Healthy Eating – Healthy Action
Oranga Kai – Oranga Pumau
A background
2003

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Introduction

Aims

Healthy Eating – Healthy Action: A Background provides the scientific support and rationale for the directions proposed in the accompanying strategy document, *Healthy Eating – Healthy Action: A strategic framework*.

Review of the international literature combined with extensive public consultation has identified issues for each of the background areas: nutrition, physical activity, obesity, Māori, and Pacific peoples. The issues identified have been summarised in the accompanying text and supported by appropriate scientific literature, where it exists. The background sections provide important facts that support the framework for action and will underpin the development of the detailed implementation plans to improve nutrition, increase physical activity and help maintain healthy body weight for all New Zealanders.

This document is not intended to be a full analysis of all issues, but instead focuses on those issues considered most relevant. It is anticipated that this paper will need to be reviewed and updated as issues develop and change, and new information and evidence become available.

Key issues

Improving nutrition, increasing physical activity and reducing obesity in the population would have a significant impact on the health and wellbeing of many New Zealanders. The key population messages arising from the consultation on the strategy and review of the current situation for nutrition, physical activity and obesity are listed below. They do not replace the Food and Nutrition Guidelines and do not necessarily provide the appropriate wording for communicating messages to the general public. They do, however, provide the intent of the messages that have arisen from the development of the strategy.

Key messages

- Eat a variety of nutritious foods.
- Eat less fatty, salty and sugary foods.
- Eat plenty of vegetables and fruits.
- Fully breastfeed infants for at least six months.
- Be active every day for at least 30 minutes in as many ways as possible.
- Add some vigorous exercise for extra benefit and fitness.
- Aim to maintain a healthy weight throughout life.
- Promote and foster the development of environments that support healthy lifestyles.

Approaches to Healthy Eating – Healthy Action

Identifying the most effective ways to make these improvements is not easy, but there appear to be some approaches that could help to bring about positive change. These approaches should be multi-levelled and use a range of strategies. Some themes common to strategies for improving nutrition, increasing physical activity and reducing obesity are summarised below.

Socioeconomic status

Women living in deprived areas appear to suffer disproportionately from obesity and overweight (Russell et al 1999; Parnell 2002). They are also more likely to experience food insecurity and not be able to purchase adequate or appropriate food for their families.

Ability to participate in physical activity may be adversely affected by lack of money. Lower socioeconomic status is also associated with poorer health generally, poorer housing and lower levels of education. Developing services and programmes that meet the needs of people from lower socioeconomic groups should be a key focus.

Children and young people

Improving nutrition and physical activity and promoting a healthy body weight are issues for all age groups, but health status in the early years can impact on future health throughout life. A focus on infants, children and young people, using the family and whānau setting, also provides a sound environment for supporting positive behavioural change.

Environments

The environment has been identified as crucial to improving nutrition, increasing physical activity and reducing obesity. Supportive environments where the healthy choices are the easy choices need to be developed and considered in all planning. This calls for strong intersectoral activities and collaboration between the relevant government agencies, and between government and non-government organisations, including key industry groups. Local governments are key players in providing supportive environments, and an environmental approach includes supporting communities to create the environments that are conducive to appropriate change.

Communication

A few key population messages have arisen from the consultation in the development of *Healthy Eating – Healthy Action*. But different levels of communication are required to ensure that consistent messages are delivered – through media and population channels as well as on an individual basis using appropriate behavioural change techniques.

Workforce

Bringing about change in nutrition and physical activity behaviours will require a significant number of people skilled in the various disciplines. This includes people skilled in nutrition and physical activity at all levels – research and academic, policy and programme development and purchasing, and in the community. There is a particular need for appropriately trained people to help improve nutrition and physical activity for Māori and Pacific peoples and a need to encourage Māori and Pacific peoples to seek training in these disciplines.

In addition to these themes, monitoring of the nutritional status (including rates of obesity) and levels of physical activity of New Zealanders is essential. These data are necessary to review policies and redirect services and programmes.

1 Nutrition

Key messages

- Eat a variety of nutritious foods.
- Eat less fatty, salty and sugary foods.
- Eat plenty of vegetables and fruits.
- Fully breastfeed infants for at least six months.

(Refer to the *Food and Nutrition Guidelines* series, Ministry of Health)

The issue

There is increasing recognition that food and nutrition are important to the health and wellbeing of people. What we choose to eat, however, whether because of preference, affordability, convenience or other reasons, may not be consistent with the food choices that are best for our health. Ischaemic heart disease, cancer and stroke are the three leading causes of death for New Zealanders, and food and nutrition play a major role in all of these. Nutrition is a major determinant in the prevalence of obesity, hypertension, non-insulin-dependent (type 2) diabetes and dental decay. It is also a factor in determining the risk of osteoporosis and a number of gastrointestinal diseases (Ministry of Health 1998b).

The 1997 National Nutrition Survey (NNS97) provides the most up-to-date national data on food and nutrient intakes, dietary habits and nutrition-related clinical measures for adults. Data on children's nutrition have been collected during the 2002 school year and will be released in late 2003.

A Ministry of Health and Auckland University study has estimated the burden of disease attributable to nutrition-related risk factors (Ministry of Health and University of Auckland, in preparation). The risk factors include blood pressure, blood cholesterol, vegetable and fruit intake, and body mass index (BMI). The study uses the Comparative Risk Assessment (CRA) methodology developed by the World Health Organization for the latest Global Burden of Disease study to estimate the current disease burden attributable to these four risk factors, as well as the future disease burden that might be avoidable if current risk factor levels were reduced.

Current situation

Food and nutrient intakes

Foods

Vegetables and fruit

Consumption of vegetables and fruit has been strongly linked with positive health outcomes, including protection against cardiovascular disease and some cancers (Byers et al 2002; World Cancer Research Fund and American Institute for Cancer Research 1997; Key et al 2002).

The NNS97 found that two-thirds of New Zealanders are eating three or more servings of vegetables (including potatoes) daily. Although potatoes do not appear to have the protective effects of other vegetables, they are an important source of vitamin C in the New Zealand diet (LINZ 1999a). The NNS97 also found that nearly half of adult New Zealanders consume the recommended two or more servings of fruit per day (Russell et al 1999).

European and other New Zealanders were more likely than Māori and Pacific peoples to meet the recommendations for vegetables and fruit. Those living in more deprived areas were less likely to meet the recommendations, and cost was often cited as a key barrier to increasing consumption of vegetables and fruit (Russell et al 1999).

It is estimated that in 1997 a total of 1558 deaths in New Zealand adults aged 25 years and over (6% of all deaths) were attributable to inadequate vegetable and fruit consumption (Ministry of Health and University of Auckland, in preparation).

Breads and cereals

Breads and cereals provide energy and key macronutrients, in the form of protein, carbohydrate, dietary fibre and a number of the micronutrients. Diets high in wholegrain cereals and dietary fibre may provide some protection against coronary heart disease, especially those diets high in soluble forms of dietary fibre (Mann 2002). Wholegrain cereals are also considered to be protective against colorectal cancers (International Agency for Research on Cancer 2002). The NNS97 found that less than one-fifth of adult New Zealanders consume the recommended six servings per day of breads and cereals (Russell et al 1999).

