New Zealand.

It was not surprising that nearly 95% of the participants reported a weight increase after immigration (Table 4.3). There was also a marked shift in the structure of the diet with an increase in the proportion of the population consuming more than 35% of energy from fat (discussed below). The combination of these two factors probably explains the body weight increase of the study subjects.

Lack of physical activity has been shown to be an important risk factor for heart disease. Increased physical activity has also been shown to decrease the chances of having high blood pressure, a stroke, and developing diabetes or cancer of the colon (US Department of Health and Human Services 1996; New Zealand National Advisory Committee on Health and Disability, 1998). So, an increase physical activity is necessary in the study subjects.

5.3. Anthropometric Characteristics of the Study Participants

As shown in Table 4.4, All the mean anthropometric measurements were higher in the 4-year group than that in the 2-year group. Except for the differences of waist and hip circumference, all differences did not achieve statistical significance. The participants in the 2- year group were younger than those in the 4-year group ($P< 0.05$). The participants in the 2-year group were on average nearly three kilograms lighter and 1.9 centimeters shorter than those in the 4- year group, although the differences were not significant ($P > 0.05$ and $P> 0.1$). Mean BMI was 21.5 in the 2-year group and 22.1 in the 4-year group. No significant ($P>0.1$) difference was detected in BMI between the two groups. The means of triceps skinfold, biceps skinfold and subscapular skinfold in the 2-year group were all lower, although all the differences did not achieve statistical significance ($P>0.1$). The means of waist circumference and hip circumference were significantly narrower in the 2-year group ($P< 0.05$). However, there was no significant difference in the ratio of waist to hip (W/H) between the two cohorts. Both mean systolic blood pressure and diastolic blood pressure tended to be lower in the 2-year group compared with the 4-year group, but the differences were insignificant.

In Table 4.5, forty-two (76%) subjects came from South China and thirteen (24%) subjects came from North China. North Chinese women were on average 3.3 centimeter taller than South Chinese women. The difference was statistically significant. Moreover, mean subscapular skinfolds were significantly higher in Southern women compared to Northern women. Mean values for body weight, BMI, triceps skinfold, biceps skinfold, waist/hip ratio were higher in Southern women than those in northern women, although the differences were not significant. Mean systolic blood pressure was the same in the two groups, whereas, diastolic blood pressure was slightly higher in the northern women although the differences were not significant.

According to the New Zealand standard, 24% and 20% of the 2-year subjects and 4-year subjects respectively were underweight, while 8% and 16.7% respectively were overweight. More women in the 4-year group were overweight. None of the participants were obese. When all the women were considered together, 13% could be classified as overweight, 22% were underweight, and 65% were in the normal BMI range (Table 4.6).

According to the Chinese standard, 8% of the 2-year subjects were underweight. None of the subjects in the 4-year group were underweight. Four percent and 16.7% respectively of the 2-year subjects and 4-year subjects were overweight, and four percent of the 2-year subjects were obese. Again, more women in the 4-year group were overweight. In this classification when all women were considered together as a group, 4% were underweight, 84% were in the normal range, 11% were overweight and 2% were obese (Table 4.7).

Compared with the New Zealand classification, the proportions of normal weight and severely overweight women increased, and the proportions of underweight and overweight women decreased, when the Chinese standard was used.

As shown in Table 4.8, in the 2-year cohort, only 28% of the subjects had waist/hip ratio above the 0.8 cut-off value, whereas, most of the subjects in the 4-year cohort (67%) were above the cut-off value. When all the women were considered together as one group, nearly half were in the high-risk category.

Table 4.9 indicated that the 2-year group subjects had better blood pressure status than the 4-year group subjects. Overall, more than 90% of subjects fell into the normal blood pressure range. Only 7% and 2% of the subjects were at the borderline of high systolic pressure and high diastolic pressure respectively. None of the subjects had high blood pressure.

Table 4.10 describes the distribution of the study subjects in different waist circumference categories. All the 2-year group subjects had waist circumferences under the cut-off values. Only 6.7% of the subjects in the 4-year group had waist circumference above the cut-off values. When all the women were considered together, only 3.6% of the study subjects were in the risk category.

5.4. Nutrient Intake Analysis

5.41 Comparison of Nutrient Intakes between Two Groups

The macronutrient intakes in the two groups were very close. Median of energy and fat intake in the 4-year group was slightly higher. On the contrary, median of fat/energy ratio and protein/energy ratio was slightly higher in the 2-year group. However, all the differences were not significant (Table 4.12).

Median intakes of niacin, vitamin C, vitamin D, vitamin E, B-carotene, total A Eq and iron were higher in the 2-year group, whereas median intakes of folate, calcium, manganese and sodium were higher in the 4-year group. Again, the differences could not achieve statistical significance (Table 4.13).

As shown in Table 4.14, median intake of total fat was slightly higher in the 4-year group. Median intake of total fat, saturated fatty acid was slightly higher in the 4-year group. Whereas, the median intake of cholesterol, monounsaturated fatty acid and polyunsaturated fatty acid was slightly higher in the 2-year group, although differences were not significant. Except for the percentage of polyunsaturated fatty acid, percentages of monounsaturated fatty acid and saturated fatty acid were higher in the 2-year group.

5.42 Evaluation of All Subject's Nutrient Intakes in Comparison with Recommended Daily Allowance

Macronutrient intakes and sources of dietary energy were compared with the Chinese Recommended Daily Allowance (RDA) values and the Australian Recommended Dietary Intake (RDI) values (Table 5.1). The Chinese assume that intake levels ranging from 80 to 120 percent of RDA are acceptable (Zhang et al, 1997). The RDA of the Chinese was published in 1990 by the Chinese Nutrition Society (Chinese Nutrition Society, 1990). The RDA was worked out on the basis of the Chinese dietary characteristics: grains being the main foods, and consumption of animal foods is inadequate. Thus calcium from dairy products and heme iron intakes are insufficient. However, the Mainland Chinese RDA for iron, zinc, vitamin D, E, C, and thiamin is significant higher than the Australian RDI for these nutrients.

The energy intake was on average 7138kJ (1705kcal) per day in this study, accounting for 81% of the Chinese RDA and 81-99% of the Australia RDI.

The Chinese RDA for protein was set at a higher level than the Australian RDI. This is because the proportion of protein coming from animals and legumes is only 37% in the Chinese diet (Ge, 1996). Protein quality is relatively low. The average protein consumption in this study was 73g per day, the average body weight of the study subjects was 55.3kg, Therefore the protein intake was on average 1.3g/kg/day, higher than both the Chinese RDA and Australian RDI. The study subjects had a high protein intake.

It is worthy to note that when the lipid energy ratio is evaluated, the present study participants consumed excess fat. Excess lipid intake is among the well-established nutritional risk factors for cardiovascular disease. Dietary fat provided 37.5% of energy intake in this study, which was much higher than the Chinese RDA (22.5%). In comparing the data with the Dietary Goals of WHO, the dietary fat intake of the study subjects was also higher than that recommended by WHO (15-30%) (Garrow et al, 2000). The cholesterol intake (323mg) was close to the recommended value for cardiovascular health of 300mg (the International Lipid Information Bureau, 1995).

The general guideline set out by the Nutrition Task Force in 1991 (New Zealand Nutrition Task Force, 1991) in New Zealand suggested that fiber intake should be 25-30g/day. Soluble fiber should comprise one quarter of total dietary fiber. Study subjects took 17g fiber daily on average, accounting for only 57-68% of the New Zealand guideline. Intake of dietary fiber by the study subjects seemed inadequate. There is no recommendation for fiber intake in China so far.

Compared with the Chinese RDA's, the study subject's intake of vitamin B, niacin, vitamin C, vitamin E and selenium was adequate, but vitamin D, retionl, calcium, iron, and zinc intakes were insufficient (Table 5.2).

However when considering these results, several factors should be taken into account:

- The vitamin D status of the human is partly determined by exposure to UV light from the sun. Considering the inadequate exposure to sunlight in China, the Chinese RDA for vitamin D is set at the levels generally higher than the Australia RDI. Although the study subjects seemed to have insufficient vitamin D intake from food in terms of the Chinese RDA, living in New Zealand, they probably get enough vitamin D from the sun.

- As in China, dietary iron is poorly absorbed, greater than 95% of the mean iron intake was in the nonheme form (Chen et al, 1990; Campbell & Chen, 1994; Du, et al, 2000). Iron deficiency and iron deficiency anemia are the most common nutritional deficiency problems in China, particularly of women and children, with a prevalence of anemia in Mainland Chinese women as high as 21.6-24.7% (Ge, 1996). Therefore, the Chinese RDA value for iron was set at a higher level than that in other countries. In term of the Chinese RDA, subjects in the present study had inadequate iron intakes, but the higher protein and fat intake in the present study indicated that the study subjects might have higher animal food intakes and iron absorption may be more effective. Further study is needed to reveal the dietary sources of iron and the iron status in this population.

On the other hand, except for calcium intake, all the vitamin and mineral intakes met the Australia RDI's. Calcium consumption was obviously lower than the recommended intake level. The low calcium intake was a result of lower consumption of dairy foods. Milk was only consumed for breakfast by most of the study subjects. Cheese, yogurt and other dairy products were not often consumed, which is not surprising, as typical Chinese meals do not include these foods.

Sodium intake was on average 3923g per day in the present study, which was obviously higher than the Australia RDI. Salt should be restricted because the incidence of high blood pressure positively correlates with sodium intake. Chinese scientists have suggested that a dietary goal for the year 2000 (Ge & Shen, 1991; Chinese Nutrition Society, 1990): be reduction of NaCl intake to less than 10g (3913mg Na). For hypertension prevention, sodium intake by the study subjects needs further decrease, although it was close to the Chinese recommendation.

5.43 Evaluation of All Subject's Nutrient Intakes in Comparison with the United Kingdom Lower Reference Nutrient Intake (LRNI)

Half of the study subjects had vitamin A intakes below the United Kingdom LRNI value (Table 5.3). One-third of the subjects had calcium and selenium intakes less than the LRNI values. Eleven percent and 16% subjects had insufficient iron and riboflavin intakes respectively. Although the average riboflavin intake was higher than the Chinese RDA, a number had inadequate intakes. Inadequate intakes of vitamin A, riboflavin, calcium and iron were the main nutritional problems in the study population.

5.5 Comparison of Food Patterns between the Two Groups

In this study, subjects in the 2-year group ate more salted vegetables, organ meats, other meats, such as lamb and beef, dairy food, chips and soft drink, but less rice, vegetables, poultry and fast food than subjects in the 4-year. These differences were not statistically significant except the difference in intake of rice and its products (Table 4.15).

5.6 Limitations of the Study

1. The three-day dietary survey was carried out during a winter-to spring period. Since the availability of many foods varies by season, it is recognized that these results may not be generalized to other seasons. In general, seasonal effects will probably be greater for food patterns rather than nutrient intakes (Gibson, 1990).

2. Both a Chinese food composition table and a United Kingdom food composition database were used for calculation of the nutrient content of the Chinese foods not available in the New Zealand food composition database. The literature clearly indicated that the plant uptake, and nutrient contents in the plant are influenced by many factors including concentration of the element in the soil, soil pH, soil temperature, moisture levels and so on (Javris et al, 1976; Chaney & Hornick, 1977; Van Bruwaene et al, 1984). Therefore, it is quite conceivable that the nutrient contents of vegetables, for example, will vary with the contents of the soil where they are grown for harvest. Thus, the nutrient values in the Chinese food composition table and the United Kingdom food composition database may not accurately reflect the true nutrient contents of the food bought by the Chinese women in New Zealand.

3. Only raw foods are contained in the Chinese Food Composition Table. Nutrient values for cooked food are not available. It is well known that the nutrient content of food differs before and after a food being cooked, especially the soluble vitamin content of vegetables, which diminishes after being cooked. Therefore, some nutrient intakes, such as, soluble vitamins, may be overestimated in this study.

4. Food diaries may cause the subject to change her normal eating habits.

5. The present study is a cross sectional study. A cross sectional study design is a poor design for examining the relationship between putative modifiable risk factors and an outcome, which may take decades to develop.

6. Only women subjects were included in this study. However, Chinese men are more likely to drink and smoke than women. Attention should also be paid to their nutritional status, body measurements, life habits and the impacts of these on their health.

Table 5.1 Macronutrient Intake as a Percentage of the Recommended Daily Allowance (RDA)/Recommended Dietary Intakes (RDI)

Nutrients	Amount of Intake by Subjects	Chinese RDA for 18-45yrs Women (very sedentary)[1]	Chinese RDA%	Australian RDI for 19-54yrs women[2]	Australian RDI %
Energy (kJ)	7138	8800	81	7200-8800	81-99
Protein (g)	73	1.2g/kg	-	0.75g/kg	-
Total Fat (g)	73.3	-	-	-	-
Carbohydrate (g)	190	-	-	-	-
Fiber (g)	17	-	-	-	-
Energy from Protein %	17.4	-	-	-	-
Energy from Fat %	37.5	22.5	167	-	-
Energy from Carbohydrate %	43.0	-	-	-	-

[1] Data from Chen, 1996.
[2] Data from National Health and Medical Research Council, 1991

Table 5.2 Vitamin and Mineral Intakes as a Percentage of the Recommended Daily Allowance (RDA)/Recommended Dietary Intakes (RDI)

Nutrients	Amount of Intake by Subjects	Chinese RDA for 18-45yrs Women (very sedentary)[1]	Chinese RDA%	Australian RDI for 19-54yrs women[2]	Australian RDI %
Thiamin (mg)	1.2	1.1	109	0.8	150
Riboflavin (mg)	1.3	1.1	118	1.2	108
Niacin (mg)	13.2	11	120	13	101
Vitamin C (mg)	135	60	225	30	450
Vitamin D (ug)	2.1	5	42	-	-
Vitamin E (mg)	9.7	10	97	7	138
Vitamin B_6 (mg)	1.1	-	-	0.9-1.4	79-122
Vitamin B_{12} (mg)	4.3	-	-	2	215
Total Folate (ug)	196	-	-	200	98
B-Carotene Eq (ug)	3370	-	-	-	-
Retinol (ug)	568	800	71	-	-
Total A Eq (ug)	950	-	-	750	127
Sodium (mg)	3923	-	-	920-2300	170-426
Potassium (mg)	2463	-	-	1950-5460	451-126
Magnesium (mg)	268	-	-	270	99
Calcium (mg)	518	800	65	800	65
Phosphorus (mg)	1076	-	-	1000	108
Iron (mg)	13.7	18	76	12-16	86-114
Zinc (mg)	9.9	15	66	12	82
Manganese (ug)	3814	-	-	-	-
Copper (mg)	1.3	-	-	-	-
Selenium (ug)	60.0	50	120	70	86

Table 5.3 Percentage of Insufficient Intake of Nutrients among the Study Subjects

Nutrients	United Kingdom Lower Reference Nutrient Intake*	Number of Cases	Percentage %
Vitamin A(ug retinol equivalent/day)	250	28	51
Vitamin D (ug/day)	0 (If exposed to the sun)		
Vitamin C (mg/day)	10	0	-
Thiamin (mg/day)	0.23	0	-
Riboflavin (mg/day)	0.8	9	16
Nicotinic (mg/1000kcal)	4.4	1	2
Vitamin B_{12} (ug/day)	1.0	4	7
Folate (ug/day)	100	4	7
Calcium (mg/day)	400	18	33
Magnesium (mg/day)	190	8	15
Selenium (ug/day)	40	18	33
Zinc (mg/day)	4.0	0	-
Iron (mg/day)	8.0	6	11
Sodium(mg/day)	575	0	-
Potassium (mg/day)	2000	14	25

CHAPTER 6. DISCUSSION – COMPARISON OF THE COMBINED STUDY RESULTS WITH OTHER STUDIES

6.1 Life Style Comparison

6.11 Smoking Habits

Chinese women have a very low prevalence of cigarette smoking. In China, on average, only 1.45% of Chinese women were reported to be current smokers. In 1991, a random survey indicated that among females, the highest smoking rate was 18.8% and the lowest was 1.2% in China (Chen, 1997). In Melbourne, only 7.5% of the Melbourne Chinese women were smokers (Hsu-Hage et al, 1993). None of the participants smoked in the present study.

In contrast, New Zealand women were more likely to be current smokers than the Chinese women. The results of the 1996/1997 Health Survey showed that near one quarter of the New Zealand women were current smokers (New Zealand Ministry of Health, 1999). Smoking prevalence was shown to be strongly related to socioeconomic status: people in lower socioeconomic groups were more likely to be smokers. Young women (15-24 years) were more likely to be smokers than men of the same age (New Zealand Ministry of Health[2], 1999).

6.12 Alcohol Consumption

Again, alcohol consumption by Chinese is very low by Western standards. Most Chinese women are teetotalers. In the present study, only two subjects, accounting for 3.6% of total, drank alcoholic beverages. Auckland Chinese women had less interest in drinking than New Zealand women. Nearly two-thirds of New Zealanders reported that they drank alcohol. Around 1 in 10 females scored eight or more on the AUDIT questionnaire (women with an AUDIT score of less than eight can be considered relatively safe drinkers) (New Zealand Ministry of Health[2], 1999). Drinking prevalence was shown to be related to socioeconomic status both in New Zealand and in China. People with lower family incomes, and lower levels of education were more likely to drink, especially among the younger generation in New Zealand. In China, the less educated consumed more alcohol (Siegrist et al, 1990), a similar pattern to that seen in New Zealand.