Recommendations to increase the consumption of breads and cereals need to be accompanied by clear messages about the choice of spreads and fillings on breads. A study of New Zealanders' eating habits found that discretionary additions of fat to food contribute almost one-quarter of the total daily fat intake of adults, and that 44 percent of discretionary fat is from butter/margarine, most of which is added to bread products (Simpson et al 2002).

Recommendations to increase bread and cereal consumption should emphasise wholegrain breads and cereals, and cereals low in added sugar and fat.

Milk and milk products

Milk and milk products provide important nutrients at all stages in life and are particularly important sources of protein and calcium. Milk products also provide some of the essential micronutrients, including vitamin A, riboflavin and iodine. However, some milk and milk products (full-fat and homogenised milk, butter and cheese) are major sources of total and saturated fat intake in the New Zealand diet (Russell et al 1999). For this reason it is generally recommended that people choose low-fat milk and milk products where possible, apart from children under two years of age, who should consume the full-fat milks.

Meat, poultry, seafood and eggs

This food group is an important source of protein and is a key dietary source of some of the micronutrients, especially iron and zinc. Seafoods, eggs and meats can also be important dietary sources of iodine and selenium in New Zealand. To help reduce total and saturated fat intake, meat, poultry and fish should be lean and cooked with a minimum of added fat. This includes reducing consumption of such common foods as battered fish.

Beverages

Non-alcoholic

Non-alcoholic beverages, including tea, coffee and water, are commonly consumed in New Zealand. The range of non-alcoholic beverages that provide energy (usually as sugar) and other nutrients is increasing in New Zealand. These include fruit juices, fruit drinks, powdered drinks, carbonated drinks and sports drinks.

In the NNS97 30 percent of men and 18 percent of women were found to consume carbonated sweetened drinks regularly (at least three times per week) (Russell et al 1999). Consumption of carbonated, powdered, fruit and sports drinks was highest in young adults (18–24-year-olds). The results from the pre-test of the Children's Nutrition Survey indicate that New Zealand children also frequently consume soft drinks, including cordials, powdered, fruit and carbonated sweetened drinks (Watson et al 2001).

Increased consumption of soft drinks is associated with their decreasing cost. From 1988 to 1998 there was approximately a 50 percent decrease in the cost of soft drinks, while over the same period the price of milk has almost doubled (AC Nielsen 1998). High soft drink consumption in children in the USA is associated with lower milk and fruit juice consumption and thus lower intakes of calcium and vitamin C (Harnack et al 1999).

This may partly explain why soft drinks appear to be replacing milk as a beverage chosen by children. In a US study, children who had the highest soft drink consumption had the lowest milk consumption, and energy intake was positively associated with soft drink consumption (Harnack et al 1999). The study also found that when milk consumption was higher, the overall nutritional quality of the diet was better (Harnack et al 1999). The rapid increase in the consumption of sugar/sweetened drinks has been linked with the rising levels of obesity in children (Ludwig et al 2001; Troiano et al 2000).

Some UK nutritionists claim that the maintenance of high salt intakes is a key factor in the promotion of soft drinks. It is estimated that reducing salt consumption to recommended levels could decrease soft drink consumption by one can (330 ml) per day (Robinson 2001).

Alcoholic

Alcoholic beverages can contribute significant amounts of energy in the diets of some New Zealanders while contributing few nutrients (Tasman-Jones 1998). The NNS97 identified that, as a group, males aged 45–64 years consumed the most alcohol, at 26 g/day (Russell et al 1999).

In a recent survey of 5500 New Zealanders, 87 percent had consumed alcohol in the last 12 months. Twenty-eight percent of young women aged 15–17 years drank four or more drinks at least once a week; 58 percent of young men and 50 percent of young women aged 15–17 years drank enough to feel drunk at least once a month (Alcohol and Public Health Research Unit 2002).

A non-random survey of 504 pregnant women in the upper North Island (regional New Zealand survey) identified that 81 percent consumed some alcohol before pregnancy, of which over half consumed alcohol at least weekly prior to pregnancy. The proportion consuming alcohol varied by ethnic group, with 87 percent of all New Zealand-born Europeans, 80 percent of all Māori and 46 percent of all Pacific women drinking when they were not pregnant. When they knew they were pregnant, 65 percent of women who previously drank gave up drinking alcohol altogether, leaving 29 percent of the total sample drinking, of whom 35 percent drank at least once per week during pregnancy. Young women and those of lower socioeconomic status were more likely to continue to drink during pregnancy and in larger quantities (Watson and McDonald 1999).

Heavy use of alcohol is directly and independently related to blood pressure (Intersalt Cooperative Research Group 1988). A reduction in alcohol consumption by high consumers is accompanied by a reduction in blood pressure (Xin et al 2001).

There are various schools of thought about the role alcohol plays as a risk factor for a number of health problems. It appears that moderate consumption of alcohol may have a protective role for some of those at risk of coronary heart disease, but alcohol is an important risk factor for some cancers, including breast cancer (American Cancer Society 2002; World Cancer Research Fund and American Institute for Cancer Research 1997).

The Food and Nutrition Guidelines recommend that those who choose to drink alcohol should do so in moderation (Ministry of Health 1998a; Ministry of Health in press).

Energy and macronutrients

Total energy intake

Since different dietary collection tools were used for the national nutrition surveys in the Life in New Zealand Survey (LINZ) undertaken in 1989 (Howarth et al 1991) and the NNS97, changes in energy intake cannot be assessed with confidence. However, the macronutrient sources of energy have changed, with an increase in the percentage of energy from carbohydrates and a decrease in the percentage of energy from fat (but still not to recommended levels) (Russell et al 1999).

Increasing consumption of takeaway and fast foods has been shown to be positively associated with energy and fat intake (Kant 2000) and body fatness (McCrory et al 1999). If they replace other more nutritious foods, the consumption of these energy-dense, nutrient-poor foods may also compromise nutrient intakes.

Fat

Fat plays an important role in the diet. There are a number of key nutrients often associated with sources of fat, including the fat-soluble vitamins A and E. Fat also contributes significantly to total energy intake, satiety and palatability. Consumption of too much fat, in particular saturated fat, is associated with increased risks of a number of adverse health outcomes, in particular coronary heart disease.

The NNS97 showed that adult New Zealanders are still consuming about 35 percent of their total energy as fat (recommended intake is 30% or less), with a significant contribution from saturated fat (15% of total energy [Russell et al 1999]), the fat most associated with increased risk of heart disease. Mono-unsaturated fat provides 11–12 percent of energy, with 5 percent of energy coming from polyunsaturated fats (recommended intake 6 to 10% of total energy) (Russell et al 1999). Major sources of fat in the New Zealand diet include butter and margarine, potatoes and kūmara (where fat has been added in the cooking), beef and veal, milk, and cakes and biscuits (Russell et al 1999).

Dietary fats, in particular saturated fats, are an important dietary determinant of blood cholesterol concentrations (Howell et al 1997). High blood cholesterol is a major risk factor for coronary heart disease (Law et al 1994). It is estimated that in 1997 4722 deaths in New Zealand adults aged 25 years and older (18% of all deaths) were attributable to higher-than-optimal blood cholesterol levels (Ministry of Health and University of Auckland, in preparation).

The Food and Nutrition Guidelines support a reduction in total fat intake as well as a change in the fatty acid profile: a decrease in the proportion of saturated fats and an increase in the proportion of mono- and polyunsaturated fats. This is consistent with the messages of the Food and Nutrition Guidelines (Ministry of Health 1998a).

Sucrose

Sucrose is considered an issue because of its contribution to total energy intake (with few other nutritional benefits), as well as its association with dental health (see section below on dental health). However, sucrose plays an important function in the taste, texture and appeal of foods, and is the most significant sugar contributing to total sugar in the New Zealand diet (Russell et al 1999).

Major sources of sucrose in the New Zealand diet include sugar and sweets, non-alcoholic beverages (including cordials, soft drinks and fruit drinks), fruit, cakes and muffins, dairy products and biscuits (LINZ 1999, Table B12a).

The NNS97 showed that total sugar intake declines with age, particularly over the age of 25 years (Russell et al 1999). Data collected in the early 1990s on New Zealand children and teenagers, however, showed that total sugar contributed 25 percent of dietary energy intake, with most of this coming from snack foods and sweet drinks (Brinsdon et al 1992; Brinsdon et al 1993).

Micronutrients

Although micronutrient intake is appropriate for the majority of the population, there are some groups more at risk, including pregnant women (Watson and McDonald 1999), some older people, infants (Soh et al 2002), and those on lower incomes. Adults living in the most deprived areas of New Zealand are at greater risk of inadequate intakes of vitamin A, riboflavin and folate (Russell et al 1999).

Iodine

New Zealand has a naturally low iodine environment, which is reflected in low dietary intakes of iodine. Iodine is an essential nutrient for normal growth and development in the fetus, infants and children, and maintaining a number of normal functions in adults, such as thyroid hormone production.

Iodised table salt was first introduced in 1924, and the level of iodine added to salt was further increased to its current level (40–80 mg iodine per kg salt) in 1938. Prior to the 1950s goitre was endemic in New Zealand, but iodine intakes were probably adequate from the 1960s to the 1980s.

During the 1990s the New Zealand Total Diet Survey (Vannoort et al 2000; Vannoort et al 1995) showed that iodine intakes had decreased. A number of factors that could be involved in the decreasing intakes include:

- a decline in the use of iodophors by the dairy industry as a sanitiser (Sutcliffe 1990)
- a decrease in the use of salt for cooking and at the table (Thomson et al 1997)
- adoption of health messages regarding reduction in salt (Thomson et al 1997)
- a general decrease in home cooking (salt used in processed foods is not iodised).

Key food sources of iodine in New Zealand are milk and milk products, fish, chicken, eggs and meat. Iodine levels in these foods are influenced by the use of iodine-based compounds in the dairy industry and iodine supplemented animal feeds. Concentrated sources of iodine include foods containing seaweed.

Reduced iodine intakes are reflected in a lower iodine status measured by urinary iodide excretion (Thomson et al 2001; Thomson et al 1997; Skeaff et al 2002).

An enlarged thyroid gland (goitre) is also an indication of inadequate iodine intake. A sample of adults in Otago was found to have a re-emergence of goitre (Thomson et al 2001). A regional survey of children found 11–12 percent of children had goitre when using the 2001 WHO reference values (Skeaff et al 2002). International standards classify a prevalence of goitre over 5 percent as endemic.

The first national data on iodine status are being collected in the Children's Nutrition Survey. Urinary iodide excretions will be assessed in children aged 5–14 years including Māori and Pacific children. Data collection has been completed and the findings will be reported on in late 2003.

The Ministry of Health and the New Zealand Food Safety Authority are managing a project to address the re-emergence of iodine deficiency.

Selenium

Selenium plays an essential role as an antioxidant and in thyroid hormone metabolism.

New Zealand soils are naturally low in selenium and plant foods reflect the selenium content of soils. Intakes of selenium appear to have increased over the past decade (Russell et al 1999). This finding is supported by the Total Diet Survey which explains the increasing selenium intake by the increase in importation of Australian wheat and other food products and supplementation of animals feeds with selenium. However, selenium intakes are still low in the South Island because more flour and flour-based food products are made from locally grown wheat, which is low in selenium (Vannoort et al 2000).

In New Zealand the main sources of selenium in the diet include seafood (29%), breads (11%), red meats (11%), poultry (8%) and eggs (5%) (LINZ 1999 Table B36a). The contribution of cereal products to dietary selenium intake varies depending upon where the cereal products are grown and the selenium content of the soils.

There is no recommended level of selenium intake known for optimum health. Although dietary intakes of selenium have been low by international standards these have not been conclusively associated with any adverse health condition. This is the subject of active research including the role of selenium and cancer.

There is a need for ongoing monitoring of the international research, the selenium status of the population and the content of the food supply.

Folate

Adequate intakes of folic acid (folate) are known to protect women against having a baby born with a neural tube defect (NTD). A randomised Medical Research Council trial in the United Kingdom conclusively established the link between a folic acid supplement and the reduction in the occurrence and recurrence of NTDs. The study found that folic acid supplementation of 4 mg reduced the recurrence of NTDs by up to 70 percent (MRC Vitamin Study Research Group 1991). It is current policy in New Zealand to advise women considering pregnancy to take an 800 mg folic acid supplement for four weeks prior to conception and in the first 12 weeks of pregnancy (PHC 1995a). Key food sources of folate include some vegetables and fruits, breads and cereals (sometimes fortified), and some meats, including organ meats.

Intakes of folate in New Zealand remain low, at about half the recommended intake levels (400 mg/day) for women of childbearing age, despite voluntary provisions to fortify a number of food products and the ability to make a folate/NTD health claim (Ferguson et al 2000). This, combined with the fact that more than half of pregnancies are unplanned and therefore do not benefit from folic acid supplementation before and during early pregnancy, suggests the need to explore alternative ways to increase intakes of folic acid, especially for women of childbearing age. There is a need for consideration of ways to increase intakes of folic acid such as mandatory fortification.

There is also considerable research being undertaken on some of the other potential health benefits from folic acid. Research to date is not conclusive, but focuses on reduced risk of cardiovascular disease and some cancers, including colon cancer (Department of Health [London] 2000).

Iron

Sub-optimal iron status is associated with impaired work capacity, body temperature regulation and resistance to infections. In children, iron deficiency (particularly at the level of iron deficiency anaemia) has been linked with impaired intellectual development, which is not reversed by subsequent iron therapy. Iron deficiency during pregnancy is associated with prematurity, low birthweight and increased perinatal mortality (MacPhail 2002).