6.2 Comparison of Anthropometry Characteristics

The anthropometry characteristics of Mainland Chinese, migrant Chinese and New Zealand women were compared in Table 6.1. Sources of the Chinese data were from 1992 National Nutrition Survey and Zhang's study. The 1992 National Nutrition Survey, reported by Ge (Ge, 1996), was conducted by the Chinese Government in 1992, and involved urban and rural areas, males and females, more than 25,000 households, 100,000 people, and was therefore the largest. Zhang's study was conducted in China in 1993-1995. Here 50 women in each of three cities: Beijing, Shanghai and Nanning (thus 150 in total) were selected. The results represented the nutritional status of adult women living in big cities in continental China. The studies conducted in Newcastle and in Melbourne involved 375 and 545 Chinese men and women respectively (Unwin et al, 1997; Hsu-Hage et al, 1993). They provided nutritional and anthropometry data on an immigrant Chinese population in United Kingdom and Australia.

On average, Chinese women were all shorter and lighter than New Zealand women. Similar observations were made in another study which compared the anthropometry data in a European and Asian population (Wang et al, 1994). Body weight was very similar in the five Chinese cohorts. In contrast, height patterns of the five Chinese cohorts differed widely. Subjects in the present study were the tallest, followed by the subjects in Zhang's study. The Newcastle cohort was the shortest.

Body mass index is an accepted and commonly used measure of body fat and obesity in population studies. Excess body fat is associated with chronic diseases such as hypertension, non-insulin-dependent diabetes mellitus, stokes, and myocardial ischemia (Ravussin & Swinburn, 1992). Compared to the Chinese women, New Zealand women had higher BMI levels (Table 6.1). Subjects in the present study, Chinese women in the Melbourne study and Zhang's study had very similar BMI levels. BMI values in the Chinese National Nutrition Survey and Newcastle study were slightly higher. In a word, subjects in the present study had lower BMI levels than New Zealand women and Mainland Chinese women in the national study.

According to the New Zealand classification, the study subjects were only half as likely to be overweight than their New Zealand counterparts (Table 6.2). Again, they were less likely to be classified as obese than New Zealand women. No one in the present study was classified as obese, far below the proportion of obese in the National New Zealand Survey.

However, it should be taken into account that Asian ethnicity is associated with a smaller body frame than European ethnicity. Therefore the BMI cut-offs should be adjusted downwards. Significant differences in anthropometry between races are well recognized. In New Zealand, at a fixed percentage of body fat, BMI in Polynesians was three to four units higher than in New Zealand European (Rush et al, 1997). A BMI of 30 for the New Zealand European group corresponded to a BMI of 34 for the Polynesian group at an equivalent percentage of body fat (42%). In another cross-country study (Wang et al, 1994), it was indicated that, for lean and normal BMIs, Asians were fatter than whites in both sexes. Asians had more subcutaneous fat than whites and Asians had more upper-body subcutaneous fat than did whites. Another study conducted by Deurenberg (Deurenberg et al, 1998) revealed the relationship between percentage of body fat and BMI in different ethnic groups. The results showed that for the same level of body fat, age and gender, American Blacks had a 1.3 kg/m^2 and Polynesians a 4.5 kg/m^2 lower BMI compared to Caucasians. By contrast, in Chinese, Ethiopians, Indonesians and Thais BMIs were 1.9, 4.6, 3.2 and 2.9 kg/m^2 lower compared to Caucasians, respectively. The differences found in the body fat and BMI relationship in different ethnic groups means that population surveys should take account of ethnicity in the interpretation of BMI results. The cut-off points for overweight and obesity based on BMI will have to be ethnic specific.

Table 6.3 summarizes the proportion of Chinese women in different BMI categories by different area, according to the Chinese BMI classification. Data in Beijing, Shanghai and Guangdong are selected for comparison. In general, the study subjects had the lowest proportion of underweight and overweight among the other populations living in different areas in urban China. However, it should be taken into account, that the values of Chinese National Study were for the whole female population, with age ranging from 10 to 80 years old. The distribution of BMI should be different from that of the study subjects. The proportion of overweight in the study subjects was similar with that in Zhang's study, a group of similar age.

Compared to New Zealand women, the study subjects had lower mean triceps skinfolds, and slightly higher mean subscapular skinfolds (Table 6.1). The ratio of subscapular to triceps skinfold thickness is a measure of the distribution of subcutaneous fat between the peripheral and central regions. The study subjects had more central subcutaneous fat and less peripheral fat than New Zealand women. It is suggested that subcutaneous-fat distributions may vary by race. In a New Zealand study, more central subcutaneous fat and less peripheral fat was found in the Polynesian group than the European group (Rush et al, 1997). In 1990, Zillikens and Conway suggested a difference in location of adipose tissue stores, specifically, that black women had greater upper-body obesity (Zillikens & Conway, 1990).

Waist to hip ratio (W/H) is considered an indicator of cardiovascular risk when the ratio exceeds 0.9 for males and 0.8 for females (National Cholesterol Education Program, 1994; Norgan, 1986). A high W/H ratio indicates accumulation of excess fat in the abdominal regions, while a low ratio means more fat in the gluteal-femoral regions. The function of adipose tissue is different in different regions. The abdominal adipocytes have high responsiveness and sensitivity to catecholamines in the lipolytic system. An enlarged abdominal fat depot would then presumably be associated with an overflow of free fatty acids (Norgan, 1986). Interestingly, however, the study subjects had a relatively high W/H ratio, on average 0.82, compared to 0.77 for their New Zealand counterparts. Table 6.5 also shows that the study subjects had a twofold prevalence of W/H ratio excess (49.1%) compared to their New Zealand counterparts (24.8%). The high average W/H ratio was found not only in the present study, but also in two other Chinese immigrant studies (Hsu-Hage et al, 1993; Unwin et al, 1997): Melbourne Chinese women had on average a 0.88 W/H ratio. Seventy-five percent of them had a W/H ratio greater than 0.83 (Hsu-Hage et al, 1993). The average W/H ratio in Newcastle Chinese women was 0.84, higher than their European counterparts (0.78) (Unwin et al, 1997). Correspondingly, Melbourne Chinese women had a higher prevalence of hypertriglyceridaemia than the general Australian female population. There was no significant difference in the prevalence of hypertension between the Melbourne Chinese women and their Australian counterparts. However, the age adjusted prevalences of glucose intolerance in Newcastle Chinese and European women was 20.2% v 13.3%. Because data on the Mainland Chinese population are not available, whether or not the W/H ratio in migrant Chinese women changed after immigration is not known. Research into the waist to hip ratio, its impact on cardiovascular risk, and the incidence and development of cardiovascular disease, diabetes, hypertension in the New Zealand Chinese population, is needed.

The hip circumference includes not only the subcutaneous adipose tissue fat in this region but also the skeleton size. Examination of American skeletal material from the 19^{th} and early 20^{th} centuries kept by the Smithsonian Institute suggested that the pelvic dimensions of African Americans were different to those of white Americans (Yasar Iscan 1983). Thus the waist-hip ratio may not be a valid method of comparing abdominal obesity between races, and W/H cut-off values should be adjusted to account for ethnic differences. However, equivalent levels have not been determined for the different ethnic groups.

Compared to New Zealand women, the study subjects had a fairly low mean blood pressure, only 101/71mmHg, compared to 117/75 mmHg in the New Zealand cohort. Similar observations have been made in other studies, where Chinese have been shown to have a lower blood pressure than Americans, Germans and Australian (Choi et al, 1990; Hsu-Hage et al, 1993). Yet, in the Melbourne Study, the mean blood pressure in the Melbourne Chinese women was relatively low compared to the national average, but the prevalence of treated hypertension in women was similar to that among their Australian counterparts. The fact that Melbourne Chinese women had a relatively low mean blood pressure does not imply a lower prevalence of hypertension. Therefore, further attention should be paid on the New Zealand Chinese population.

High blood pressure is considered as a major risk factor for coronary heart disease and the control and prevention of high blood pressure is essential in the prevention of stroke. High blood pressure is common in New Zealand, affecting at least ten percent of all adults (New Zealand Ministry of Health[2], 1999). It was found that the study subjects had a good blood pressure profile; only 1.8% was borderline, and no one was deemed to be hypertensive (Table 6.4). The prevalence of abnormal blood pressure in the New Zealand cohort was more than eight-fold that of the study subjects.

6.3 Comparison of Nutrient Intakes

Tables 6.6-6.8 summarize the results from selected published studies of nutrient intakes in New Zealand women and the Chinese population, including original and migrant groups. Because the distribution of nutrient intakes may not be symmetric, the median is a better summary statistic than mean. Unfortunately, median values were not available in the report of the Chinese National Nutrition Survey, therefore only the mean values can be compared. The Chinese National Nutritional Survey also gave the nutrient intake results for men and women combined. Such values should inevitably be larger than the values for women alone.

6.31 Soluble Vitamins:

Thiamin:

The study subjects, New Zealand women and Chinese women in the national study all had very similar thiamin intakes. Chinese women living in urban China had lower thiamin intake than the other cohorts.

Riboflavin:

The intakes of riboflavin showed wide variation in the selected studies. New Zealand women had the highest intake among the four surveys, followed by the study subjects. Values in the Chinese National Nutrition Survey and the urban China study were similar.

Vitamin C:

Vitamin C intake in the present study is the highest among the four surveys. Intakes of vitamin C in the two New Zealand cohorts were higher than in both Chinese studies.

In general, the study subjects consumed much more thiamin, riboflavin and vitamin C than their Chinese counterparts, but similar amounts to their New Zealand counterparts. Intakes of vitamin B_6 and folate were slightly lower in the study subjects than their New Zealand counterparts.

6.32 Insoluble Vitamins

Mainland Chinese consumed much more vitamin E than the study subjects and the New Zealand women. Furthermore, compared with the New Zealand women, retinol, total vitamin A, and vitamin E intakes were slightly higher in the present study. In general, the study subjects consumed greater amount of retinol, and total vitamin A than their Chinese and New Zealand counterparts. However vitamin E intake by the study subjects was still far below Mainland Chinese intakes.

Vitamin E is rich in vegetable oils and nuts. The difference of oil intake between the study subjects and Mainland Chinese may be one of the reasons for the great difference of vitamin E intake between these two cohorts. Oil intake in Mainland Chinese was twofold higher than that in the study subjects.

6.33 Minerals

Sodium:

The study subject's diets contained less sodium than the diets in the Chinese National Study, but were similar to the intake in the Chinese urban women in Zhang's study.

Calcium:

Among the four groups, New Zealand women had the highest intakes of calcium. The intake of calcium of the study subjects was considerably less than the New Zealand women, but higher than their Chinese counterparts. The higher intake of calcium by New Zealanders should be attributed to the their higher consumption of milk and dairy products.

Iron:

The study subjects had higher intakes of iron than New Zealand women. However, their dietary iron intakes were much less than those in the Chinese Nutrition Survey and Zhang's study. That could be attributed to the following reasons:

1. Chinese people eat a diet consisting mainly of cereals; Cereals such as wheat contain nearly twice as much iron per 100g as meat.

2. Soy and its products are one of the common foods in the Chinese diet. Relative to other plant foods, soy is high in iron. The iron content of several soy foods are shown as follow (Hasler 1998):

Soy milk	0.6 mg/100g
Tofu	10.5 mg/100g
Soy sauce	1.5 mg/100g
Soybeans, raw	15.7 mg/100g
Soy protein isolate	14.5 mg/100g

3. In some areas of China, animal blood, such as chicken blood, pig blood, is a valued part of the diet. A study on iron status of pregnant women in China (Xu et al, 1997) showed that the intake of liver and animal blood was positively correlated with hemoglobin values.

Although iron intake in China was surprisingly high, iron deficiency anemia is still common. In the Chinese diet, plant foods are the main sources of iron. Such diets include abundant amounts of cereals, legumes and vegetables containing components such as phytate, fibers and soybean protein, which are inhibitory to nonheme iron absorption (Cook et al, 1981; Hallberg & Rossander 1982; Schricker et al, 1982; Lynch et al, 1984 and 1985). So they are less useful suppliers of dietary iron.

A study (Shaw et al, 1995) compared the iron intake and status in a group of vegetarians with a group of nonvegetarians. It was found that nonvegetarian subjects consumed only 74% as much iron as the vegetarian subjects, but their iron status was better. Iron deficiency is caused not only by too low an intake, but is also the result of low bioavailability.

In Chinese diets, vegetables are commonly stir-fried, and fruit juice or fresh fruits are seldom eaten with a meal. Therefore, although vitamin C enhances absorption of nonheme iron (Hallberg 1981), the benefit of vitamin C is compromised by heat susceptibility and separate consumption. So, increasing both iron intake and iron bioavailability is necessary for the Chinese population.

6.34 Macronutrients and Energy Sources

Among the four surveys, women in the present study had the smallest mean energy intake (7138kJ /day). People in the Chinese National Survey had the highest intake of energy. However, it should be taken into account, that the values were for men and women combined, and such values should inevitably be larger than the values for women only, because men eat more than women (Chiang and Huang 1986, 1987). When the values for women are selected, the differences from the present results are much smaller. New Zealand women had a higher energy intake than the Chinese women.

Intake of protein, 72.9g/day on average, in the present study was markedly higher than that of the Chinese urban women in Zhang's study, but lower than that of New Zealand women and the Chinese in the National Nutrition Survey. However, when the protein energy ratio was taken into account, the percentage of total energy from protein was the highest in the present study, accounting for 17.4% of total energy.

The lipid consumption in the present study was the lowest among the four studies. However, when the lipid/energy ratio was evaluated, the result reported in the present study was the second highest, partly because total energy intake was the smallest. The average lipid/energy ratio of the study subject's diets (37.5%) was very similar to that found in Zhang's study (37.6%). In the Chinese National Nutrition survey, the urban population had the lowest lipid energy intake, less than 30%.

Lipid intakes by women in the present study and New Zealand women are compared in Table 4.11. Study subjects consumed more cholesterol than New Zealand women did. Monounsaturated fatty acid intake in the two cohorts was very similar. New Zealand women had higher intakes of saturated fatty acid and lower intakes of polyunsaturated fatty acid than the study subjects (Figure 4.2). Saturated fat was the major contributor to the usual daily fat intake in New Zealand. When the fatty acid energy ratios were evaluated, the study subjects seemed to have a better profile of fatty acid intake than New Zealand women, according to the clinical guide of United States (The International Lipid Information Bureau, 1995). It was probably attributed to Chinese favouring vegetable fats such as soya bean oil, peanut oil in food cooking. No one in this study used animal fat in cooking. The majority of the lipid consumed was plant-based.

In the present study, carbohydrate provided 43 percent of total energy, and starch intake at an average of 99g/per day, appeared to be the smallest among the four surveys. However, sugar intake by New Zealand women was double that of the study subjects.

Compared to the New Zealand women, alcohol consumption of the study subjects was very low.

Fiber intakes in both the New Zealand women and the study subjects were very close, and higher than the intakes in Mainland China subjects.

In general, compared to their Chinese Mainland counterparts, the study subjects had lower energy intakes and lower carbohydrate/energy rations, but higher fiber intakes and higher protein and fat/energy ratio in their diets. On the other hand, compared to their New Zealand counterparts, the study subjects had lower energy, alcohol, sugar, and starch intakes and carbohydrate/energy ratios, but higher protein and fat/energy ratios (Figure 6.1).

6.4 Comparison of Food Consumption Patterns

Food habits are a complex behavioral expression. In a sociocultural model, major determinants of food habits are the traditional food culture, food availability, and household economy (McKenzie, 1979; Krondl & Lau, 1982; Axelson, 1986). Migrant populations are particularly sensitive to these determinants because of an inevitable pressure to change after migration.

Compared with the Chinese data (Ge, 1996), the study subjects ate less cereal, vegetables, salted vegetables, pork, organ meats and oils (Table 6.9). Rice, not unexpectedly, remained the cereal of choice. But this study indicated that the amount of cereal consumed declined sharply after immigration. In a traditional Chinese diet, carbohydrate is the main source of energy, accounting for 60-70% of total energy. But in the present study, carbohydrate energy ratio was only 43%, partly because of the decrease of cereal intake. The decreased consumption of pork and it's products by migrant Chinese was also reported in another study (Soh et al, 2000). The poor flavour of pork and the lack of freshness were identified as problems in that study.

In contrast, legumes, fruits, other meats (lamb, beef, etc), poultry, egg, fish, shellfish, dairy food and sweet products exhibited increases in consumption after immigration. Increases in fruit, legumes, poultry, fish and dairy food intakes were especially marked.

Increased intakes of dairy products in migrant Chinese was also found in several other studies (Grivetti & Baquette, 1978; Wang et al, 1994; Hsu-Hage et al, 1995; Woo et al, 1999; Soh et al, 2000). However, the higher mean consumption of dairy products among the Chinese after immigration suggested that lactase deficiency might be acquired. Indeed, a theory of adaptation has been proposed (Cuatrecasas et al, 1965; Davis et al, 1967). Specifically, lactase deficiency could be acquired from a lack of challenge from the substrate (from diets low in lactose), resulting in a decrease in the enzyme. It is suggested that the process of acculturation has encouraged the consumption of dairy products among the Chinese women living in Auckland.

6.5 Relationships between Nutrient Intakes, Body Measurements and Extraneous Factors

Education level and socioeconomic status have been shown to play a significant role in the food consumption patterns of population groups (Hsu-Hage et al, 1995; Ge, 1996). The Chinese National Nutrition Survey (Ge, 1996) showed that dietary intake and nutritional status of Chinese adults differed with different socioeconomic level. The intake of animal protein and animal fat increased with the improvement of economic status.

Educational attainment is best characterised by its influence on food acculturation. A Melbourne Chinese nutritional survey indicated that intake patterns of educated men and women moved from traditional Chinese foods. Those who were less educated tended to keep to traditional Chinese eating patterns, consuming a limited variety of foods.

Several socioeconomic factors, such as income level, education level, whether living with mother, were selected to examine the associations with some nutrient intakes. But no significant associations were found between these factors. The small proportion of less educated subjects (only 20% of the participants had no tertiary qualification) would contribute to this absence of association.