The principal sources of iron in the diet of New Zealand adults are bread (13%), beef and veal (12%), breakfast cereals (9%), vegetables (8%), and potatoes/kūmara (5%) (LINZ 1999 Table B 34a). A number of dietary factors either promote or inhibit iron absorption (MacPhail 2002).

In the NNS97 the highest prevalence of inadequate dietary iron intakes among adult New Zealanders (39–45%) was among non-pregnant females aged 15–44 years. However, biochemical analyses indicated that the prevalence of low iron stores, iron deficiency and iron deficiency anaemia in females was much lower (6%, 3% and 2% respectively), with the highest prevalence among Māori females (11%, 9% and 6%) (Russell et al 1999).

Ferguson et al (2001) have noted that the NNS97 data indicate that the iron status of New Zealand women compares favourably with women in other Western countries despite similar or lower dietary iron intakes. The prevalence of biochemical iron deficiency in New Zealand is lower than other countries, but any sub-optimal iron status has the potential for negative functional consequences (Ferguson et al 2001).

In a study of Auckland adolescents the prevalence of biochemical iron deficiency was found to be 18.4 percent in girls and 11.8 percent in boys. The prevalence of iron deficiency among Māori, Pacific and Asian female adolescents was considerably higher than among European female adolescents. The reasons for these differences are not clear and warrant further investigation, including the role of iron losses in subsequent deficiency (Scragg 1999).

Data on the iron status of infants and children are limited, although prevalence data on a sample of 266 South Island infants and toddlers identified 66 percent of toddlers and 15 percent of infants at risk of low dietary iron intakes. Dietary factors that modify iron absorption and intake of iron were associated with the levels of iron stores in these young children (Soh et al 2002).

Further studies are in progress on the iron status of infants and toddlers in the Auckland region. Interim results support including iron deficiency in infants and toddlers as an issue to be addressed in this strategy (Wall et al 2000).

Vitamin A

Vitamin A is essential for vision, growth, cellular differentiation and the integrity of the immune system. The main food sources of vitamin A in the New Zealand diet include vegetables (38%), butter/margarine (16%), other meats[1] (9%), milk (6%) and fruit (4%) (LINZ 1999, Table B19a).

The NNS97 identified that intakes of vitamin A are adequate overall, although those living in the most deprived areas are at greater risk of inadequate intakes (Russell et al 1999).

Preliminary results from ongoing work among infants and toddlers, which includes biochemical vitamin A levels, would support vitamin A being identified as a nutrient that may need further consideration (Wall et al 2000).

Sodium

Sodium is an essential nutrient in the body, particularly for the regulation of extracellular fluid and its volume. It is involved in the regulation of concentration of salts in body fluids, acid-base balance and the membrane potential of cells. However, current intakes of sodium in New Zealand are considerably higher than requirements (10–20 mmol/day). The targets set by the Nutrition Taskforce were to reduce dietary

[1] Other meats = game and organ meats.

sodium intakes to 120 mmol per day or less by the year 2000. This is equivalent to a salt intake of about 7g per day (Department of Health 1991). The target year was extended by the Public Health Commission to 2005 (PHC 1995b).

Sodium intake is best assessed by 24-hour urinary sodium excretion. A series of local studies measuring 24-hour urinary sodium excretion in a total of 724 individuals in the Otago, Waikato and Taranaki regions has been carried out (Thomson and Colls 1998). These studies indicate that New Zealanders currently consume about 9g of salt per day, down from about 10g per day in the 1980s (Simpson et al 1982).

Based on data from the UK, only about 10 percent of the salt consumed represents salt naturally present in foods; about 15 percent represents salt used in cooking and at the table, and at least 75 percent comes from the consumption of processed foods (James et al 1987).

Major food sources of sodium in the New Zealand diet include breads and other baked goods, breakfast cereals, processed meats, cheese, and some canned and fast foods (Vannoort et al 2000).

Dietary sodium is an important determinant of blood pressure (Elliott et al 1996), and high blood pressure is a major risk factor for coronary heart disease and stroke (Prospective Studies Collaboration 2002). It is estimated that in 1997 a total of 3699 deaths in New Zealand adults aged 25 years and over (14% of all deaths) were attributable to higher-than-optimal blood pressure (Ministry of Health and University of Auckland, in preparation). Reducing dietary sodium intake to recommended levels could help reduce the number of deaths attributable to high blood pressure.

Calcium

Calcium is essential for the development of bones and for achieving maximum bone density. Because of the key role of calcium in skeletal development it is an important nutrient for children and adolescents. High intakes of calcium (food or supplement) may also help regulate blood pressure (Conlin et al 2000; Griffith et al 1999). The most common food sources of calcium include milk and milk products, fish with bones, and vegetables. Other potential food sources include nuts and seeds. A number of non-dairy beverages, such as soy beverages, are fortified with calcium.

Inadequate calcium intake is still an issue, especially for young women and men. In 1997 33 percent of young males and 37 percent of young females had inadequate calcium intakes (Russell et al 1999). Māori women have a higher prevalence of inadequate calcium intakes compared to European and Others (Russell et al 1999). Whether this has an impact on bone health has not been confirmed in Māori or Pacific peoples.

A New Zealand study of pre-pubertal boys and girls found that those who avoided cow milk reported major problems in bone health, including small bones and a high prevalence of bone fractures. Other concerns found among the milk avoiders were short stature and high adiposity (Black et al 2002).

Other micronutrients

Other micronutrients that may be emerging as nutritionally significant for New Zealanders in the future, either through research or on the international and political agenda, include zinc, thiamin and vitamin D.

Supplementation and fortification

Supplementation

There appears to be significant misinformation and confusion in the public arena regarding the appropriate use of dietary supplements and claims about their purported health benefits.

A number of people are choosing to take vitamin, mineral and other dietary supplements. In 1997 half of the adult New Zealand population consumed a vitamin and/or mineral supplement over the previous year, with 28 percent consuming vitamin and mineral supplements at least once a week (Russell et al 1999).

Fortification

Eating a varied diet should provide the range of nutrients needed by most groups. Where there are concerns for the nutrient intake of a population, restoration or fortification of particular foods may be considered as an appropriate measure. This first happened in New Zealand, with the addition of iodine to salt in 1924, to treat and prevent endemic goitre.

Many foods on the market are now fortified, on a voluntary basis, with controlled levels of a number of vitamins and minerals, particularly ready-to-eat breakfast cereals and beverages. Ongoing monitoring of the food supply is important, with the range of fortified foods continually expanding. The Manufactured Food Database and rolling nutrition survey programme (to date the NNS97 and the Children's Nutrition Survey currently in progress) are key monitoring tools. It is important to note that the NNS97 provides baseline data (ie, it assumed pre-fortification levels). The Ministry of Health has made a commitment to a regular survey programme including national nutrition surveys (Ministry of Health 2002a).

Breastfeeding and infant feeding

The Ministry of Health undertakes to support, protect and promote breastfeeding, and believes that breastmilk is the best food for babies (Ministry of Health 2000a).

The World Health Assembly meeting in May 2001 adopted a resolution to:

> protect, promote and support exclusive breastfeeding for six months as a global public health recommendation, and to provide safe and appropriate complementary foods, with continued breastfeeding for up to two years of age or beyond *(WHO 2001).*

Scientific evidence indicates that breastfeeding has a wide range of benefits, including nutritional, reducing illness and other benefits to the infant and the mother.

The level of full breastfeeding at three months of age was about 51 percent in 2001 and has changed little since 1994, when some 56 percent of European and Other infants were fully breastfed at three months. In 2001 41 percent of Māori infants were fully breastfed at three months compared with 43 percent of Pacific infants (Ministry of Health 2001b). In 1998 62 percent of European and Other infants, 53 percent of Māori and 60 percent of Pacific infants were fully or partially breastfed at six months (Ministry of Health 1999).

The Ministry recognises the need to improve the duration of full breastfeeding and has recently developed *Breastfeeding: A guide to action*, which aims to improve the rates of both the initiation and maintenance of breastfeeding (Ministry of Health 2002b). The Ministry also supports the Baby Friendly Hospital Initiative to foster the initiation of and promotion of ongoing successful breastfeeding.

An area of concern is that some infants are being given solid food before it is appropriate to do so (Heath et al 2002). Early introduction of weaning foods before the infant is physiologically ready is associated with an increased risk of eczema, diarrhoea and dehydration. The Ministry of Health has developed *Food and Nutrition Guidelines for Healthy Infants and Toddlers (aged 0–2 years)*. The *Guidelines* provide health professionals, educators and caregivers with sound advice on the nutritional needs and recommended feeding practices for infants and toddlers (Ministry of Health 2000a).

At the 55th World Health Assembly meeting in May 2002 the global strategy for infant and young child feeding was endorsed. The strategy emphasises the importance of timeliness, adequacy and safety of infant feeding and having a properly fed infant. It also stresses the importance of adequate micronutrient intakes in older infants (WHO 2002).

Food security

Developed countries throughout the world have sectors of their populations that are not having enough to eat, or are eating inappropriately because of poverty. In the poorest income groups, food acquisition is sensitive to both price and income, and many people struggle to obtain enough high-quality food to achieve what is considered to be a healthy diet. In New Zealand the diet of households of lower socioeconomic groups tends to be lower in dairy products (Parnell 1997).

It is suspected that there are other dietary differences where poverty adversely impacts on the quality of food purchased, although this requires further research.

The NNS97 showed that those living in more deprived areas were more likely to have poor nutrition. These households are also more likely not to meet the Food and Nutrition Guidelines, and report running out of food or being unable to eat properly because of lack of money more often than households in less deprived areas. Māori

and Pacific peoples are significantly over-represented in lower socioeconomic populations. The NNS97 also found a strong relationship between obesity in women and the deprivation status of their households (Russell et al 1999).

About one-half of Pacific and one-third of Māori households, compared with only one-tenth of New Zealand European and Other households, reported that food ran out 'often or sometimes'. In addition, more people in the most deprived households reported that lack of money limits the variety of food in their household (Russell et al 1999). People with disabilities are often over-represented in the lower socioeconomic groups (Ministry of Health 2001c).

The cost of consuming a healthy diet, consistent with the Ministry of Health's Food and Nutrition Guidelines, is monitored annually at different locations throughout New Zealand by the University of Otago. The calculated weekly food costs for a moderately varied diet are as follows.

Table 1: The weekly costs of a healthy diet for different age and sex groups

Adult male	$65–74
Adult female	$62–71
Adolescent male	$83–95
Adolescent female	$69–80
10-year-old child	$55–64
5-year-old child	$37–42
4-year-old child	$34–40
1-year-old child	$30–35

Source: Department of Human Nutrition 2002

These estimates appear to be increasing annually. The calculations support the concept that the cost of a healthy diet is not affordable for all people, including many families in New Zealand (Parnell 1997).

Dental health

Dental caries remains a significant problem in New Zealand (Ministry of Health 2001a). Poor oral health is associated with dysfunction, discomfort and disability. Nutrition and diet are major determinants of oral health or disease. Conversely, poor oral health can adversely affect an individual's dietary intake. Older people who have few teeth left or poorly fitting dentures find eating difficult and may avoid foods such as vegetables, fresh fruit, nuts and meat.

Adults with intellectual disability have more untreated caries than the general population, and the prevalence of gum disease is 1.2 to 1.9 times that of the general population (Cumella et al 2000).

High-carbohydrate diets are associated with an increased risk of dental caries. Different carbohydrates have different cariogenic potential. Sucrose, glucose and fructose are the most cariogenic, but starch is also fermentable by dental plaque bacteria, albeit to a lesser extent. The frequency of exposure to carbohydrate foods is considered very important in dental health and it is often recommended that people limit the number of times they eat high-carbohydrate or sugary foods (Rugg-Gunn 2001; Sheiham 2001).

Dental erosion rates are thought to be increasing, mainly due to acid in foods and drinks (Sheiham 2001). Dental caries in New Zealand are most prevalent in children, particularly those living in poorer households and those of Māori and Pacific ethnicity (Ministry of Health 2001a).

Fluoridation of the water supplies is the most effective method of reducing inequalities in dental health status, as the benefit is greatest for those at highest risk of tooth decay (Rugg-Gunn 2001; NHMRC 1999).

Scope for health gain

A Ministry of Health and Auckland University study (in preparation) estimated the current burden of disease attributable to selected nutrition-related risk factors (inadequate vegetable and fruit intake, high blood cholesterol and high blood pressure). Estimates of the current (1997) attributable burden, summed across all diseases, have been included in the earlier sections on vegetables and fruit, fat and sodium.

The study also estimated the disease burden that could be avoided in 2011 if initiatives were introduced now to reduce risk factor levels (ie, increase vegetable and fruit intake and decrease both blood cholesterol and blood pressure through changes in diet). The estimates of the potentially avoidable disease burden, summed across all diseases, are summarised in Table 2. These estimates relate to a single intervention and a particular year (2011), rather than the cumulative number of deaths avoided over a period of years. As alternative intervention options are developed during the implementation phase of Healthy Eating – Healthy Action, these can be run through the model and their likely health impact assessed.

Table 2: Avoidable burdens, all-cause mortality, 2011

Risk factor	Change in mean population risk factor level	Total avoidable deaths in 2011*
Systolic blood pressure	Decrease 0.5 mmHg	282
Total cholesterol	Decrease 0.075 mmol/L	300
Vegetables and fruit	Increase 40 g/day	337

* Assuming change is fully implemented by 2006, so allowing for a lag period of up to five years.

The estimates of avoidable disease burden demonstrate that even small improvements in risk factor exposure levels translate into important decreases in mortality. For example, if vegetable and fruit intakes were increased by 40 g/day (about half a serving), approximately 300 deaths might be avoided each year by 2011.

Options for achieving a decrease of 0.5 mmHg in mean population systolic blood pressure (2–3 mmHg in older age groups) include a general shift towards the Food and Nutrition Guidelines or a targeted effort to reduce sodium (salt) consumption. Processed foods are a major contributor of salt to the diet. One of the key recommendations from a recent international conference on the role of salt in health was a reduction in the amount of salt used in processed foods (Mac Evilly 2002).