Among immigrants, it has been observed that the extent of dietary change is associated with the length of exposure to the new environment (Ho et al, 1966; Gupta 1975; Yang & Fox, 1979). In this study, differences of nutrient intake between the 2-year group and 4-year group were not statistically significant. A 2-year period is probably too short to observe any change in nutrient intakes. The effects of residence length will probably be greater on food patterns rather than nutrient intakes.

Table 6.1 Anthropometry Characteristics in Different Surveys

	Subjects of Present Study Mean	1992 Chinese National Survey (Urban Women 20y-50y)[1] Mean	New Zealand Women (25-44y)[2] Mean	Newcastle Chinese Women (25-64yr)[3] Mean	Hus-Hage's Study Melbourne Chinese[4] Women (25yr and over) Mean	Zhang's Study[5] (Chinese Urban Women) Mean
Body Weight (kg)	55.3	53.0-58.3	68.6	56.3	53.3	55.6
Height (cm)	159.2	154.8-157.2	163.6	154.7	156.2	158.4
Body Mass Index (kg/m2)	21.8	22.9	25.7	23.5	21.8	21.4
Skinfolds						
Triceps (mm)	19.9	-	25.2			-
Biceps (mm)	10.0	-				-
Subscapular (mm)	23.4	-	23.0			-
Circumference						
Waist (cm)	74.0	-	-	77.3	81.4	-
Hip (cm)	90.8	-	-	91.6	92.1	-
Ratio of Waist/Hip	0.82	-	0.77	0.84	0.88	-
Blood Pressure						
Systolic (mmHg)	101	-	117		114	-
Diastolic (mmHg)	71	-	75		67	-

[1] Data from Ge, 1996
[2] Data from Russell D, et al, 1999.
[3] Data from Unwin et al, 1997
[4] Data from Hus-Hage et al, 1993
[5] Data from Zhang et al, 1997.
- Data is not available

Table 6.2. Percentages of Migrant Chinese Women and New Zealand Women in Different Weight Categories (New Zealand Classification)

Groups	Percentage in Different Body Mass Index Range (%)			
	<20	20-24.9	25-29.9	≥30
Study Subjects	22	65	13	0
New Zealand Women (25-44yr)[1]	11	45	25	17
Melbourne Chinese Women (> 25yr)[2]	31	52	14	2

[1]Data from Russell et al, 1999.
[2] Data from Hus-Hage et al, 1993

Table 6.3. Percentages of Study Subjects and Chinese Women in Different Body Mass Index Categories (Chinese Classification)

Groups	Percentage in Different Body Mass Index Range (%)		
	<18.5	18.5-25.0	>25.0
Subjects of present study	3.6	83.6	12.7
Chinese female adults living in urban China[1]	8.0	67.0	25.1
Chinese female adults living in Beijing[1]	3.7	50.7	45.6
Chinese female adults living in Shanghai[1]	5.5	64.9	29.6
Chinese female adults living in Guangdong[1]	11.3	68.3	20.3
Subjects of Zhang's Study[2]	-	-	11

[1] Data from Ge, 1996.

[2] Data from Zhang et al, 1997.

Table 6.4 Percentages of Study Subjects and New Zealand Women in Different Blood Pressure Categories

Groups	Blood Pressure Categories		
	Normotensive[1]	Borderline[2]	Hypertensive[3]
Subjects of Present Study	98.2%	1.8%	-
New Zealand Women (25-44yr)[4]	85.4 %	8.3%	6.35%

[1]systolic < 140mmHg and diastolic < 90mmHg
[2] 140mmHg ≤ systolic < 160mmHg, and/or 90mmHg ≤ diastolic < 95mmHg
[3]systolic ≥160mmHg or diastolic ≥ 95mmHg
[4]Data from Russell et al, 1999.

Table 6.5. Percentage of Study Subjects and New Zealand Women in Different Waist/Hip Circumference Ratio Categories

Subjects	Percentage	
	Waist/Hip Circumference Ratio	
	<=0.8	>0.8
Subjects of Present Study	50.9	49.1
New Zealand Women(25-44yr)[1]	75.2	24.8

[1] Data from Russell et al, 1999.

Table 6.6 Vitamin and Mineral Intakes in Different Surveys

Nutrients	Subjects of Present Study (Urban Women) Mean	New Zealand Women (25-44 yr.) [3] Mean	Chinese (Urban Male and Female Adults Combined) [1] Mean	Zhang' Study (Urban Women) [2] Mean
B-Carotene Eq (ug)	3370	2825	-	-
Retinol (ug)	568	406	277	-
Total A Eq (ug)	950	875	606	544
Thiamin (mg)	1.2	1.2	1.1	0.6
Riboflavin (mg)	1.3	1.6	0.9	0.8
Niacin (mg)	13.2	31	16.9	-
Vitamin C (mg)	135	105	95.6	65.5
Vitamin D (ug)	2.1	-	-	-
Vitamin E (mg)	9.7	9	37.4	31.0
Vitamin B_6 (mg)	1.1	1.3	-	-
Vitamin B_{12} (mg)	4.3	3.9	-	-
Total Folate (ug)	196	220	-	-
Sodium (mg)	3923	-	7259	3398
Potassium (mg)	2463	3045	1886	1521
Magnesium (mg)	268	286	339	-
Calcium (mg)	518	759	458	439
Phosphorus (mg)	1076	1334	1077	921
Iron (mg)	13.7	10.5	25.5	24.1
Zinc (mg)	9.9	10.7	13.2	-
Manganese (ug)	3814	4093	7300	-
Copper (mg)	1.3	1.3	2.6	-
Selenium (ug)	60.0	47	52.3	-

[1]Ge, 1996
[2]Zhang et al, 1997
[3]Russell et al, 1999
-Value is not available

Table 6.7 Energy Sources and Macronutrient Intakes in Different Surveys

Nutrients	Subjects of Present Study (Urban Women) Mean	New Zealand Women (25-44 yr.) [3] Mean	Chinese(Urban Male and Female Adults Combined) [1] Mean	Zhang' Study (Urban Women) [2] Mean
Energy (kJ)	7138	8417	10011	7431
Energy (Kcal)	1705	2014	2395	1776
Protein (g)	72.9	77	75.1	57.0
Total fat (g)	73.3	80	77.7	75.4
Carbohydrate (g)	190	229	340	218
Alcohol (g)	0.4	11	-	-
Fiber (g)	17	18	11.6	8.7
Total Sugars (g)	59.5	106	-	-
Starch (g)	98.5	123	-	-
Energy from Protein %	17.4	16	12.7	13
Energy from Fat %	37.5	35	28.4	37.6
Energy from Carbohydrate %	43.0	46	58.9	49
Energy from Alcohol %	0.2	3	-	-

[1] Ge, 1996
[2] Zhang et al, 1997
[3] Russell et al, 1999
-Value is not available

Table 6.8 Comparison of Lipid Intakes between Chinese Women and New Zealand Women

Nutrients	Subjects of Present Study Mean	New Zealand Women (25-44 yr.) [1] Mean
Cholesterol (mg)	323	278
Saturated Fatty Acid (SFA) (g)	24	35
Monounsaturated Fatty Acid (MUFA) (g)	27	26
Polyunsaturated Fatty Acid (PUFA) (g)	19	11
Energy from SFA (%)	13	15
Energy from MUFA (%)	14	12
Energy from PUFA (%)	10	5

[1]Russell et al, 1999

Table 6.9. Food Consumption Patterns of Mainland Chinese and Study Subjects (g/day)

Food Items	Chinese National Survey in 1992 (Urban Area, Men and Women Combined) Mean	Present Study (Women Only) (n=55) Mean
Rice/products	223	131
Wheat/flour/products	165	81
Legume/products	13	26
Vegetables, tubers	365	300
Salted vegetables	8	3.4
Fruits	80	272
Pork/products	61	56
Other meats (lamb, beef, etc)	17	26
Organ meats	6	5.3
Poultry/products	16	51
Eggs/products	29	37
Fish/shellfish	44	58
Cooking oils/spread	37	18
Snack/sweet products	21	26
Dairy food	36	49

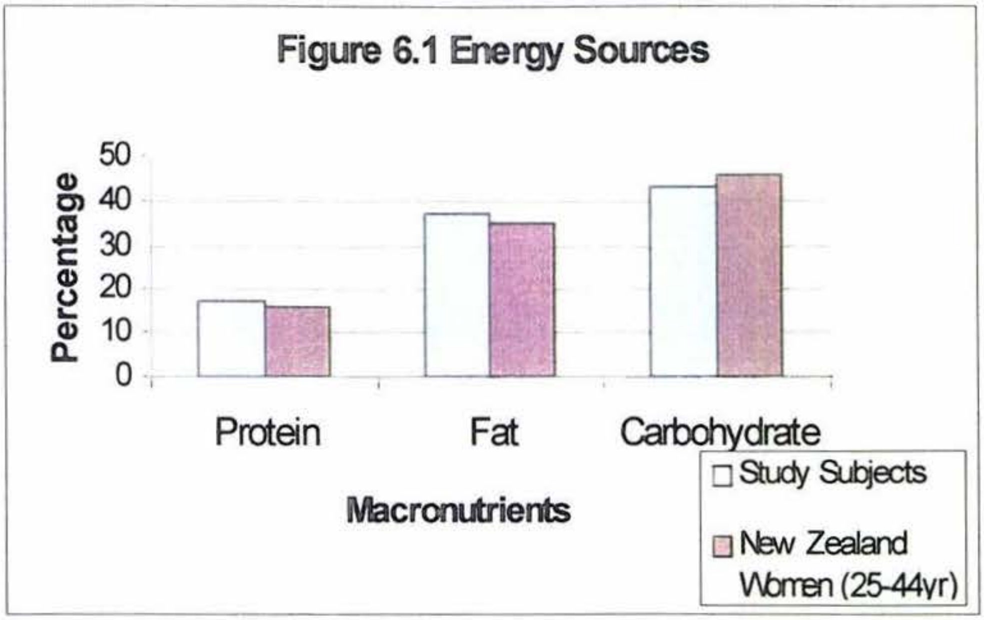


Figure 6.1 Energy Sources
Percentage
50
40
30
20
10
0
Protein
Fat
Carbohydrate
Macronutrients
Study Subjects
New Zealand Women (25-44yr)

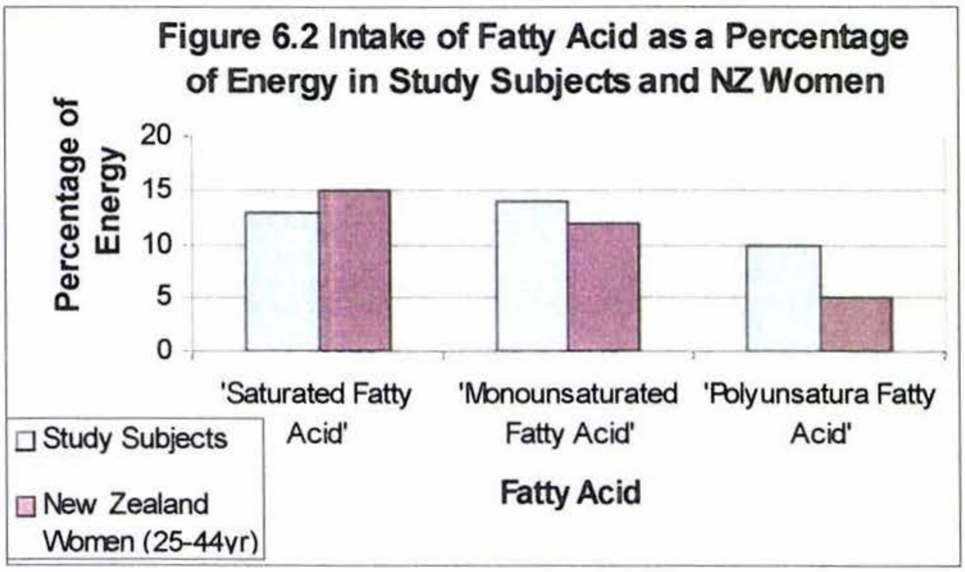


Figure 6.2 Intake of Fatty Acid as a Percentage of Energy in Study Subjects and NZ Women
Percentage of Energy
20
15
10
5
0
'Saturated Fatty Acid'
'Monounsaturated Fatty Acid'
'Polyunsatura Fatty Acid'
Fatty Acid
Study Subjects
New Zealand Women (25-44yr)

CHAPTER 7. CONCLUSION

The study subjects were generally highly educated and young. All the mean anthropometric measurements were higher in the 4-year group than that in the 2-year group. Except for the differences of waist and hip circumference, all differences did not achieve statistical significance. Compared to New Zealand women, they had slightly better risk factor profile: a more favourable blood pressure profile, lower mean BMI, lower prevalence of obesity, and they smoked less and drank less. On the other hand, they had more central subcutaneous fat and less peripheral fat, and higher upper body obesity (higher waist/hip ratios) than New Zealand women. Compared to Mainland Chinese women living in urban China, the study subjects had similar BMI level, and a lower prevalence of underweight and overweight.

There were no significant differences in nutrient intake between the two study groups. A 2-year period is probably too short to observe any change in nutrient intakes. Study subjects had higher intake of vitamin A, vitamin C, fiber, calcium but a lower intake of iron than their Chinese counterparts, and had a better profile of fatty acid intake than the New Zealand women. However, inadequate intakes of vitamin A, riboflavin, calcium, and higher intake of protein and sodium, and an excessive fat/energy ratio were the main nutritional problems in this group. Iron nutritional status in this population needs further study.

In the present study, food patterns in the 2-year group were similar with those in the 4-year group, except for the lower consumption of rice and its products in the 2-year group. They ate less cereal, cooking oil, but more fruits, poultry, and dairy food than the Mainland Chinese people in the national study.

Results from the present study suggested that decreasing protein, fat, salt intake, and increasing calcium, iron, fiber intake, and carbohydrate/energy ratio, as well as increasing activity, may all be beneficial in preventing disease in these migrant Chinese women.

Further research is needed to address the following issues raised by this study:

1. This study highlights the differences in body fat distribution and composition between different ethnic groups. Thus, there is a need to develop consensus on obesity indicators, such as the cut-off points for overweight and obesity based on BMI and waist/hip cut-off value, that are appropriate for different races.

2. The study subjects had a relatively low mean blood pressure and a low prevalence of hypertension. However, a Melbourne Chinese study indicated that Melbourne Chinese women having a relatively low mean blood pressure did not imply a lower prevalence of hypertension. Therefore, further attention should be paid to the prevalence of hypertension in the New Zealand Chinese population.

3. Chinese women had a relatively high incidence of iron deficiency anemia in the Chinese National Nutrition Survey. As dietary iron intakes of the study subjects were much less than those in the Chinese Nutrition Survey, and blood tests were not conducted in the present study, iron status in this population needs further study.

4. It is necessary to monitor the relationship between changing dietary patterns and other risk factors, and the changing prevalence of coronary heart disease with time in the migrant Chinese population in New Zealand.

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Appendix 1 Human Ethics Application

MASSEY UNIVERSITY HUMAN ETHICS COMMITTEE

To: Ethics Secretary
Human Ethics Committee
AVC's Office (Research)
Turitea, Palmerston North Campus

OR

Committee Secretary
Human Ethics Committee
Principal's Office
Albany Campus

Please send/deliver this original application plus 11 copies (PN Campus) OR plus 8 copies (Albany Campus)

APPLICATION FOR APPROVAL OF PROPOSED TEACHING/RESEARCH PROCEDURES INVOLVING HUMAN SUBJECTS

APPLICANT(S):

Name: Patsy Watson

Department: Institute of Food Nutrition and Human Health, Albany Campus

Contact Number: Ext 9755

Status: Senior Lecturer , Programme Leader in Human Nutrition
(e.g. lecturer, PhD/masterate student)

Name of Employer: Massey University

PROJECT:

Title: Dietary Intake and Anthropometric Measurement of Mainland Chinese Women, Newly Arrived and Longer Resident in Auckland.

Status: Masterate Thesis, Student Researcher Kai Hong Tan
(e.g. staff research, doctorate/masterate)

Funding Source: Patsy Watson will cover the minimal expenses for this study from her research grants. Equipment from previous studies will be used.

Clinical Trial Status: yes ☐ no *

ATTACHMENTS: Information Sheets both General and Specific,Consent Form, Questionnaire, Diet and Measurement Recording Booklets, Results Hand Back Form.
(E.g. Information Sheet(s), Consent Form(s), Questionnaire, etc)

SUPERVISOR(S):

Name: Patsy Watson

Department: Institute of Food Nutrition and Human Health, Albany

SIGNATURE(S):

Applicant(s): P E Watson

Supervisor(s):
(required for all projects involving student research, implies satisfaction with application)

DATE: 20/12/99

OFFICE USE ONLY

Received:

Decision:

(Note: Address application to appropriate campus)

Appendix 1

1. DESCRIPTION

1.1. Justification

In recent times many women from Mainland China have become permanent New Zealand residents and settled in Auckland. Food choices available to New Zealand Chinese are very different to food choices available to Chinese living in Mainland China. We hypothesize that newly arrived Chinese women maintain a dietary intake similar to the Mainland Chinese diet they left, however with time their diet changes to one more similar to that of their adopted country. If the change we suggest does indeed occur this will impact on the body fat levels and health of these women. We intend to investigate this proposition. If this hypothesis is confirmed the results of the study will be used to produce simple health messages to help immigrant Chinese women avoid dietary changes that may impact negatively on their health and wellbeing.

1.2. Objectives

- To assess dietary intake, body composition and blood pressure in a sample of Mainland Chinese women that have arrived in Auckland in the last two years.
- To assess dietary intake, body composition and blood pressure in a sample of Mainland Chinese women resident in New Zealand for four years or more.
- To compare group nutrient intake, body composition and blood pressure results of these two groups of women and determine if there are any significant differences with respect to their overall nutritional status and health.
- To compare group nutrient intake, body composition and blood pressure in both New Zealand groups with average data from similar studies of groups of women living in urban areas of Mainland China and determine if there are any significant differences with respect to their overall nutritional status and health.