Options for achieving a decrease of 0.075 mmol/L in mean population blood cholesterol (0.1 mmol/L in older age groups) include a general shift towards the Food and Nutrition Guidelines or a targeted effort to reduce butter consumption, a major source of saturated fat in the New Zealand diet. New Zealanders' intake of butter is high compared to that of other similar countries. Decreasing butter consumption in New Zealand to the same levels as Australia (by replacing butter with mono/polyunsaturated margarines and table spreads) could lower mean population total blood cholesterol levels by the target amount.

Evidence for effective interventions

Because of the multi-faceted nature of changing dietary habits, reports of effective interventions and programmes are limited. A number of interventions and programmes have targeted different aspects of improving nutrition.

The effectiveness of programmes to increase consumption of vegetables and fruit have been published widely. These include:

- multimedia approaches to increase awareness of the range of vegetables and fruit
- school-based programmes promoting the benefits of 5 + A DAY
- increasing availability of vegetables and fruit by ensuring appropriate meals available at restaurants
- increasing availability of low-cost vegetables and fruit to low-income communities (Anderson et al 1998).

Evaluation of programmes that increase awareness of healthy food choices, such as Pick the Tick and 5 + A DAY, have shown a 90 percent awareness of Pick the Tick and that 59 percent of consumers use it for shopping (Young et al 2002), while 5 + A DAY has a 90 percent awareness among shoppers with children (United Fresh 2001).

A review of effective interventions found that the majority of interventions in supermarkets and catering settings showed some effect on food purchases, at least in the short term. Interventions included improved identification of healthy options and accessibility to healthier versus less healthy options. Passive manipulation of the food composition decreased fat intakes of catered meals by 6–12 percent of energy (Roe et al 1997).

Settings-based interventions that had the most sustained effect on diet-related outcomes included:

- interventions based on behavioural theories rather than provision of information
- some degree of personalisation of the intervention
- the provision of feedback
- multiple contacts over a sustained period of time
- simple identification of meal-time options (Roe et al 1997).

A major review of 217 studies aimed at evaluating the effectiveness of nutrition education for the public found that the more effective programmes:

- took into account the motivations of particular population groups
- involved self-esteem and feedback
- required active participation (Contento et al 1995).

An evaluation of a number of New Zealand-based programmes found that:

- programmes that link to community aspirations and needs were likely to be more successful
- effective programmes had defined goals and were well planned
- community programmes could be enhanced when supported by programmes that operate on a national level
- school settings were ideal for reaching and influencing most young people
- strategies need to counter the influence of advertising, especially for young people (Evaluation Associates 1999).

Evaluation of Māori community nutrition programmes in New Zealand has indicated that community nutrition programmes developed and delivered by Māori resulted in a number of positive outcomes (see Chapter 6: Māori) (Moewaka-Barnes et al 1998a; 1998b; 1998c).

The price of food is an important determinant of what is purchased. The experience in New Zealand with alcohol and tobacco would suggest costs are important in determining purchasing behaviour. A number of countries apply tax incentives and disincentives to different types of foods. Trials in the US have shown that pricing strategies can promote the purchase of vegetables and fruit and low-fat snacks (French, Jeffrey et al 1997; French, Story et al 1997; Jeffrey et al 1994).

Whatever strategies are used to improve nutrition, they should be consistent with broad public health principles, and they should be sustainable long term, multi-levelled and adequately resourced. There is an ongoing need for regular monitoring and evaluation of strategies and actions to implement them.

Current and future work

The Ministry of Health purchases nutrition services throughout the country. The public health units around the country provide significant nutrition work, although this varies by region and provider. There are specific services through By Māori for Māori providers, some Pacific providers, and some non-government organisations (such as the National Heart Foundation and Agencies for Nutrition Action). The work of the food industry in nutrition promotion is significant and there are specific NGOs that bridge the work of industry and the public health sector, such as the Nutrition Foundation. The focus of all programmes to date has been promotion of the Food and Nutrition Guidelines to specific population groups.

Agencies for Nutrition Action (ANA) is a joint body comprising the key nutrition-related NGOs in New Zealand. ANA represents a strong move towards integration of effort for the promotion of healthy weight in New Zealand, and is part of the obesity coalition working towards reducing the obesogenic environment (Tasman-Jones 2002).

It is anticipated that the Ministry-funded nutrition services and programmes will continue – if not expand – in the future. There is significant scope for collaborative programmes between different sectors and between government and non-government organisations.

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2 Physical Activity

Key messages

- Be active every day for at least 30 minutes in as many ways as possible.
- Add some vigorous exercise for extra benefit and fitness.

(Refer to the New Zealand Physical Activity Guidelines, Hillary Commission 2001).

The issue

Strong research evidence has found that physical activity reduces the risk of developing or dying from many serious diseases, becoming disabled, and having accidents. In New Zealand physical activity is important for reducing the risk of cardiovascular disease (40% of all deaths), some cancers (especially colorectal and breast), type 2 diabetes, obesity, osteoarthritis and osteoporosis, depression, and falls in older people. The strongest evidence for the benefit of physical activity is in reducing the risk of morbidity and mortality from cardiovascular disease, in particular ischaemic heart disease. Individuals with moderate to high levels of physical activity or cardiorespiratory fitness have been found to have a lower mortality rate than those with less active habits (US Department of Health and Human Services 1996).

The evidence suggests that recent and ongoing participation in physical activity, rather than activity performed in the past, is required for reduction in risk of ischaemic heart disease. The relationship between physical activity and mortality seems to follow a dose-response relationship, with lower mortality occurring in the more active.

About one-third of New Zealand adults are insufficiently physically active to benefit their health (Sport and Recreation New Zealand 2002a). It is recommended that New Zealanders should undertake *at least* 30 minutes of moderate-intensity physical activity on most, if not all, days of the week. If possible, some vigorous activity would provide extra health benefit and fitness.

Current situation[2]

Sixty-eight percent of adults and young people are physically active for 2.5 hours each week (see Table 3). Ten percent of adults and 9 percent of young people are sedentary. Among young people, those aged 9–12 years are the most active. Among

[2] All the figures in this section come from Push Play III (Sport and Recreation New Zealand 2002a), which provides data and analysis from the New Zealand Sport and Physical Activity Surveys. Combined data and trend data are provided from the 1997/98, 1998/99 and 2000/01 surveys. All data in this section are from the combined surveys unless otherwise stated.

adults those aged 18–24 and over 50 years are the most active. More girls and women (36% and 34%) are inactive compared to boys and men (27% and 31%).

Table 3: Definitions of active and inactive

Physically inactive	**Sedentary** – no sports activities in the previous seven days. **Relatively inactive** – some leisure-time physical activity in the previous seven days but less than 2.5 hours.
Physically active	**Relatively active** – at least 2.5 hours but less than five hours of leisure-time physical activity in the previous seven days. **Highly active** – five hours or more of leisure-time physical activity in the previous seven days.

Māori, New Zealand European and Pacific men are similarly active, while men from other cultures[3] are less active. New Zealand European and Māori women are the most active. Māori young people (71%) and New Zealand European young people (71%) are more active than Pacific young people and those from other cultures (53% and 59% respectively).

Trend analysis shows that adults were more active in 2000/02 (70%) than they were in 1997/98 (67%), resulting in around 150,000 more adults being active. Physical activity levels for young people have declined from 69 percent in 1997/98 to 66 percent in 2000/01, especially among boys, Māori and Pacific young people, and young people aged 5–8 and 13–15 years of age.[4]

Activity levels for young people vary across the country, but there is little regional variation for adults.

Those who have no qualifications are more likely to be sedentary than those with school and post-school qualifications (Ministry of Health 1999b).

While 68 percent of adults are active for 2.5 hours per week, when regularity of physical activity is taken into account (ie, the proportion of adults who are active for at least 30 minutes per day on five or more days), only 39 percent of adults are sufficiently active. This result accords closely with the 1997/98 New Zealand Health Survey results on regular physical activity (40%) (Ministry of Health 1999a).

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[3] 'Other cultures' refers to all people who do not identify themselves as Māori, European or Pacific peoples.

[4] Although indications are that fewer young people are active, there is no actual reduction in numbers over the surveys due to changes in population structure.

Burden of disease

Physical inactivity comes second only to smoking as a modifiable risk factor for poor health and is associated with 8 percent of all deaths. Physical inactivity is estimated to account for over 2600 deaths per year, amounting to 29,000 years of life lost per year. A 10 percent increase in participation in physical activity could result in 600 fewer deaths per year (Ministry of Health 1999a).

Barriers to physical activity

The New Zealand Sport and Physical Activity Survey has found that over half the adults (57%) and 62 percent of young people interviewed would like to be more active (Sport and Recreation New Zealand 2002a). A concern is that young people's interest in participating in a new sport or active leisure activity has decreased since 1997/98. Sedentary people are the least likely to want to be active, while people who are doing some activity, but less than 2.5 hours per week, show most interest in increasing their activity levels (National Health Committee 1998). However, a number of barriers or perceived barriers exist to reduce a person's physical activity, including:

- *personal/social barriers:* cultural and social perceptions, disability and health status, time commitments, lack of people to be active with, having young children or caring for others, lack of knowledge about activities, language, feelings of inadequacy, fear, and lack of motivation
- *structural or environmental barriers:* transport, location, personal safety, access, workplace, school and facilities
- *interpersonal barriers:* social interactions and family, friends and others, such as family commitments (Genet 2000).

Perceptions of appropriate activity can differ by gender, age, weight, marital status, family responsibility, disability and socioeconomic factors.

What type of physical activity

While sport and recreational activity are to be encouraged, there are also considerable benefits to be gained from incidental, transport and occupational activities. These may include taking the stairs instead of the lift, walking or cycling to work, household chores, and manual labour (if able). These activities need to be promoted as lifetime activities to achieve the greatest benefits. The physical and social environment must support these activities, by providing street lighting, secure cycle lanes, showers and storage places in workplaces, etc. Incidental activity becomes more difficult for those with a disability and changes may be required to support disabled people to be active.

The type of activity most appropriate for an individual will depend on their social and personal preferences, physical abilities and limitations, time, environment, social circumstances, access to facilities, and what they hope to achieve through being active.

How much physical activity

The current guidelines for physical activity (Hillary Commission 2001) recommend at least 30 minutes a day, on most if not all days of the week, for health gains. This activity should be of moderate intensity, such as brisk walking that makes you breathe somewhat harder than normal. However, there is good evidence that further health benefit can be obtained by increasing the time spent being active (IARC 2002) and by adding in some vigorous activity. Vigorous activity is activity that makes you huff and puff, such as running, cycling uphill, or walking briskly up stairs. Activity can be accumulated over the course of the day to reach your daily total, a concept known as snacktivity.

Effect of activity on disease

While current Sport and Recreation New Zealand (SPARC) guidelines for physical activity (Hillary Commission 2001) recommend at least 30 minutes of moderate-intensity physical activity on five or more days of the week, this may not be appropriate for all health conditions. Physical activity can be aerobic or anaerobic, weight-bearing or non-weight-bearing, strength or resistance activity. Activity can be undertaken at light, moderate or vigorous intensity, and can be short-term, sustained, or life-long. This section briefly outlines the recommended activity/activities to reduce the risk of, or improve, outcomes for a number of health conditions, based on recent research.

- *Alzheimer's disease:* regular, moderate aerobic activity is associated with a reduction in the risk of developing Alzheimer's disease (Yoshitake et al 1995; Laurin et al 2001).
- *Anxiety:* any activity that is acceptable, appropriate, and self-chosen by an individual should reduce anxiety, especially if it is maintained on a long-term basis (Scully et al 1999).
- *Asthma:* there is some evidence that physical fitness is associated with a reduced risk of adult-onset asthma (Huovinen et al 2001; Rasmussen et al 2000), so activity for the prevention of adult-onset asthma should be moderate to vigorous intensity.
- *Coronary heart disease*: aerobic activity is important for the prevention and control of coronary heart disease (Sherman et al 1999). A dose-response relationship exists, with increasing benefits obtained through increasing intensity (Manson et al 1999; Ades and Coello 2000), and duration (Hakim et al 1999). Activity should be performed regularly.
- *CORD (chronic obstructive respiratory disease):* regular aerobic activity may result in improvements in ventilation, oxygen consumption and dyspnoea in people with CORD (Mink 1997; Weiner et al 2000). Strength or resistance training may also be useful to reduce muscle fatigue (Mink 1997).
- *CVA (cerebrovascular accident, or stroke):* aerobic activity (particularly vigorous activity) in middle-aged and older adults is associated with a reduction in the risk

of ischaemic stroke (Ellekjaer et al 2000; Hu et al 2000). Stroke risk decreases with increasing intensity of aerobic activity (Hu et al 2000), so some vigorous activity is recommended.