1.3. Procedures for Recruiting Participants and Obtaining Informed Consent

The study will be advertised in the Auckland Chinese language newspapers, and through Auckland Chinese networks. Volunteer information sheets will also be available from Chinese Association Rooms, Chinese supermarkets, Chinese churches and from Chinese Medical Centres. Women who are interested in volunteering will contact the researcher by phone or return the 'expression of interest' slip by post. The researcher will then send these women the detailed outline of the study along with a stamped addressed envelope to return the 'wish to volunteer' form. Women who wish to volunteer can either contact the researcher by phone, or send back the 'wish to volunteer' slip. All volunteers will then be sent a consent form to sign, which will be collected by the researcher on her first visit. A non-random convenience sample of 30 newly arrived and 30 longer resident women aged between 20 and 45 will be recruited.

1.4. Procedure in which Research Participants will be involved

There will be two visits to each subject. The procedures carried out in each visit are outlined below.

Visit One (Around one hour required)

- A general questionnaire to determine social, health and lifestyle details will be administered.
- A standard dietary recall of all food consumed in the last 24 hours will be recorded.
- The following body measurements will be taken;
  - Height
  - Weight
  - Triceps, biceps and subscapular skinfolds
  - Waist and hip circumference
  - Blood pressure.

Between Visit One and Visit Two (Around half an hour required on each of two days)
The subject will weigh all food and drink consumed during two complete days and record a description of this food and drink, and its weight in the record book provided. Scales will be provided to weigh the food and drink.

Visit Two (Around twenty minutes required)
The completed 2-day weighed diet record, and food scales will be collected. Blood pressure will be measured and recorded for the second time.

1.5. Procedures for handling information and material produced in the course of the research including raw data and final research report(s)

The information will be collected as hard copy; no audio or video records will be used.

All volunteers will be given a code number. A separate master file will be kept linking subject name and address to code number. This master file will be kept under lock and key and stored in a separate location to the data. Only the supervisor and researcher will have access to this list.

Data collection forms will be identified by code number only. When organising interviews the researcher will place removable name and address labels on each subject's data collection forms. These labels will be removed and destroyed once the interview is complete or the data collected. All data entered in the computer will be identified by code number only. Electronic data will be stored on the researcher's hard drive or personal H: drive on the network and will be accessible by password only, by the researcher or her supervisor. The password will be changed regularly to maintain security. All completed data collection forms will be stored in locked filing cabinets in the nutrition research room, which is locked and alarmed when no researcher is present.

No subject will be identified either by name or code number in the final research report, or in any conference presentations or scientific papers that may result from this work.

Each subject will receive a brief outline of their individual results as well as a summary of the study findings.

2. ETHICAL CONCERNS

2.1. Access to Participants

The study will be publicised through the networks mentioned in 1.3. . Initial contact will be made by the potential volunteer requesting further information from the researcher. On the basis of this information the potential volunteer will choose to enroll in the study or not. If the volunteer chooses to enroll in the study, she will phone the researcher, or send in the 'wish to volunteer' slip. The researcher will then post her the consent form and arrange a suitable time and place for the first visit. This visit will be at a location chosen by the volunteer e.g. home, workplace etc. The signed consent form will be collected at the first visit. Appointments will be made for the second home visit, again at a location and time convenient to the subject.

2.2. Informed Consent

All volunteers will be sent the information sheet describing the purpose of the study and what will be required of them. This form will be written in both English and Chinese. (See Appendix). It explains the rights of the volunteers, including the right to decline to take part in all or any part of the study at any time. Assurance of confidentiality is clearly stated. Volunteers will have the opportunity to ask questions of the researcher or the supervisor at any time before they sign the consent form.

The consent form will be signed by the volunteer in the presence of a witness (other than the researcher), who will also sign the form. The consent form includes the name of the researcher and her supervisor (See Appendix).

2.3. Anonymity and Confidentiality

The measures taken in 1.5 will be used to ensure the anonymity and confidentiality of the volunteers.

2.4. Potential Harm to Participants

There is no possible harm that can befall volunteers for this study. At most a feeling of pressure but not pain can be felt when skinfolds and blood pressures are taken. All participants have the right to decline to take part in any aspect of the study they feel uneasy with

2.5. Potential Harm to Researcher(s)

The study methodology involves no possible harm to the researcher. In case of emergency the researcher will carry a mobile phone when she visits the subjects. If she feels threatened she will leave the premises immediately.

2.6. Potential Harm to the University

This study can bring no potential harm to the University. The strict anonymity, confidentiality and professional attitude during collection and handling of data should avoid any potential embarrassment to the University.

2.7. Participant's Right to Decline to Take Part

The information sheet and consent form clearly state that the volunteer can decline to take part in the study, can decline to take part in any section of the study e.g. body measurements, can decline to answer any question, or can withdraw from the study, at any time. This message will be repeated verbally during phone calls and home visits.

2.8. Uses of the Information

The information obtained from the study will be analysed and written up as a research report (thesis), presented as a conference paper, and if suitable written up as a paper for publication in a scientific journal. Each volunteer will receive a brief outline of her individual results (See Appended Handback) and a summary of the results as a whole. The summary of results will also be sent to the Chinese language newspapers for dissemination to the Auckland Chinese community.

2.9. Conflict of Interest/Conflict of Roles

This study involves no conflict of interest for either the researcher or the supervisor.

2.10. Other Ethical Concerns

If during the course of her research the researcher encounters a serious social or family problem, after listening attentively she will suggest the volunteer contact the most appropriate of the following organisations: the Chinese Life Hot Line, the Women's Refuge, or the Family Planning Centre. If she finds a volunteer has a serious financial problem she will refer them to Work and Income Support Services, and if she finds a health problem she will suggest the volunteer consult her General Practitioner.

3. LEGAL CONCERNS

3.1. Legislation

3.1.1. Intellectual Property legislation e.g. Copyright Act 1994
Any scientific material will be appropriately referenced. The data collected will belong to Massey University.

3.1.2. Human Rights Act 1993
The questions and procedures involved in the study were carefully designed to contain no verbal or physical abuse, and contain no insulting or derogatory remarks directed at any section of the community.

3.1.3. Privacy Act 1993
The information required will be collected directly from the volunteer, and recorded as hard copy. No video or audio records will be used. Measures to ensure confidentiality for volunteers are detailed in Section 1.5. These confidentiality measures will also cover those who choose to withdraw from the study at any stage.

The information collected will only be used for the purposes outlined in the information sheet. Publications will contain none of the participant's names or any information that may identify them. Massey University is clearly identified as the body responsible for this study.

3.1.4. Health and Safety in Employment Act 1992
No potential health hazards are foreseen.

3.1.5. Accident Rehabilitation Compensation Insurance Act 1992
The researcher will be covered by ACC in her car.

3.1.6. Employment Contracts Act 1991
Not applicable.

3.2. Other Legal Issues

Not applicable.

4. CULTURAL CONCERNS

This research is being carried out on Mainland Chinese immigrant women, by a researcher who is herself from Mainland China, and has qualifications from a Chinese University. All study information, consent forms and questionnaires and record booklets have been translated into Chinese.

5. OTHER ETHICAL BODIES RELEVANT TO THIS RESEARCH

5.1. Ethics Committees

Auckland Ethics Committee.

5.2. Professional Codes

Not applicable.

5. OTHER RELEVANT ISSUES

None that we perceive at this time.

- .

Appendix 2 First Reply from Human Ethics Committee

Massey University

Office of the Principal
Massey University
Albany Campus
Private Bag 102 904,
North Shore MSC,
Auckland,
New Zealand
Principal: 64 9 443 9799 ext 9517
Campus Registrar: 64 9 443 9799 ext 9516
Facsimile: 64 9 414 0814

4 February 2000

Patsy Watson/Kai Hong Tan
Food, Nutrition and Human Health
Massey University
Albany

Dear Patsy/Kai

HUMAN ETHICS APPROVAL APPLICATION – MUAHEC 00/001
DIETARY INTAKE AND ANTHROPOMETRIC MEASUREMENT OF MAINLAND CHINESE WOMEN, NEWLY ARRIVED AND LONGER RESIDENT IN AUCKLAND

Thank you for the above application, which was received and considered by the Massey University, Albany Campus, Human Ethics Committee at their meeting held on 27th January 2000. The Committee raised the following points regarding your application:

- Please state clearly the point at which withdrawal from the study will not be possible, on both the information sheet and consent form.
- Please reconsider the use of personal contact details.
- Please remove the witnessing of the signature from the consent form, due to anonymity and confidentiality.

Subject to the above amendments and inclusions being received, the ethics of the application will be approved.

Any departure from the approved application will require you to return this project to the Human Ethics Committee, Albany Campus, for further consideration and approval.

Yours sincerely

Gindgad.
PP

Dr Mike O'Brien
CHAIRPERSON,
MASSEY UNIVERSITY, ALBANY CAMPUS
HUMAN ETHICS COMMITTEE

Appendix 3 Second Reply from Human Ethics Committee

Massey University

Office of the Principal
Massey University
Albany Campus
Private Bag 102 904,
North Shore MSC,
Auckland,
New Zealand
Principal: 64 9 443 9799 ext 9
Campus Registrar: 64 9 443 9
ext 9516
Facsimile: 64 9 414 0814

10 February 2000

Patsy Watson/Kai Hong Tan
C/O Institute of Food, Nutrition and Human Health
Massey University
ALBANY

Dear Patsy/Kai Hong

HUMAN ETHICS APPROVAL APPLICATION – MUAHEC 00/001
DIETARY INTAKE AND ANTHROPOMETRIC MEASUREMENT OF MAINLAND CHINESE WOMEN, NEWLY ARRIVED AND LONGER RESIDENT IN AUCKLAND

Thank you for your memo, of 7th February 2000, and amended Consent Forms and Information Sheets, which 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

Dr Mike O'Brien
CHAIRPERSON,
MASSEY UNIVERSITY, ALBANY CAMPUS
HUMAN ETHICS COMMITTEE

Appendix 4 A Letter to Programme Manager of Radio AM 990 for Volunteer Required

Massey University
COLLEGE OF SCIENCES

Institute of Food, Nutrition and Human Health
Private Bag 102 904,
North Shore Mail Centre,
Auckland,
New Zealand
Telephone: 64 9 443 9700
Facsimile: 64 9 443 9640

22 March,2000

Programme Manager,
Community Notice Board,
Radio AM 990,
Auckland.

Dear Sir / Madam, 廖小姐：

We would be most grateful if we could use your 'Community Notice Board" to help us recruit subjects for our study of the nutrition and health of newly arrived and longer resident Mainland Chinese women aged between 20 and 45 living in Auckland. An outline of our study is enclosed for you to use as you see fit. We are looking for 30 newly arrived Chinese women, and 30 women who have been living in New Zealand for more than 4 years. All women who volunteer will receive an analysis of their diet, body composition and blood pressure. This study has been approved by the Massey University Committee on Human Ethics.

We greatly appreciate your help in our study.

Yours sincerely,

Patsy Watson
谭凯虹

Patsy Watson.
Programme Leader in Human Nutrition.
Kai Hong Tan,
MSc in Nutritional Science Research Student.

Appendix 5 A Description of the Study to Radio AM 990 for Volunteer Required (In Chinese)

MASSEY UNIVERSITY

Albany Campus
Institute for Food, Nutrition and Human Health

膳食调查结果显示中国传统膳食以高淀粉类食物，高纤维，低脂肪，低蛋固醇为特点。中国的心血管病和肥胖症的发病率在世界上属于低水平，这可能正是得益于这种膳食特点。

另一方面，与中国传统膳食相比，西方膳食含有较高的脂肪，蛋固醇和糖，而淀粉类食物和纤维又较少。随之而导致了较多心血管病，糖尿病和肥胖症的发生。

奥洲和美国曾对中国移民的膳食结构做过广泛的调查。结果显示中国移民的膳食逐渐被西方饮食所同化。同时，中国移民的心血管病，糖尿病和肥胖症的发病率亦逐渐高于中国同类人群的发病率。升高的发病率可能是生活和饮食习惯改变的结果。

中国人移居纽西兰已有一百多年的历史。据统计约有近100，000华人居住在纽西兰。但对于他们的膳食结构，健康和健康的需求却知道的很少。

为了解移居纽西兰的中国大陆妇女的膳食模式，膳食的改变及揭示任何营养不平衡的因素，梅西大学食品，营养和人类健康学院将对居住奥克兰来自中国大陆的妇女进行一次膳食调查。

我们需要一些年龄在20到45岁之间的中国大陆妇女协助我们的研究。如果您感兴趣，并希望参加该研究的话，请拨以下电话跟我们联系：

(09) 4101188 谭凯虹
(09) 4439755 Patsy Watson

Appendix 6 A Reply from Triangle TV for Volunteer Required

Watson, Patsy
From: Heather Wright [HeatherW@ahsl.co.nz]
Sent: Thursday, March 30, 2000 12:06 PM
To: 'Patsy Watson'

Dear Patsy,
I made contact with Robin Kingsley Smith - the producer of Asia Dynamic. Told him about Kai Hong's project - that 1. we would like exposure to get more participants and (2) as an item of interest when she is further along. He told me that they have a "notice board" section in the programme in which he is happy to announce Kai Hong's study (next week)and request for more people. She should write something about the study and fax it to him - also a timeline for the study. Kai Hong must include contact phone numbers/fax numbers so they know where to contact her (or you)

Robin Kingsley-Smith
Producer
Asia Dynamic
Fax: 308 9888
Best Regards,
heather

Appendix 7 A Description of the Study to Triangle TV for Volunteer Required

MASSEY
UNIVERSITY

Albany Campus
Institute for Food, Nutrition and Human Health

Dietary surveys show that the diet of the Mainland Chinese people is high in carbohydrate and fiber, and low in fat and cholesterol. The prevalence of Coronary Heart Disease and obesity in China is among the lowest in the world. This is partly a result of a diet more favorable towards heart health.

On the other hand, the western diet contains a considerably higher fat, cholesterol, sugar, and lower carbohydrate and fiber. Compared with the Chinese, Western people have a higher prevalence and mortality rate of coronary heart disease, obesity and diabetes.

Food intake patterns of migrant Chinese have been widely studied in USA and Australia. The results showed that the dietary patterns of migrant Chinese had become westernized. At the same time, the migrant Chinese experienced an increased risk of Coronary Heart Disease. It is thought that it is due to changing life-style and dietary practices.

Although there are nearly 100,000 Chinese in New Zealand, comparatively little is known about their dietary patterns, health and health needs. Diets of Chinese living in NZ have not been reported previously.

In order to evaluate the dietary patterns of Chinese women in New Zealand and reveal any risk of nutritional problems, Kai Hong Tan of the Institute for Food, Nutrition and Human Health of Massey University is conducting a survey in Auckland.

She is looking for Mainland Chinese women in the 20-45-age range living in Auckland to assist in this study. If you are interested, and we hope you will be, and would like to take part in the study, please phone:

(09) 4101188 Kai Hong Tan
or (09) 4439755 Patsy Watson

Appendix 8 An Advertisement for Volunteer Required in a Chinese Newspaper (In Chinese)

主曆二仟年四月八日 星期六(庚辰三月初四日) 南極光

Appendix 9. Concise Outline of the Study for Volunteer Required (In English)

MASSEY
UNIVERSITY

Albany Campus
Institute for Food, Nutrition and Human Health

Volunteers Required

Dietary Intake and Anthropometric Measurements of Newly Arrived and Longer Resident Mainland Chinese Women in Auckland

We are looking for volunteers to assist us in a study on Dietary Intake of Newly Arrived and Longer Resident Mainland Chinese Women in Auckland. We will be studying women in the 20- 45 age range.

We know that environmental and cultural factors are important in affecting dietary behavior. We think that diet may change with time in Mainland Chinese women living in New Zealand. In order to evaluate the energy and nutrients intake of Chinese women in New Zealand and reveal any risk of nutritional imbalance in this population, we will have a dietary survey among this population. The results of this study will be converted into simple health education messages to improve the health and well being of Chinese immigrant women in New Zealand.

In the study, we plan to record the food intakes by a 24-hour recall, and weighed diet record. Data of height, weight, skin folds, circumference of waist and hip, and blood pressure will be collected.

All women taking part will receive a brief analysis of their nutrient intakes and body anthropometric measurements. This study has been approved by the Massey University committee on Human Ethics and the North Health Committee on Human Ethics.

Appendix 9

If you would like to have more information and/or take part in this study please fill in the attached form and return it to:

Kai Hong Tan / c/o Patsy Watson
Massey University
Institute for Food, Nutrition and Human Health
Albany Campus
Private Bag 102-904
North Shore MSC
North Shore City

or phone
Kai Hong Tan (09) 4101188
Patsy Watson (09) 4439755

Yes, I am interested in being part of the nutrition in Dietary Survey.
Please send me more information.

Name: ______________________________

Phone: ______________________________

Address: ____________________________

____

____

Appendix 10. Concise Outline of the Study for Volunteer Required (In Chinese)

MASSEY UNIVERSITY

Albany Campus
Institute for Food, Nutrition and Human Health

新到和长期居住奥克兰的中国大陆妇女
膳食摄入和体格的研究

我们知道环境和文化是影响进食行为的重要因素。当中国大陆妇女移居纽西兰后，膳食摄入可能会发生改变。为获得中国妇女移居纽西兰后的膳食模式，和评价是否存在任何营养不平衡的因素，我们将对这个人群进行一次膳食调查。调查的结果将作为健康宣传资料，以使移居纽西兰的中国大陆妇女更健康和幸福。

我们需要一些年龄在20到45岁之间的中国大陆妇女自愿者，协助我们进行膳食摄入和体格的研究工作。

我们将通过24小时回顾法和称量法来记录每天进食的食物。此外，还将测量身高，体重，皮褶厚度，腰围，臀围和血压。

参加该研究的妇女将会收到一份关于她们自己的膳食模式和体格测量的分析报告。此研究已经梅西大学人伦委员会和北岸健康人伦委员会的确认。

如果您想得到更详尽的资料，并希望参加该研究的话，请填好下表并寄回以下地址

Kai Hong Tan
Massey University
Institute for Food, Nutrition and Human Health
Albany Campus
Private Bag 102-904
North Shore MSC
North Shore City

or phone
Kai Hong Tan (09)4101188
Patsy Watson (09) 4439755

Appendix 10

--- 阅后回条 ---

我对此研究感兴趣，并希望参加该研究，请寄给我有关资料。

姓名：____________________

电话：____________________

地址：____________________

Appendix 11. Detailed Description of the Study for Volunteer Required (In English)

MASSEY
UNIVERSITY

Albany Campus
Institute for Food, Nutrition and Human Health

Dietary Intake and Anthropometric Measurements of Newly Arrived and Longer Resident of Mainland Chinese Women in Auckland

Volunteers are wanted in 2000 for a study of the Individual Dietary Intake & Body Measurement of Newly Arrived and Longer Resident of Mainland Chinese Women in Auckland

This study is being conducted by Kai Hong Tan. She has a bachelor's degree of medicine from SunYat-Sen Medical University, and, worked as a dietitian in SunYat-Sen Memorial Hospital in Guang Zhou city for 6 years before emigrating to New Zealand. She is at present completing her masters of nutritional science in Massey University. Kai Hong has 2 Children. One is aged five, and the other is newborn. Her supervisor is Patsy Watson, a nutritionist and senior lecturer in the Institute for Food, Nutrition and Human Health of Massey University in Albany Campus. She is a mother of three adult children.

OUTLINE OF THE STUDY

There is a great difference of culture and food supplies between China and New Zealand. This may affect the dietary intakes of Mainland Chinese women living in New Zealand. In order to reveal any changes in the diet, we will survey the dietary intakes of Chinese women in New Zealand.

The aim of this study is to provide baseline data on the food consumption patterns and body measurements of newly arrived and longer resident Mainland Chinese women living in New Zealand. The results will be compared with the nutrient intakes and anthropometric details of similar groups of women living in urban areas of Mainland

China In addition, any risk of nutritional imbalance in New Zealand groups will be identified. Furthermore, the body measurements in these Chinese women will be used to assess their body composition and health. The results of this study will be converted into simple health education messages to improve the health and well being of Chinese immigrant women in New Zealand.

WHAT WILL YOU BE ASKED TO DO IF YOU VOLUNTEER?

There will be two visits to you

Visit One (Requires around one hour)

- A general questionnaire to determine social, health and lifestyle details will be administered by the researcher. This information is necessary for the survey.
- The researcher will carry out a 24-hour recall interview on your dietary intake.
- The following body measurements will be taken

Your height.

Your weight.

Your skinfolds: these will be measured at the same time as weight, using calipers. The calipers measure the width of a fold of skin. This produces a feeling of slight pressure, but no pain.

The following skinfolds will be measured:
Triceps – Back of upper arm
Biceps – Front of upper arm
Subscapular – At the site immediately below the shoulder blade.

Your circumference of waist and hip

Your blood pressure

Between Visit One and Visit Two (Requires at most half an hour per day)
You will be asked to weight all food and drink consumed during two complete days, and record a description of this food and drink, and its weight in the record book provided. Scales will be provided to weigh the food and drink.

Visit Two (Requires around 20 minutes)

The completed two-day weighed diet record, and food scales will be collected. Blood pressure will be measured and recorded for the second time.

RIGHTS OF VOLUNTEERS

- Any woman receiving this information sheet may decline to take part in the study.
- Any volunteer may refuse to answer any question if they wish.
- All volunteers can withdraw from the study at any time up to the completion of data collection or visit two
- Once data collection is completed, volunteers will not be able to withdraw their data from the study.
- All volunteers have the right to ask questions about the study at any time during the study.
- All volunteers provide information on the understanding that their name will not be used.
- All volunteers will be a summary of the findings of the study when complete.

If you have any queries or concerns regarding your rights as a participant in this research, you may contact the Health Advocates Trust, Phone (09) 638-9638.

CONFIDENTIALITY

The results of this study will of course be **CONFIDENTIAL**. Anything a volunteer tells the researchers will be anonymous and remain confidential. Each volunteer will be identified by code number only, not by name, in the collection and analysis of all information. All data collected will be filed in a locked cabinet in a locked and alarmed room. The analysis of the information will focus on the results for the group as a whole, not the individual. In the publication of results the area in which the study took place will not be identified.

WHAT WILL YOU GET OUT OF TAKING PART

Each volunteer will receive a summery of the study results as well as a brief analysis of her individual nutrient intake, body composition, and blood pressure results.

Appendix 11

PUBLICATION OF RESULTS

Results of this study will be written up in a thesis, and presented at nutrition conference and as a scientific paper. A summery of the result will be sent to the Chinese language newspapers.

If you have any questions at any time please do not hesitate to contact me:

Ph: (09) 4101188 (Kai Hong Tan)
(09) 4439755 (Patsy Watson)

IF YOU ARE INTERESTED, AND WE DO HOPE YOU WILL BE, PLEASE PHONE THE RESEARCHERS OR COMPLETE THE ATTACHED FORM AND SEND IT BACK TO:

Kai Hong Tan / c/o Patsy Watson
Massey University
Institute for Food, Nutrition and Human Health
Albany Campus
Private Bag 102-904
North Shore MSC
NORTH SHORE CITY

Thank you.

Appendix 12. Detailed Description of the Study for Volunteer Required (In Chinese)

MASSEY
UNIVERSITY

Albany Campus
Institute for Food, Nutrition and Human Health

新到和长期居住奥克兰的中国大陆妇女
膳食摄入和体格的研究

寻求自愿参加膳食和体格调查的
新到和长期居住奥克兰的中国大陆妇女

此研究由正在梅西大学攻读营养硕士学位课程的谭凯虹具体进行。她曾在中国广州中山医科大学取得医学学士学位，并在孙逸仙纪念医院任职营养医师六年。她有两个小孩，一个五岁，另一个刚出生。她的导师是梅西大学食物与人类健康学院的高级讲师和营养学家 — Patsy Watson。她是三个孩子的母亲。

关于该研究的概要说明

纽西兰在饮食文化和食物提供上与中国存在着很大的差别，这可能影响到中国移民的食物选择。为揭示膳食中的任何变化，我们将对移居纽西兰的中国大陆妇女进行一次膳食调查。

本研究的目的在于收集有关新到和长期居住奥克兰的中国大陆妇女膳食模式和体格的基本资料。研究的结果将与中国同类人群的资料作比较，并对该人群是否存在任何营养不平衡的因素作出评价。此外，体格测量的结果将用于评估身体组成和健康的状况。研究的结果将用作健康宣传资料，以使移居纽西兰的中国大陆妇女更健康和幸福。

Appendix 12

作为自愿者，您需要做些什么？

您将会接受两次访问

第一次访问 (大概需要一个小时)

首先，访问者将会跟您作一个有关您家庭，健康，经济，教育和生活习惯方面的问卷调查，这些资料对本课题是必须的。

其次，访问者将会跟您做一个24小时回顾性膳食调查。

最后，做以下的身体测量：

1 身高
2 体重
3皮褶厚度：我们将使用皮褶计来测量。测量中您只会感到有轻微压迫感，不会疼痛。

我们将对三个部位进行测量：
三头肌皮褶厚度：上臂后部
二头肌皮褶厚度：上臂前部
肩胛下角皮褶厚度：背部肩胛下角

4 腰围和臀围
5 血压

第一次访问和第二次访问之间 (每天最多需要半个小时)

您将要把在两整天内进食的所有食物和饮料的种类和份量记录下来，我们将提供记录本和称。

第二次访问 (大概需要20分钟)

我们将上门收回您的记录和称，并再测量一次血压。

自愿者的权利

- 任何收到该资料的妇女都可以拒绝参加该研究。
- 任何自愿者有权拒绝回答任何问题。
- 任何自愿者可以在资料收集完成之前，即第二次访问之前的任何时间退出实验

- 一旦资料收集完成，自愿者的资料不能从实验中撤掉。
- 任何自愿者有权在任何时候询问有关该研究的任何问题。
- 所有自愿者是在匿名的前提下提供自己的资料。
- 在研究完成后，所有自愿者的资料将会有一个总结。

您若想知道作为该研究的参与者所拥有的权利，可联系The Health Advocates Trust. 电话：09-6389638。

保密性

研究的结果将会保密。所有有关自愿者的资料是匿名和保密的。收集和分析资料的时侯只会出现自愿者的代码，而非姓名。所有收集到的资料将会封存于一间有防盗报警装置的房间的橱柜中。研究的重点是群体而非个体，研究的地点将不会在发表的结果中注明。

您将会收到什么

参加该研究的妇女将会收到一份关于该研究结果的总结和她们自己的膳食模式和体格测量的分析报告。

结果的发表

研究的结果将会写成论文，发表在营养学方面的资料上，同时，亦会寄给中文报刊登载。

如有任何疑问，请电：
Ph: (09) 4101188 (谭凯虹)
(09) 4439755 (Patsy Watson)

如对此研究感兴趣，并希望参加该研究的话，请给我们电话或填好附上的表格，并寄回以下地址：

Kai Hong Tan
Massey University
Institute for Food, Nutrition and Human Health
Albany Campus
Private Bag 102-904
North Shore MSC
NORTH SHORE CITY

Appendix 13. Consent Form (In English)

MASSEY
UNIVERSITY

Albany Campus
Institute for Food, Nutrition and Human Health

Dietary Intake and Anthropometric Measurements of Newly Arrived and Longer Resident of Mainland Chinese Women in Auckland

CONSENT FORM

This Study Has Been Approved by the Massey University Human Ethics Committee and The North Health Ethics Committee

If you would like to take part in this study please complete this consent form and return it to:

Kai Hong Tan / c/o Patsy Watson
Massey University
Institute for Food, Nutrition and Human Health
Albany Campus
Private Bag 102-904
North Shore MSC
North Shore City

Phone: (09) 4439755 (Patsy Watson)

Appendix 13. Consent Form (In English)

I, ____

(full name, please print)

- I have heard and understood an explanation of the research project I have been invited to take part in.
- I have been given, and I have read, a written explanation of what is asked of me, and
- I have had an opportunity to ask questions and to have them answered.
- I understand that I have the right to decline to answer any particular questions.
- I understand that I may withdraw from the project at any time up to the completion of data collection at visit two.
- I agree to provide information to the researcher on the understanding that my name will not be used without my permission.
- I understand that my consent to take part does not alter my legal rights.

I consent to take part as a subject in this research, under the conditions set out in the Information Sheet.

SIGNED:

____________________	____________________	____________________
Subject (please print)	***Signature***	***Date***

Thank you very much for your help.

Appendix 14. Consent Form (In Chinese)

MASSEY UNIVERSITY

Albany Campus
Institute for Food, Nutrition and Human Health

新到和长期居住奥克兰的中国大陆妇女
膳食摄入和体格的研究

自愿参加者意向书

此研究已经梅西大学人伦委员会和北岸健康人伦委员会的确认

如您对此研究感兴趣，并希望参加该研究的话，请填好意向书，并寄回以下地址：

Kai Hong Tan
Massey University
Institute for Food, Nutrition and Human Health
Albany Campus
Private Bag 102-904
North Shore MSC
North Shore City

Phone: (09) 4439755 (Patsy Watson)

谢谢您的参与！

Appendix 14. Consent Form (In Chinese)

意向书

我，姓名____________

- 已经明白对该研究课题的解释。
- 我已经收到并阅读了有关需要我配合的资料。
- 我有机会提出问题并已得到解答。
- 我明白我有权利拒绝回答任何特殊问题
- 我明白我可以在资料收集完成之前，即第二次访问之前的任何时间退出该研究
- 在未经我同意不能使用我的名字的前提下，我会给研究者提供我个人的资料。
- 我明白我同意参加该研究并不改变我的法律权利。

我同意作为研究对象参加该研究，条件与前面关于该课题的解释相同。

签名：________________ 日期：________________

Appendix 15. Questionnaire (General Background) (In English)

MASSEY UNIVERSITY

Albany Campus
Institute for Food, Nutrition and Human Health

Dietary Intake and Anthropometric Measurements of Newly Arrived and Longer Resident Mainland Chinese Women in Auckland

QUESTIONNAIRE
(General Background)

Code Number of Subject: ____________________

Time of Interview: ____________________

Date of Interview: ____________________

Interviewer (Initials): ____________________

Place of Interview: ____________________

Coding: ☐☐☐☐

Date: ☐☐☐☐☐☐

Note: In all cases circle each letter that applies unless specified

1. Your date of birth:

Please write down ___/______/________.

1. Decimal age ☐☐☐☐☐☐

Today's decimal date

____

Date of birth decimal date

____

Decimal age

____

2. Which area did you live in China before you arrived New Zealand?

Please write down ____________________

2. Area of China ☐☐

1 = South of China
2 = North of China
3 =Area of national minority
99 = Don't know

3. How long have you been in New Zealand?

a. ≥4 years

b. ≤2 years

c. More than 2 years, but less than 4 years

3. Time in NZ ☐

1 = a
2 = b
3=c

4a. Did you do any tertiary training?

a. Yes.

b. No.

4a. Tertiary training ☐

1 = a
2 = b

4b. If yes, what's the highest qualification did you gain?

a. Certificate

b. Diploma

c. Bachelor degree

d. Master degree

e. PhD

4b. Type of qualification ☐☐

1 = a
2 = b
3 = c
4 = d
5 = e
88 = NA
99 = Don't know

5. Which of the following best describe you?

a. Has a full time job

b. Has a part-time job

c. Not in paid work but on benefit

d. Neither in paid work nor on benefit

e. Retired

f. Other specify, please write down ______________

5. Employment status ☐

1 = a
2 = b
3 = c
4 = d
5 = e
6 = f
88 = NA
99 = Don't know

6.What is your current occupation?

Please write down __________

6. Occupation ☐ ☐

1 = Legislators, senior officials, managers
2 = Professionals
3 = Technicians and Associate professionals
4 = Clerks
5 = Service, shop, market
6 = Skilled Ag and fish
7 = Craft and related trades
8 = Plant and Machine operators, assemblers
9 = Elementary occupations (eg. Labour)
10 = Not specified
88 = NA
99 = Don't know

7. What would be the total income that your family got in the last 12 months (before tax)?

a. Income < $ 15,000

b. $ 15,000 ≤ Income < $ 30,000

c. $30,000 ≤ income < $45,000

d. $ 45,000 ≤ income <$60,000

e. Income ≥ $ 60,000

7. Total income ☐ ☐

1 = a
2 = b
3 = c
4 = d
5 = e
99 = Don't know

8. Have you received any of these types of income support in the last year:

a. Family support

b. Unemployment benefit

c. DPB

d. ACC

e. Sickness or invalids benefit

f. Student allowance

g. Other government benefits

h. NZ superannuation

8. Type of benefit

1 = a
2 = b
3 = c
4 = d
5 = e
6 = f
7 = g
8 = h
88 = NA
99 = Don't know

9. Which of the following best describes you?

a. Own a house

b. Rent a house

9. Property

1 = a
2 = b
99 = Don't know

10. If you own a house, how many bedrooms are there in your house?

a. 1

b. 2

c. 3

d. 4

e. more than 4

10. Number of bedrooms

1 = a
2 = b
3 = c
4 = d
5 = e
88 = NA
99 = Don't know

11a. How many people usually live in your home including yourself?	**11a. No. of people** ☐
a. 1	1 = a
b. 2	2 = b
c. 3	3 = c
d. 4	4 = d
e. 5	5 = e
f. 6	6 = f
g. 7	7 = g
h. 8	8 = h
i. more than 8	9 = I
11b. Who are they?	**11b. Code** **1 = Yes** **2 = No**
a. Self	a ☐
b. Children	b ☐
c. Husband or partner	c ☐
d. Father	d ☐
e. Mother	e ☐
f. Other relatives	f ☐
g. flatmate	g ☐
h. Other	h ☐

12. How many children do you have?	**12. No. of children** ☐
a. 0	1 = a
b. 1	2 = b
c. 2	3 = c
d. 3	4 = d
e. more than 3	5 = e
13. If no husband / partner in 11b. Does your husband live oversea ?	**13. Husband/ Partner** ☐
a. Yes. Go to question 14.	1 = a
b. No. Go to question 16.	2 = b
14. Which of the following best describes your husband?	**14. Employment status** ☐
a. Has a full time job	1 = a
b. Has a part-time job	2 = b
c. Not in paid work but on benefit	3 = c
d. Neither in paid work nor on benefit	4 = d
e. Retired	5 = e
f. Other specify, please write down ______________	6 = f
	88 = NA
	99 = Don't know

15. What is your husband's current occupation? Please write down ______________	**15. Occupation** ☐ ☐ 1 = Legislators, senior officials, managers 2 = Professionals 3 = Technicians and Associate professionals 4 = Clerks 5 = Service, shop, market 6 = Skilled Ag and fish 7 = Craft and related trades 8 = Plant and Machine operators, assemblers 9 = Elementary occupations (eg. Labour) 10 = Not specified 88 = NA 99 = Don't know
16a. Do you smoke? a. yes b. no	**16a. Smoking habit** ☐ 1 = a 2 = b
16b. How many cigarettes do you smoke per day? a. Under 5 b. 5-10 c. Over 10	**16b. Number of cigarettes** ☐ ☐ 1 = a 2 = b 3 = c 88 = NA 99 = Don't know
17a. Do you drink alcoholic drinks? a. Yes b. No	**17a. Drinking habits** ☐ 1 = a 2 = b

17b. What do you usually drink?

Please write down ____________

17b. Type of drink ☐ ☐

1 = Beer
2 = Wine
3 = Spirits
4 = Beer and wine
5 = Beer and spirits
6 = Wine and spirits
7 = Beer, wine and spirits
88 = NA
99 = Don't know

17c. How much do you usually drink per week?

Please write down: Beer ______________ ml

Wine ______________ ml

Spirit ____________ ml

17c. Volume of drink (ml)

Beer ☐ ☐ ☐ ☐

Wine ☐ ☐ ☐ ☐

Spirit ☐ ☐ ☐ ☐

88 = NA
99 = Don't know

18. Is there any change in your body weight after you live in New Zealand?

a. No difference

b. Increase > 5 kg

c. Increase < 5 kg

d. Increase, but I don't know the amount

e. Decrease > 5 kg

f. Decrease < 5 kg

g. Decrease, but I don't know the amount

18. Change of BW ☐ ☐

1 = a
2 = b
3 = c
4 = d
5 = e
6 = f
7 = g
99 = Don't know

Appendix 15

19. Do you have any of the following:	19. Code 1 = Yes 2 = No
a. Diabetes	a ☐
b. heart disease	b ☐
c. hyperlipidemia	c ☐
d. Low iron level	d ☐
e. Hyperthyroid	e ☐
f. Backache	f ☐
g. Hypertension	g ☐
20. Do you take any nutritional supplements regularly?	20. Consume of Supplements ☐
a. Yes. Please write down ____________	1 = Yes 2 = No
b. No	
21. Do you take any herbs regularly?	21. Consume of herbs ☐
a. Yes, Please write down ______________	1 = Yes 2 = No
b. No.	
22. Are you having oral contraceptive now?	22. Oral contraceptive ☐
a. Yes.	1 = Yes 2 = No
b. No	

Appendix 16. Questionnaire (General Background) (In Chinese)

MASSEY UNIVERSITY

Albany Campus
Institute for Food, Nutrition and Human Health

新到和长期居住奥克兰的中国大陆妇女
膳食摄入和体格的研究

问卷
(基本背景)

受访者号码：____________________

访问时间 ____________________

访问日期 ____________________

访问者 ____________________

访问地点 ____________________

编码：☐ ☐ ☐ ☐

日期：☐ ☐ ☐ ☐ ☐ ☐

注意：除非特别注明，请圈上所选答案前的字母。

Appendix 16

1。 您的出生日期

请写下 ________/________/____________

2。在移民纽西兰之前，您在中国大陆哪一个省份(地区)居住？

请写下 ________________

3。 您在纽西兰居住了多久？

a. 超过4年
b. 不到2年
c. 超过2年，不到4年

4a。您有否受过大专以上教育？

a. 有
b. 无

4b。如果有，您所取得过的最高学历是什么？

a. 证书
b. 大专
c. 本科(学士)
d. 硕士研究生
e. 博士研究生

5。您现时处于下列哪种状况？

a. 有一份全职工作
b. 有一份兼职工作
c. 没有工作，领取救济金
d. 既没有工作，也没有领取救济金
e. 退休
f. 其他，请写下______________________________

Appendix 16

6。您现在的职业是什么？

请写下____________________

7。过去12个月内您家庭的总收入(税前)是多少？

a. 少于$15，000
b. 高于等于$15，000， 少于$30，000
c. 高于等于$30，000， 少于$45，000
d. 高于等于$45，000， 少于$60，000
e. 高于等于$60，000

8。您在过去一年内有否领取以下福利津贴：

a. 家庭支助
b. 失业救济
c. DPB
d. ACC
e. 疾病或残疾救济
f. 学生津贴
g. 其他政府津贴
h. 纽西兰退休金

9。您属于下列哪种情形？

a. 买了房子
b. 租房

10。如果买了房子，您的房子有几个卧室？

a. 1
b. 2
c. 3
d. 4
e. 超过4

Appendix 16

11a。您家里包括您在内总共有几人？

a. 1
b. 2
c. 3
d. 4
e. 5
f. 6
g. 7
h. 8
I. 超过8

11b。他们是谁？

a. 您自己
b. 小孩
c. 丈夫或伴侣
d. 父亲
e. 母亲
f. 其他亲戚
g. 房客
h. 其他

12。您有几个小孩？

a. 0
b. 1
c. 2
d. 3
e. 超过3

13。如果您在问题11b中回答您的丈夫或伴侣没有与您住在一起，请问他是在海外吗？

a. 是，请继续问题14
b. 不，请继续问题16

14。以下哪种情形适合您 丈夫或伴侣？

a. 有一份全职工作
b. 有一份兼职工作
c. 没有工作，领取救济金
d. 既没有工作，也没有领取救济金
e. 退休
f. 其他，请写下________________________

15。您 丈夫或伴侣现在的职业是什么？

请写下________________

16a。您抽烟吗？

a. 是
b. 否

16b。如果抽烟，您每天抽多少支？

a. 少于5
b. 5-10
c. 超过10

17a。您饮酒精性饮料吗？

a. 是
b. 否

17b。您经常饮用哪些 酒精性饮料？

请写下________________

17c。每周 饮用多少 酒精性饮料？

请写下：啤酒 ______________ ml
果酒______________ ml
烈性酒______________ ml

18。您移居纽西兰后体重有否变化？

a. 没变化
b. 增加超过5kg
c. 增加少于5kg
d. 有增加，但不知道多少
e. 减少超过5kg
f. 减少少于5kg
g. 有减少，但不知道多少

19。您是否有以下疾病？

a. 糖尿病
b. 心脏病
c. 高血脂
d. 低铁血症
e. 甲亢
f. 背痛
g. 高血压

20。您是否规律进食营养补充剂？

a. 是，请写下________________
b. 否

21。 您是否规律进食中药材？

a. 是，请写下________________
b. 否

22。您是否用口服避孕药？

a. 是
b. 否

Appendix 17. First Interview Record (Including a 24-hour Recall and Body Measurement Records)

MASSEY UNIVERSITY

Albany Campus
Institute for Food, Nutrition and Human Health

Dietary Intake and Anthropometric Measurements of Newly Arrived and Longer Resident of Mainland Chinese Women in Auckland

Code Number Subject: ____________________

Time of Interview: ____________________

Date of Interview: ____________________

Interviewer (Initials): ____________________

Place of Interview: ____________________

Coding: ☐ ☐ ☐ ☐

Date: ____/____/________

24 Hours Recall

Date: ___/___/_______ **Page No. of Diet ___**

Eating Time	Meal Type	Food and Beverage Name, Brand, Description, Preparation i.e. boiling, frying, microwave etc, and Recipe if necessary.	Amount or Volume Consumed

Body Measurement

1. Body Weight: ________________ kg

________________ kg

Mean BW: __________kg

2. Height: ________________cm

________________ cm

________________ cm

Mean Height: __________cm

3. Skinfolds:

Triceps: __________cm

__________cm

__________ cm

Mean TSF: ___________cm

Biceps: __________ cm

__________ cm

__________ cm

Mean BSF: ___________ cm

Subscapular: ________ cm

________ cm

________ cm

Mean SSF: ___________cm

Appendix 17

4. Circumference of waist: ______________ cm

______________ cm

______________ cm

Mean CW: __________ cm

5 Circumference of hip: ______________ cm

______________ cm

______________ cm

Mean CH: __________ cm

6 Blood Pressure: ________________ mmHg

________________ mmHg

________________ mmHg

Mean BP: __________ mmHg

Appendix 18. Two-day Weighed Diet Record (In English)

MASSEY UNIVERSITY

Albany Campus
Institute for Food, Nutrition and Human Health

Dietary Intake and Anthropometric Measurements of Newly Arrived and Longer Resident of Mainland Chinese Women in Auckland

Two-day Weighed Diet Record

Note:

- Use the two-day record pad provided to keep a record of **All** the food, drink and condiment you consume during two complete days.
- Each day's record must start at any time but must continue for 24 hours.
- Record as accurately as possible the amount or volume of each food or drink. Please use the scale provided to weigh your food. Or you can appropriate record the volume of food in terms of teaspoon, tablespoons or cups. Otherwise record the number of units eaten e.g. six slices of white bread.
- The weight of many bought foods and the volumes of many bought drinks are recorded on the container. These can be used directly.
- After a meal the amount of any left over edible food must be estimated and subtracted from the amount originally recorded.

Name: ____________________

Code Number: _ _ _ _

Enquiries Contact:
Kai Hong Tan
Phone: 4101188

Thank you.

Appendix 18. Two-day Weighed Diet Record (In English)

Two-day Weighed Diet Record

Date:___/___/________ **Page No. of Diet ___**

Eating Time	Meal Type	Food and Beverage Name, Brand, Description, Preparation i.e. boiling, frying, microwave etc, and Recipe if necessary.	Amount or Volume Consumed

Appendix 19. Two-day Weighed Diet Record (In Chinese)

两天称量膳食记录

请注意

- 请使用提供的表格记录您在两整天里所进食的**所有**食物，包括食物，饮料和调味品。
- 每天的记录可始於任何时间，但必须持续24小时。
- 请准确地记录食物的重量和饮料的体积。尽量使用所提供的天枰称量食物。您也可以用汤匙，茶匙和杯来记量。有些食物如面包，可以片来计算。
- 很多买回来的食物和饮料，包装容器上已标明重量和体积，请尽量利用它。
- 餐后请把吃剩的食物的量从您当初记录的总量中剔除出来，这才是您真正吃进去的量。

姓名：____________

编号：_ _ _ _

如有任何疑问，请联系：
谭凯虹
电话：4101188

谢谢您的合作！

Appendix 19. Two-day Weighed Diet Record (In Chinese)

膳食登记表

日期：____/____/________　　　第_____页

进食时间	餐别	食物，饮料，调味品名称	数量和容积

Appendix 20 Database of Chinese Food Composition

Code Number	Food	Edible Portion %	Energe (KJ)	Water (g)	Protein (g)	Fat (g)	Fiber (g)	Carbohydrate (g)	Ash (g)
Cereal and Products									
A01029[P]	steamed Roll (Hua Juan)	100	908	45.7	6.4	1	\	45.6	1.3
A01034[P]	Pan-fried Cake (Lao Bing)	100	1067	36.4	7.5	2.3	1.9	51	0.9
A01036[P]	Plain Steamed Bread (Man Tou)	100	870	47.3	6.2	1.2	1	43.2	1.1
A01037	Gluten (MianJin) (Raw)	100	586	63.5	23.5	0.1	0.9	11.4	0.6
A01038[P]	Deep Fried Gluten (You Mian Jin)	100	2050	7.1	26.9	25.1	1.3	39.1	0.5
Legumes and products									
A02008[P]	Bean Curd (Tofu)	100	205	89.2	5	1.9	0.4	2.9	0.6
A02011	Semidried Tofu	100	586	65.2	16.2	3.6	0.8	10.7	3.5
A02027	Soybean Milk (Unsweetened)	100	54	96.4	1.8	0.7	1.1	0	0.2
A02033[P]	Salted Fermented Tofu (Fu Ru)	100	854	60.1	7.3	11.3	1	18.2	2.1
A02037[P]	Dried Bean Curd (Fu Zu)	100	1920	7.9	44.6	21.7	1	21.3	3.5
A02044	Soybean (dry)	100	1502	10.2	35.1	16	15.5	18.6	4.6
A02070	Deep Fried Tofu (You Tofu)	100	1021	58.8	17	17.6	0.6	4.3	1.7
A02078[P]	Dried Bean Stick (Zhi Zu)	100	1974	6.9	44.5	24.7	2.7	18	3.2
Fresh Bean									
A03004[P]	Yard-long Bean (Dou Jiao)	96	126	90	2.5	0.2	2.1	4.6	0.6
A03007	Snowbea (He Lan Dou)	88	113	91.9	2.5	0.3	1.4	3.5	0.4
A03011	Green Bean Sprout	100	75	94.6	2.1	0.1	0.8	2.1	0.3
Starchy root, tubers									
A04004	Waterchestnut (Ma ti)	78	247	83.6	1.2	0.2	1.1	13.1	0.8
A04020	Chinese Radish (Lo pu)	95	84	93.4	0.9	0.1	1	4	0.6
A04034[P]	Lotus-root	88	293	80.5	1.9	0.2	1.2	15.2	1
Vegetable									
A05022	GouJi	49	184	87.8	5.6	1.1	1.6	2.9	1
A05029[P]	Mustard Green (Gai Cai)	71	59	94.6	1.8	0.4	1.2	0.8	1.2
A05031[P]	Kale (Gai Lan)	78	79	93.2	2.8	0.4	1.6	1	1
A05034	Jiu Cai	90	109	91.8	2.4	0.4	1.4	3.2	0.8
A05035	Jiu Huang	88	92	93.2	2.3	0.2	1.2	2.7	0.4

Code Number	Food	B-Carotene (ug)	Retinol (ug)	VitaminB$_1$(mg)	VitaminB$_2$ (mg)	Niacin (mg)	Vitamin C (mg)
Cereal and Products							
A01029	steamed Roll (Hua Juan)	\	\	tr	0.02	1.1	
A01034	Pan-fried Cake (Lao Bing)	\	\	0.02	0.04	\	
A01036	Plain Steamed Bread (Man Tou)	\	\	0.02	0.02	\	
A01037	Gluten (MianJin) (Raw)	\	\	0.1	0.07	1.1	
A01038	Deep Fried Gluten (You Mian Jin)	\	\	0.03	0.05	2.2	
Legumes and products							
A02008	Bean Curd (Tofu)	\	\	0.06	0.03	0.3	
A02011	Semidried Tofu	\	\	0.03	0.07	0.3	
A02027	Soybean Milk (Unsweetened)	90	15	0.02	0.02	0.1	
A02033	Salted Fermented Tofu (Fu Ru)	130	22	0.03	0.06	0.4	
A02037	Dried Bean Curd (Fu Zu)	\	\	0.13	0.07	0.8	
A02044	Soybean (dry)	220	37	0.41	0.2	2.1	
A02070	Deep Fried Tofu (You Tofu)	30	5	0.05	0.04	0.3	
A02078	Dried Bean Stick (Zhi Zu)	\	\	0.11	0.07	0.9	
Fresh Bean							
A03004	Yard-long Bean (Dou Jiao)	200	33	0.05	0.07	0.9	18
A03007	Snowbea (He Lan Dou)	480	80	0.09	0.04	0.7	16
A03011	Green Bean Sprout	20	3	0.05	0.06	0.5	6
Starchy root, tubers							
A04004	Waterchestnut (Ma ti)	20	3	0.02	0.02	0.7	7
A04020	Chinese Radish (Lo pu)	20	3	0.02	0.03	0.3	21
A04034	Lotus-root	20	3	0.09	0.03	0.3	44
Vegetable							
A05022	GouJi	\	\	0.08	0.32	1.3	58
A05029	Mustard Green (Gai Cai)	1700	283	0.02	0.11	0.5	72
A05031	Kale (Gai Lan)	3450	575	0.02	0.09	1	76
A05034	Jiu Cai	1410	235	0.02	0.09	0.8	24
A05035	Jiu Huang	260	43	0.03	0.05	0.7	15

Appendix 20

Code Number	Food	Vitamin E (mg)	K (mg)	Na (mg)	Ca (mg)	Mg(mg)	Fe (mg)	Mn (mg)	Zn (mg)	Cu (mg)	P (mg)
Cereal and Products											
A01029	steamed Roll (Hua Juan)	...	83	95	19	12	0.4	\	...	0.09	72
A01034	Pan-fried Cake (Lao Bing)	1.03	141	149.3	20	51	2.4	1.15	0.94	0.15	146
A01036	Plain Steamed Bread (Man Tou)	0.09	146	165	58	20	1.7	0.29	0.4	0.05	78
A01037	Gluten (MianJin) (Raw)	0.65	69	15	76	26	4.2	0.86	1.76	0.19	133
A01038	Deep Fried Gluten (You Mian Jin)	7.18	45	29.5	29	40	2.5	1.28	2.29	0.5	98
Legumes and products											
A02008	Bean Curd (Tofu)	3.26	95	6.4	17	24	0.8	0.26	0.55	0.13	57
A02011	Semidried Tofu	\	140	76.5	308	102	4.9	1.31	1.76	0.77	273
A02027	Soybean Milk (Unsweetened)	0.8	48	3	10	9	0.5	0.09	0.24	0.07	30
A02033	Salted Fermented Tofu (Fu Ru)	13.22	283	3000	302	81	10.2	0.9	2.62	0.86	75
A02037	Dried Bean Curd (Fu Zu)	27.84	553	26.5	77	71	16.5	2.55	3.69	1.31	284
A02044	Soybean (dry)	18.9	1503	2.2	191	199	8.2	2.26	3.34	1.35	465
A02070	Deep Fried Tofu (You Tofu)	24.7	158	32.5	147	72	5.2	1.38	2.03	0.3	238
A02078	Dried Bean Stick (Zhi Zu)	26.78	837	83	49	162	10.8	2.9	3.2	0.78	490
Fresh Bean											
A03004	Yard-long Bean (Dou Jiao)	2.24	207	3.4	29	35	1.5	0.41	0.54	0.15	55
A03007	Snowbea (He Lan Dou)	0.3	116	8.8	51	16	0.9	0.48	0.5	0.06	19
A03011	Green Bean Sprout	0.19	68	4.4	9	18	0.6	0.1	0.35	0.1	37
Starchy root, tubers											
A04004	Waterchestnut (Ma ti)	0.65	306	15.7	4	12	0.6	0.11	0.34	0.07	44
A04020	Chinese Radish (Lo pu)	0.92	173	61.8	36	16	0.5	0.09	0.3	0.04	26
A04034	Lotus-root	0.73	243	44.2	39	19	1.4	1.3	0.23	0.11	58
Vegetable											
A05022	GouJi	2.99	170	29.8	36	74	2.4	0.37	0.21	0.21	32
A05029	Mustard Green (Gai Cai)	0.64	224	29	28	18	1	0.7	0.41	0.1	36
A05031	Kale (Gai Lan)	0.96	104	50.5	128	18	2	0.53	1.3	0.11	50
A05034	Jiu Cai	0.96	247	8.1	42	25	1.6	0.43	0.43	0.08	38
A05035	Jiu Huang	0.34	192	6.9	25	12	1.7	0.17	0.33	0.1	48

Appendix 20

Code Number	Food	Se (ug)	Cholesterol (mg)	Saturated Fatty Acid	Monounsaturated Fatty Acid
Cereal and Products					
A01029	steamed Roll (Hua Juan)	6.17	tr#	0.5#	0.6#
A01034	Pan-fried Cake (Lao Bing)	7.5	tr#	8.6#	11.1#
A01036	Plain Steamed Bread (Man Tou)	7.2	0	0.5#	0.6#
A01037	Gluten (MianJin) (Raw)	1	0	0.028	0.018
A01038	Deep Fried Gluten (You Mian Jin)	22.8	tr	7	8.7
Legumes and products					
A02008	Bean Curd (Tofu)	0.81	0	0.313	0.414
A02011	Semidried Tofu	0.02	0	0.569	0.763
A02027	Soybean Milk (Unsweetened)	0.14	0	0.238	0.148
A02033	Salted Fermented Tofu (Fu Ru)	1.32	0	1.774	2.588
A02037	Dried Bean Curd (Fu Zu)	6.65	0	3.211	5.034
A02044	Soybean (dry)	6.16	0#	2.9#	4.4#
A02070	Deep Fried Tofu (You Tofu)	0.63	tr	3.274	3.186
A02078	Dried Bean Stick (Zhi Zu)	6.14	0	3.656	5.73
Fresh Bean					
A03004	Yard-long Bean (Dou Jiao)	2.16	0	tr#	tr#
A03007	Snowbea (He Lan Dou)	0.42	0	tr#	tr#
A03011	Green Bean Sprout	0.5	0	0.0304	0.0156
Starchy root, tubers					
A04004	Waterchestnut (Ma ti)	0.7	0	0.026*	0.002*
A04020	Chinese Radish (Lo pu)	0.61	0	0.03*	0.017*
A04034	Lotus-root	0.39	0	0.03*	0.02*
Vegetable					
A05022	GouJi	0.35	0	tr	tr
A05029	Mustard Green (Gai Cai)	0.53	0	0.01*	0.092*
A05031	Kale (Gai Lan)	0.88	0	0.091*	0.052*
A05034	Jiu Cai	1.38	0	tr	tr
A05035	Jiu Huang	0.76	0	tr	tr

Appendix 20

Code Number	Food	Polyunsaturated Fatty Acid	
Cereal and Products			
A01029	steamed Roll (Hua Juan)	2#	From: S3, A56
A01034	Pan-fried Cake (Lao Bing)	6.2#	From: S3, A20
A01036	Plain Steamed Bread (Man Tou)	2#	From: S3, A56
A01037	Gluten (MianJin) (Raw)	0.054	
A01038	Deep Fried Gluten (You Mian Jin)	9.4	
Legumes and products			
A02008	Bean Curd (Tofu)	1.153	
A02011	Semidried Tofu	2.25	
A02027	Soybean Milk (Unsweetened)	0.309	
A02033	Salted Fermented Tofu (Fu Ru)	6.927	
A02037	Dried Bean Curd (Fu Zu)	13.302	
A02044	Soybean (dry)	11.2#	
A02070	Deep Fried Tofu (You Tofu)	11.141	
A02078	Dried Bean Stick (Zhi Zu)	15.141	
Fresh Bean			
A03004	Yard-long Bean (Dou Jiao)	0.1#	From: S3, X9
A03007	Snowbea (He Lan Dou)	0.1#	From: S3, X9
A03011	Green Bean Sprout	0.0486	
Starchy root, tubers			
A04004	Waterchestnut (Ma ti)	0.043*	
A04020	Chinese Radish (Lo pu)	0.045*	From S2, 11430
A04034	Lotus-root	0.02*	
Vegetable			
A05022	GouJi	tr	
A05029	Mustard Green (Gai Cai)	0.038*	
A05031	Kale (Gai Lan)	0.338*	
A05034	Jiu Cai	tr	
A05035	Jiu Huang	tr	

Code Number	Food	Edible Portion %	Energe (KJ)	Water (g)	Protein (g)	Fat (g)	Fiber (g)	Carbohydrate (g)	Ash (g)
A05060	Chrysanthemum (Tang Gao)	82	88	93	1.9	0.3	1.2	2.7	0.9
A05061	Water Spinach (Kong xin cai)	76	84	92.9	2.2	0.3	1.4	2.2	1
A05065	Purslane, Chrysanthemum (Xian cai)	74	105	90.2	2.8	0.3	2.2	2.8	1.7
A05068	Shang Hai Cabbage (xiao bai cai)	81	63	94.5	1.5	0.3	1.1	1.6	1
A05071	Watercress (xi yang cai)	73	71	94.5	2.9	0.5	1.2	0.3	0.6
A05073	Cai Xin	87	96	92.9	1.8	0.5	1.1	2.7	1
A05077	Coriander (Yuan Xu)	81	130	90.5	1.8	0.4	1.2	5	1.1
Melon									
A06005	Winter Melon (Dong Gua)	80	46	96.6	0.4	0.2	0.7	1.9	0.2
A06012	Bottle Gourd (Hu Lu)	87	59	95.3	0.7	0.1	0.8	2.7	0.4
A06013	Jie Gua	92	50	95.6	0.6	0.1	1.2	2.2	0.3
A06017[P]	Bitter Cucumber (Ku Gua)	81	79	93.4	1	0.1	1.4	3.5	0.6
A06024[P]	Angled Loofah (Si Gua)	83	84	94.3	1	0.2	0.6	3.6	0.3
Salted vegetable									
A08005	Salted Turnip (Da Tou Cai)	100	201	72	4.6	0.2	4.5	7	11.7
A08023	Salted Radish(Luo Pu Gan)	100	251	67.7	3.3	0.2	3.4	11.2	14.2
A08034	Xue Li Hong	100	105	77.1	2.4	0.2	2.1	3.3	14.9
A08035	Zha Cai	100	121	75	2.2	0.3	2.1	4.4	16
Fungus									
A09005	Dry Black Seaweed Strands (Fa Cai	100	1029	10.5	22.8	0.8	21.9	36.8	7.2
A09006	Dried Seaweed (Hai Dai)	98	322	70.5	1.8	0.1	6.1	17.3	4.2
A09017	Dry Fungus, Wooden Ear (Mu Er, Yu	100	858	15.5	12.1	1.5	29.9	35.7	5.3
A09026	Dry Mushroom	95	883	12.3	20	1.2	31.6	30.1	4.8
A09033	Dried Kelp (Zicai)	100	866	12.7	26.7	1.1	21.6	22.5	15.4
Meat									
A12010[P]	Chinese Sausage (dry)	100	2443	8.4	22	48.3		15.3	6
A12030	Winterized Meats, Dry Pork Meat	100	2084	31.1	11.8	48.8		2.9	5.4
A12043	Ox Stomach	100	301	83.4	14.5	1.6		0	0.6
A13004	Bei jing Roasted Duck	80	1824	38.2	16.6	38.4		6	0.8
A13031	Chicken Gizzard	100	494	73.1	19.2	2.8		4	0.9
A13035	Roasted Goose	73	1208	52.8	19.7	21.5		4.2	1.8
A13039	Duck	68	1004	63.9	15.5	19.7		0.2	0.7

Code Number	Food	B-Carotene (ug)	Retinol (ug)	Vitamin B_1(mg)	Vitamin B_2 (mg)	Niacin (mg)	Vitamin C (mg)
A05060	Chrysanthemum (Tang Gao)	1510	252	0.04	0.09	0.6	18
A05061	Water Spinach (Kong xin cai)	1520	253	0.03	0.08	0.8	25
A05065	Purslane, Chrysanthemum (Xian cai)	2110	352	0.03	0.12	0.8	47
A05068	Shang Hai Cabbage (xiao bai cai)	1680	280	0.02	0.09	0.7	28
A05071	Watercress (xi yang cai)	9550	1592	0.01	0.11	0.3	52
A05073	Cai Xin	620	103	0.04	0.11	0.7	36
A05077	Coriander (Yuan Xu)	1160	193	0.04	0.14	2.2	48
Melon							
A06005	Winter Melon (Dong Gua)	80	13	0.01	0.01	0.3	18
A06012	Bottle Gourd (Hu Lu)	40	7	0.02	0.01	0.4	11
A06013	Jie Gua	\	\	0.02	0.05	0.4	39
A06017	Bitter Cucumber (Ku Gua)	100	17	0.03	0.03	0.4	56
A06024	Angled Loofah (Si Gua)	90	15	0.02	0.04	0.4	5
Salted vegetable							
A08005	Salted Turnip (Da Tou Cai)	60	10	0.11	\	\	\
A08023	Salted Radish(Luo Pu Gan)	\	\	0.04	0.09	0.9	17
A08034	Xue Li Hong	50	8	0.05	0.07	0.7	4
A08035	Zha Cai	490	83	0.03	0.06	0.5	2
Fungus							
A09005	Dry Black Seaweed Strands (Fa Cai	\	\	0.23	\	\	...
A09006	Dried Seaweed (Hai Dai)	240	40	0.01	0.1	0.8	...
A09017	Dry Fungus, Wooden Ear (Mu Er, Yu	100	17	0.17	0.05	0.2	1
A09026	Dry Mushroom	20	3	0.19	1.26	20.5	5
A09033	Dried Kelp (Zicai)	1370	228	0.27	1.02	7.3	2
Meat							
A12010	Chinese Sausage (dry)	...	\	0.04	0.12	3.8	
A12030	Winterized Meats, Dry Pork Meat	96	96	\	\	\	
A12043	Ox Stomach	2	2	0.03	0.13	2.5	
A13004	Bei jing Roasted Duck	36	36	0.04	0.32	4.5	
A13031	Chicken Gizzard	36	36	0.04	0.09	3.4	
A13035	Roasted Goose	9	9	0.09	0.11	3.6	
A13039	Duck	52	52	0.08	0.22	4.2	

Appendix 20

Code Number	Food	Vitamin E (mg)	K (mg)	Na (mg)	Ca (mg)	Mg(mg)	Fe (mg)	Mn (mg)	Zn (mg)	Cu (mg)	P (mg)
A05060	Chrysanthemum (Tang Gao)	0.92	220	161.3	73	20	2.5	0.28	0.35	0.06	36
A05061	Water Spinach (Kong xin cai)	1.09	243	94.3	99	29	2.3	0.67	0.39	0.1	38
A05065	Purslane, Chrysanthemum (Xian cai)	0.36	207	32.4	187	119	5.4	0.78	0.8	0.13	59
A05068	Shang Hai Cabbage (xiao bai cai)	0.7	178	73.5	90	18	1.9	0.27	0.51	0.08	36
A05071	Watercress (xi yang cai)	0.59	179	61.2	30	9	1	0.25	0.69	0.06	26
A05073	Cai Xin	0.88	210	55.8	108	22	1.2	0.23	0.33	0.06	39
A05077	Coriander (Yuan Xu)	0.8	272	48.5	101	33	2.9	0.28	0.45	0.21	49
Melon											
A06005	Winter Melon (Dong Gua)	0.08	78	1.8	19	8	0.2	0.03	0.07	0.07	12
A06012	Bottle Gourd (Hu Lu)	...	87	0.6	16	7	0.4	0.08	0.14	0.04	15
A06013	Jie Gua	0.27	40	0.2	4	7	0.1	0.1	0.08	0.02	13
A06017	Bitter Cucumber (Ku Gua)	0.85	256	2.5	14	18	0.7	0.16	0.36	0.06	35
A06024	Angled Loofah (Si Gua)	0.22	115	2.6	14	11	0.4	0.06	0.21	0.06	29
Salted vegetable											
A08005	Salted Turnip (Da Tou Cai)	\	\	\	\	\	\	\	\	\	\
A08023	Salted Radish(Luo Pu Gan)	...	508	4203	53	44	3.4	0.87	1.27	0.25	65
A08034	Xue Li Hong	0.24	369	3304.2	294	40	5.5	0.46	0.74	0.51	36
A08035	Zha Cai	...	363	4252.6	155	54	3.9	0.35	0.63	0.14	41
Fungus											
A09005	Dry Black Seaweed Strands (Fa Cai	21.7	108	103.3	875	132	99.3	3.51	1.67	0.72	66
A09006	Dried Seaweed (Hai Dai)	0.85	761	327.4	348	129	4.7	1.14	0.65	0.14	52
A09017	Dry Fungus, Wooden Ear (Mu Er, Yu	7.51	52	8.5	34	57	5.5	0.97	0.53	0.04	12
A09026	Dry Mushroom	0.66	464	11.2	83	147	10.5	5.47	8.57	1.03	258
A09033	Dried Kelp (Zicai)	1.82	1796	710.5	264	105	54.9	4.32	2.47	1.68	350
Meat											
A12010	Chinese Sausage (dry)	...	100	1420	24	13	3.2	0.16	2.48	0.07	69
A12030	Winterized Meats, Dry Pork Meat	6.23	416	763.9	22	35	7.5	0.05	3.49	0.08	249
A12043	Ox Stomach	0.51	162	60.6	40	17	1.8	0.21	2.31	0.07	104
A13004	Bei jing Roasted Duck	0.97	247	83	35	13	2.4	...	1.25	0.12	175
A13031	Chicken Gizzard	0.87	272	74.8	7	15	4.4	0.06	2.76	2.11	135
A13035	Roasted Goose	0.07	22	240	91	7	3.8	0.06	2	0.26	202
A13039	Duck	0.27	191	69	6	14	2.2	0.06	1.33	0.21	122

Code Number	Food	Se (ug)	Cholesterol (mg)	Saturated Fatty Acid	Monounsaturated Fatty Acid
A05060	Chrysanthemum (Tang Gao)	0.6	0	tr	tr
A05061	Water Spinach (Kong xin cai)	1.2	0	tr	tr
A05065	Purslane, Chrysanthemum (Xian cai)	0.52	0	tr	tr
A05068	Shang Hai Cabbage (xiao bai cai)	1.17	0	0.026*	0.015*
A05071	Watercress (xi yang cai)	0.7	0	0.027*	0.008*
A05073	Cai Xin	0.79	0	tr	tr
A05077	Coriander (Yuan Xu)	0.53	0	tr	tr
Melon					
A06005	Winter Melon (Dong Gua)	0.22	0	tr	tr
A06012	Bottle Gourd (Hu Lu)	0.49	0	0.016*	0.037*
A06013	Jie Gua	\	0	tr	tr
A06017	Bitter Cucumber (Ku Gua)	0.36	0	tr	tr
A06024	Angled Loofah (Si Gua)	0.86	0	tr	tr
Salted vegetable					
A08005	Salted Turnip (Da Tou Cai)	\	0	0.008*	0.005*
A08023	Salted Radish(Luo Pu Gan)	\	0	0.073*	0.04*
A08034	Xue Li Hong	0.77	0	0.008*	0.005*
A08035	Zha Cai	1.93	0	0.008*	0.005*
Fungus					
A09005	Dry Black Seaweed Strands (Fa Cai	7.45	0	0.061*	0.027*
A09006	Dried Seaweed (Hai Dai)	5.84	0	0.061*	0.027*
A09017	Dry Fungus, Wooden Ear (Mu Er, Yu	0.46	0	0.347	0.482
A09026	Dry Mushroom	6.42	0	0.158	0.145
A09033	Dried Kelp (Zicai)	7.22	0	0.061*	0.027*
Meat					
A12010	Chinese Sausage (dry)	8.77	88	19.272	23.667
A12030	Winterized Meats, Dry Pork Meat	23.52	123	19.272	23.667
A12043	Ox Stomach	9.07	104	0.702	0.693
A13004	Bei jing Roasted Duck	10.32	91	13.44	20.813
A13031	Chicken Gizzard	10.54	103	1.103	1.098
A13035	Roasted Goose	7.68	116	6.751	11.201
A13039	Duck	12.25	94	5.949	9.85

Code Number	Food	Polyunsaturated Fatty Acid	
A05060	Chrysanthemum (Tang Gao)	tr	
A05061	Water Spinach (Kong xin cai)	tr	
A05065	Purslane, Chrysanthemum (Xian cai)	tr	
A05068	Shang Hai Cabbage (xiao bai cai)	0.096*	From: S2, 11116
A05071	Watercress (xi yang cai)	0.035*	
A05073	Cai Xin	tr	
A05077	Coriander (Yuan Xu)	tr	
Melon			
A06005	Winter Melon (Dong Gua)	tr	
A06012	Bottle Gourd (Hu Lu)	0.087*	From: S2, 11593
A06013	Jie Gua	tr	
A06017	Bitter Cucumber (Ku Gua)	tr	
A06024	Angled Loofah (Si Gua)	tr	
Salted vegetable			
A08005	Salted Turnip (Da Tou Cai)	0.042*	
A08023	Salted Radish(Luo Pu Gan)	0.108*	
A08034	Xue Li Hong	0.042*	From S2, 11889
A08035	Zha Cai	0.042*	From S2, 11889
Fungus			
A09005	Dry Black Seaweed Strands (Fa Cai	0.102*	From S2, 11663
A09006	Dried Seaweed (Hai Dai)	0.102*	
A09017	Dry Fungus, Wooden Ear (Mu Er, Yι	0.672	
A09026	Dry Mushroom	0.894	
A09033	Dried Kelp (Zicai)	0.102*	From S2, 11663
Meat			
A12010	Chinese Sausage (dry)	5.023	
A12030	Winterized Meats, Dry Pork Meat	5.023	From S1, C12004
A12043	Ox Stomach	0.157	
A13004	Bei jing Roasted Duck	4.378	
A13031	Chicken Gizzard	0.608	
A13035	Roasted Goose	3.246	
A13039	Duck	3.841	

Appendix 20

Code Number	Food	Edible Portion %	Energe (KJ)	Water (g)	Protein (g)	Fat (g)	Fiber (g)	Carbohydrate (g)	Ash (g)
A13044	Duck Wing	67	611	70.6	16.5	6.1		6.3	0.5
A13060	Duck Feet	59	628	64.7	13.4	1.9		19.7	0.3
Egg									
A16016	Century Egg (Songhua Dan)	83	745	66.4	14.8	10.6		5.8	2.4
A16018	Salted Duck Egg (Whole)	88	795	61.3	12.7	12.7		6.3	7
Bread									
A21058	Bread	100	1305	27.4	8.3	5.1	0.5	58.1	0.6
A21063	Bread (Butter)	100	1377	27.3	7.9	8.7	0.9	54.7	0.5
A21068	Bread (Unsweetened)	100	1146	34.1	9.2	3.9	0.5	50.5	1.3
Miscellaneous									
A21021	Spring Roll	100	1937	23.5	6.1	33.7	1	33.8	1.9
A22006	Tea	100		99.8	0.1	...			0.1
A11026	Watermelon Seed (Fried)	43	2397	4.3	32.7	44.8	4.5	9.7	4
Starch and products									
A25005	Green Bean Starch Sheet (Fenpi)	100	268	84.3	0.2	0.3	\	15	0.2
A25006	Green Bean Thread (Fensi)	100	1402	15	0.8	0.2	1.1	82.6	0.3
A25007	Fentiao	100	1410	14.3	0.5	0.1	0.6	83.6	0.9
Confectionery									
A26003	Vinegar (Black)	100	381	73.1	3.7	0.2	...	18.5	4.5
A26004	Vinegar (White)	100	13	99.4	0.1	0.6	...	0	0.7
A26010	Chunky Sauce (Dou Ban Jiang)	100	745	46.6	13.6	6.8	1.5	15.6	15.9
A26011	Fermented Black Bean	100	1021	22.7	24.1	...	5.9	36.8	10.5
A26019	Soya Bean Sauce	100	264	67.3	5.6	0.1	0.2	9.9	16.9
A26037	Chilli and Garlic Sauce	100	368	59.2	4.8	0.6	3.7	15.9	15.8
A26044	Weijing	100	1121	0.2	40.1	0.2	\	26.5	33

Appendix 20

Code Number	Food	B-Carotene (ug)	Retinol (ug)	VitaminB$_1$(mg)	VitaminB$_2$ (mg)	Niacin (mg)	Vitamin C (mg)
A13044	Duck Wing	14	...	0.02	0.16	2.4	
A13060	Duck Feet	11	11	tr	0.17	1.1	
Egg							
A16016	Century Egg (Songhua Dan)	310	310	0.06	0.18	0.1	
A16018	Salted Duck Egg (Whole)	134	134	0.16	0.33	0.1	
Bread							
A21058	Bread	\	\	0.03	0.06	1.7	
A21063	Bread (Butter)	...	\	0.03	0.02	2.3	
A21068	Bread (Unsweetened)	...	\	0.02	0.01	4.3	
Miscellaneous							
A21021	Spring Roll	...	\	0.01	0.01	3	\
A22006	Tea	\	\	...	...	...	...
A11026	Watermelon Seed (Fried)	\	\	0.04	0.08	3.4	...
Starch and products							
A25005	Green Bean Starch Sheet (Fenpi)			0.03	0.01	...	
A25006	Green Bean Thread (Fensi)			0.03	0.02	0.4	
A25007	Fentiao			0.01	...	0.1	
Confectionery							
A26003	Vinegar (Black)	\	\	0.02	0.03	5.8	
A26004	Vinegar (White)	\	\	...	...	tr	
A26010	Chunky Sauce (Dou Ban Jiang)	\	\	0.11	0.46	2.4	
A26011	Fermented Black Bean	\	\	0.02	0.09	0.6	
A26019	Soya Bean Sauce	\	\	0.05	0.13	1.7	
A26037	Chilli and Garlic Sauce	970	162	0.03	0.1	0.9	
A26044	Weijing	\	\	0.08	\	0.3	

Appendix 20

Code Number	Food	Vitamin E (mg)	K (mg)	Na (mg)	Ca (mg)	Mg(mg)	Fe (mg)	Mn (mg)	Zn (mg)	Cu (mg)	P (mg)
A13044	Duck Wing	\	100	53.6	20	5	2.1	...	0.74	...	84
A13060	Duck Feet	...	28	61.1	24	3	1.3	...	0.54	...	91
Egg											
A16016	Century Egg (Songhua Dan)	3.05	152	542.7	63	13	3.3	0.06	1.48	0.12	165
A16018	Salted Duck Egg (Whole)	6.25	184	2706.1	118	30	3.6	0.1	1.74	0.14	231
Bread											
A21058	Bread	1.66	88	230.4	49	31	2	0.37	0.75	0.24	107
A21063	Bread (Butter)	5.45	92	14.5	35	22	1.5	0.29	0.5	0.18	94
A21068	Bread (Unsweetened)	1.07	89	526	89	28	2.8	0.41	0.81	0.22	108
Miscellaneous											
A21021	Spring Roll	3.89	89	485.8	10	36	1.9	0.33	0.83	0.07	94
A22006	Tea	...	6	3.9	2	3	0.1	0.12	0.03	0.01	1
A11026	Watermelon Seed (Fried)	1.23	612	187.7	28	448	8.2	1.82	6.76	1.82	765
Starch and products											
A25005	Green Bean Starch Sheet (Fenpi)		15	3.9	5	2	0.5	0.03	0.27	0.38	2
A25006	Green Bean Thread (Fensi)		18	9.3	31	11	6.4	0.15	0.27	0.05	16
A25007	Fentiao		18	9.6	35	11	5.2	0.16	0.83	0.18	23
Confectionery											
A26003	Vinegar (Black)	0.27	286	349.5	45	94	\	\	0.73	0.14	262
A26004	Vinegar (White)	...	12	225.9	26	5	2.2	\	...	0.11	tr
A26010	Chunky Sauce (Dou Ban Jiang)	0.57	772	6012	53	125	16.4	1.37	1.47	0.62	154
A26011	Fermented Black Bean	40.69	715	263.8	29	202	3.7	3.17	2.37	1.04	43
A26019	Soya Bean Sauce	...	337	5757	66	156	8.6	1.11	1.17	0.06	204
A26037	Chilli and Garlic Sauce	16.28	308	3236.3	71	26	11	1.03	1.54	0.29	54
A26044	Weijing	...	4	21053	100	7	1.2	0.67	0.31	0.12	4

Appendix 20

Code Number	Food	Se (ug)	Cholesterol (mg)	Saturated Fatty Acid	Monounsaturated Fatty Acid
A13044	Duck Wing	10	49	1.842	3.05
A13060	Duck Feet	5.42	36	0.471	1.026
Egg					
A16016	Century Egg (Songhua Dan)	25.24	608	3.307	5.978
A16018	Salted Duck Egg (Whole)	24.04	647	4.432	6.566
Bread					
A21058	Bread	3.15	12#	1.9#	1.1#
A21063	Bread (Butter)	3.4	12#	1.9#	1.1#
A21068	Bread (Unsweetened)	34.4	3#	1#	0.6#
Miscellaneous					
A21021	Spring Roll	6.4			
A22006	Tea	0.08	0	tr	tr
A11026	Watermelon Seed (Fried)	23.44	0	9.779*	7.407*
Starch and products					
A25005	Green Bean Starch Sheet (Fenpi)	0.5	0	tr	tr
A25006	Green Bean Thread (Fensi)	3.39	0	tr	tr
A25007	Fentiao	2.18	0	tr	tr
Confectionery					
A26003	Vinegar (Black)	1.53	0	tr	tr
A26004	Vinegar (White)	0.35	0	0#	0#
A26010	Chunky Sauce (Dou Ban Jiang)	10.2	0	0.659	3.189
A26011	Fermented Black Bean	4.55	0	0.139*	0.047*
A26019	Soya Bean Sauce	1.39	0	tr#	tr#
A26037	Chilli and Garlic Sauce	6.55	0	tr#	tr#
A26044	Weijing	0.98	0	0	0

Appendix 20

Code Number	Food	Polyunsaturated Fatty Acid	
A13044	Duck Wing	1.189	
A13060	Duck Feet	0.416	From S1, C13016
Egg			
A16016	Century Egg (Songhua Dan)	1.378	
A16018	Salted Duck Egg (Whole)	1.295	
Bread			
A21058	Bread	3#	From S3, A16
A21063	Bread (Butter)	3#	From S3, A16
A21068	Bread (Unsweetened)	1.6#	From S3, A40
Miscellaneous			
A21021	Spring Roll		
A22006	Tea	tr	
A11026	Watermelon Seed (Fried)	28.094*	
Starch and products			
A25005	Green Bean Starch Sheet (Fenpi)	tr	
A25006	Green Bean Thread (Fensi)	tr	
A25007	Fentiao	tr	
Confectionery			
A26003	Vinegar (Black)	tr	
A26004	Vinegar (White)	0#	
A26010	Chunky Sauce (Dou Ban Jiang)	2.795	
A26011	Fermented Black Bean	0.231*	From: S2, 16315
A26019	Soya Bean Sauce	tr#	
A26037	Chilli and Garlic Sauce	tr#	
A26044	Weijing	0	

Source: Institute of Nutrition and Food Hygiene, Chinese Academy of Preventive Medicine, 1991

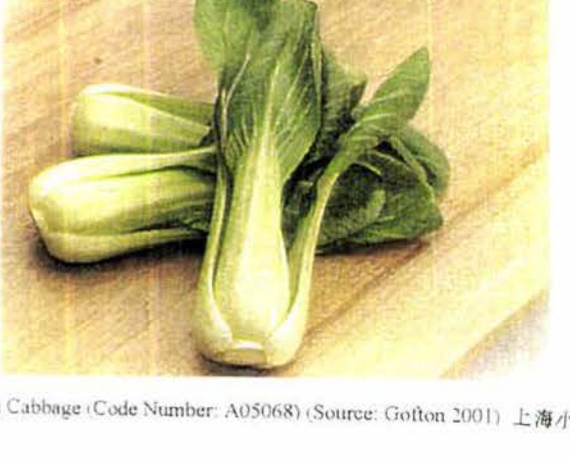
S2: From USDA wetsite

S3: Use Fat and Fatty Acid value of Similar New Zealand Food (Quigley et al,1995)

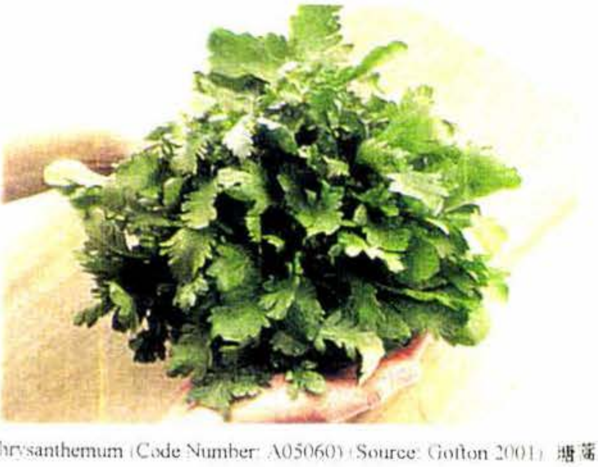
…:Couldn't be checked \: didn't check Tr: trace P: with picture in Appendices *: data from S2 #: data from S3.

Appendix 21. Photos of Some Chinese Food

Chinese Chives (Code Number: A05034) (Source: Gofton 2001) 韭菜



Shang Hai Cabbage (Code Number: A05068) (Source: Gofton 2001) 上海小白菜



Chrysanthemum (Code Number: A05060) (Source: Gofton 2001) 塘蒿

Appendix 21. Photos of Some Chinese Food

Box Thorn (Code Number: A05022) (Source: Gofton 2001) 枸 杞

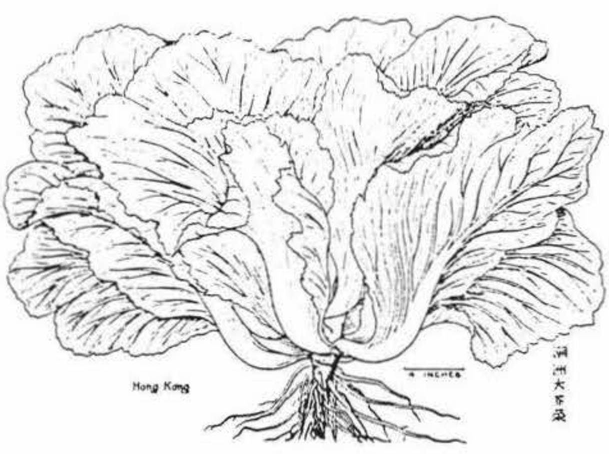
Water Spinach (Code Number: A05061) (Source: Gofton 2001) 通心菜

Caixin (Code Number: A05073) (Source: Gofton 2001) 菜心

Appendix 21. Photos of Some Chinese Food

Dried Bean Stick (Code Number: A02078) (Source: Liu, 1999) 豆角

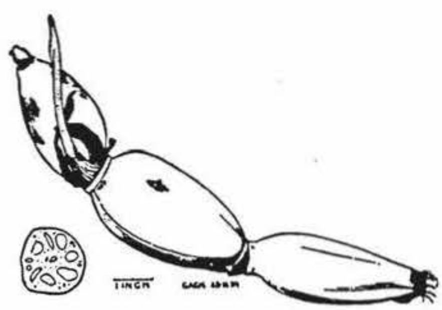
Chinese Kale (Code Number: A05031) (Source: Simoons 1991) 芥蘭



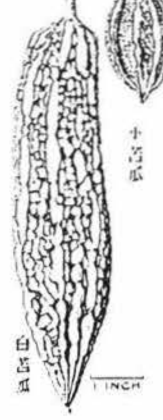
Mustard Green (Code Number: A05029) (Source: Simoons 1991) 芥菜

Appendix 21. Photos of Some Chinese Food

Angled Luffa (Code Number: A06204) (Source: Simoons 1991) 絲瓜



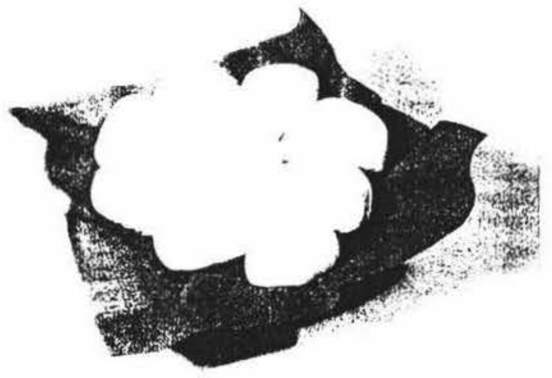
Lotus Root (Code Number: A04034) (Source: Simoons 1991) 蓮藕



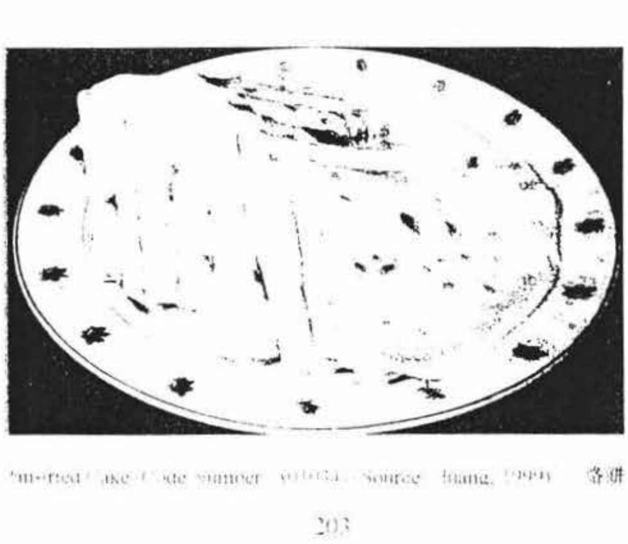
Bitter Cucumber (Code Number: A06017) (Source: Simoons 1991) 苦瓜

Appendix 21. Photos of Some Chinese Food

Steam Roll (Code Number: [illegible]) Source: Huang, [illegible]) 花卷

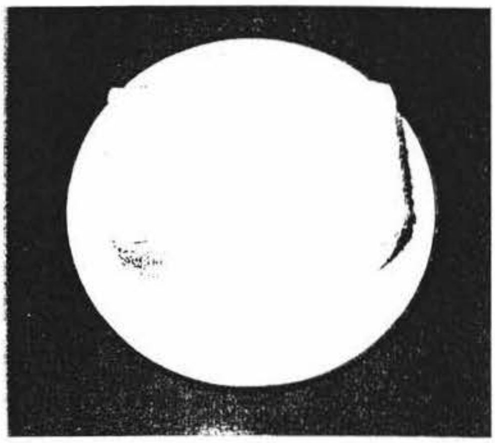


Plain Steamed Bread (Code Number: [illegible]) Source: Huang, [illegible]) 馒头



[illegible] Cake (Code Number: [illegible]) Source: Huang, [illegible]) [illegible]饼

Appendix 21. Photos of Some Chinese Food



Tofu (Code number: A02008) (Source: Lu, 1990) 豆腐

[illegible]

Dried Bean Curd (Code number: A020[illegible]) (Source: Lu, 1990) 腐皮
Dried Bean Stick (Code Number: A02078) (Source: Lu, 1990) 支竹