- *Cancer:* aerobic activity reduces the risk of colon and breast cancer (Batty and Thune 2000; Marrett et al 2000; IARC 2002). Recent evidence suggests that 45–60 minutes of moderate to vigorous activity is required to protect against colorectal cancer (IARC 2002). For cancer of the endometrium and prostate, there is limited evidence for a cancer-preventive effect of physical activity (IARC 2002).
- *Depression:* regular aerobic activity of light or moderate intensity can improve mood in those with major depressive disorders (Dimeo et al 2001) and reduce the risk of depression in others (Morgan and Bath 1998).
- *Diabetes:* regular moderate-intensity physical activity reduces the risk of developing type 2 diabetes (Perry et al 1995; Manson and Spelsberg 1994; Hu et al 1999) especially in those at high risk (Tuomilehto et al 2001). Physical activity should be coupled with a healthy diet and nutritional advice.
- *Hypertension:* aerobic activity can reduce blood pressure in the short term, and in the long term if activity level is maintained (Hagberg et al 2000).
- *Longevity:* a life-long commitment to a high level of physical activity in terms of frequency and duration, and to a lesser extent intensity, can improve disability-free life years and life expectancy (Ferrucci et al 1999; Leveille et al 1999).
- *Obesity:* regular, moderate-intensity physical activity aids in the prevention, maintenance and treatment of obesity (Grundy et al 1999).
- *Osteoarthritis:* both resistance and selected aerobic activities (high-impact activities may not be appropriate) can be of benefit in osteoarthritis, and represent a cost-effective means of improving symptoms and function if activities are maintained (Kovar et al 1992; Sevick et al 2000).
- *Osteoporosis:* moderate and vigorous activity is recommended for children to increase bone mass and strength, and in asymptomatic adults to help preserve bone density and reduce fracture risk. Modified physical activity is recommended in those with osteoporosis to improve posture and muscle strength, and to maintain bone mass (Forwood and Larsen 2000).
- *Pregnancy:* moderate-intensity physical activity during pregnancy is important for fetal wellbeing (Clapp et al 2000), although most studies have only examined the effects of activity in healthy pregnant women.
- *Stress:* any leisure-time physical activity that an individual finds enjoyable may reduce subjective stress. The intensity of the activity is not important for stress reduction (Carmack et al 1999).

Vulnerable or priority groups

While all New Zealanders can benefit from participating in more physical activity, the greatest potential benefits will occur by focusing on the following groups.

Sedentary individuals

Ten percent of adults do no physical activity. Māori (12%) and people from other cultures (17%) are more likely to be sedentary. Thirty percent of women from other cultures are sedentary. While the greatest potential health gains could be made among the sedentary groups, they are also the hardest groups to get active.

Older people

The number of people aged 65 plus will increase significantly over the next 20 to 50 years. Improving the physical activity levels of older people can have significant health, social and economic benefits, including reduction in the incidence and prevalence of common chronic conditions among this age group (eg, osteoarthritis, osteoporosis, some cancers, cognitive decline). The National Health Committee (1998) noted that osteoarthritis is the leading cause of limitation of activity in older people. Osteoporosis also results in considerable burden of disease in older people. Related to these conditions are falls in older people, which result in considerable health costs and loss of independence (National Health Committee 1998).

Children and adolescents

Although young people are among the most active, levels of physical activity reduce by school-leaving age. Pacific boys and girls aged 5–17 are more likely to be inactive. Physical activity participation has declined among young people aged 5–17 years (Dawson et al 2001).

Those at risk of and experiencing chronic conditions, diseases or disabilities

This includes especially cardiovascular disease, obesity, type 2 diabetes, depression, osteoarthritis, and osteoporosis. It is estimated that approximately 20 percent of people have already developed chronic diseases and require special health care interventions, including safe and appropriate physical activity. A number of studies have shown that leisure activities of people with intellectual disability are unlikely to include participation in physical activity (Rimmer 2000). Also, low levels of cardiovascular fitness are more prevalent than in the general population (Fernhall 1993).

Pregnant women and women with young children

Physical activity levels tend to drop during pregnancy and may often not increase after birth due to the constraints of caring for small children (Genet 2000). Appropriate physical activity may assist in a healthy pregnancy and delivery and in returning to pre-pregnancy weight.

Evidence of effective interventions

The evidence for the benefits of physical activity is clearly increasing, although the evidence for the effectiveness of specific interventions is developing more slowly. There are a number of international interventions where there is adequate evidence to support effective ways of increasing physical activity, with some common elements. These include:

- getting political endorsement and commitment at a national level, but with the recognition that the promotion of physical activity is the responsibility of a wide range of government and non-government agencies
- the creation of, or enhanced access to, places for physical activity combined with informational outreach activities – this includes creating walking paths, reducing barriers (eg, fees, or providing time) in a range of settings including the workplace, community and schools
- community-wide campaigns – interventions can include support and self-help groups, counselling for physical activity, risk factor screening, community events and the creation of walkways
- point-of-decision prompts to encourage stair use – motivational signs placed close to lifts and escalators to encourage stair use can increase stair use by over 50 percent, and ethnic-specific messages can be more effective than generic messages for some population groups
- individually adapted health-behaviour change programmes – these can include goal-setting, self-monitoring, building social support, behavioural reinforcement, problem-solving, and relapse prevention
- school-based physical education programmes – modified curricula and policies to increase physical activity for all, such as increasing the amount of physical education time, can increase activity
- social support interventions in community settings – these programmes focus on building, strengthening, and maintaining social networks, such as walking groups
- encouragement of mainstream and specialised sport and recreation opportunities.

(Task Force on Community Preventive Services 2001; National Health Committee 1998).

Within New Zealand, Green Prescriptions are an example of an individually adapted behaviour change programme. Green Prescriptions are a health practitioner's written advice for a person to be active. Free follow-up is available through regional sports trusts. A randomised control trial found that a green prescription significantly increased the number of people engaging in recreational physical activity relative to people receiving verbal advice only (Swinburn et al 1998).

SPARC's Push Play physical activity awareness campaign, which promotes the 30 minutes physical activity message, has been running since 1999. The campaign appears to be more successful than similar campaigns internationally. Recognition of the television advertisements is relatively high, reaching 66 percent in 2001. From

1999 to 2002 recognition of the Push Play logo has risen from 24 percent to 52 percent. Up to 51 percent understood that the key message was to do more physical activity (Sport and Recreation New Zealand 2002b), and 5 percent of people said they have actually done more physical activity after having seen the advertisements.

An example of a social support intervention that has been evaluated is the Hikoi 2002 (Wehipeihana and Burr 2001). Modelled on the National Heart Foundation's Stroll, Strut, Stride programme, Hikoi encourages people to walk with their whānau, making it fun to lose weight and get fitter. The number of teams participating increased from five in 1995 to 82 in 2002 (approximately 800 people).

There are a number of other possible areas where interventions could be effective. However, some have not been evaluated or there is insufficient evidence to demonstrate an effect at this stage.

Current and future work

The *Joint Policy Statement on Physical Activity* (Minister of Health and Minister of Sport, Fitness and Leisure, 1999) encourages intersectoral efforts to improve physical activity across a wide range of government and non-government agencies and organisations. Promotion of physical activity is currently led by Sport and Recreation New Zealand (SPARC), which co-ordinates a number of national and local programmes (such as Green Prescriptions and Push Play, KiwiSport, KiwiWalks, KiwiSeniors, and He Oranga Poutama), which aim to get more people more active.

The Ministry of Health purchases nutrition and physical activity services throughout the country. Public health units account for half of the current expenditure, and services are also provided through By Māori for Māori providers, some Pacific providers, and non-government organisations (eg, the National Heart Foundation).

Encouraging and supporting New Zealanders to be more physically active requires the commitment of a number of key sectors. These include recreation, sport, education, transport, environment, health and media. Settings include preschool, kohanga reo / language nests, schools, tertiary institutions, marae, churches, homes, workplaces, public facilities, and the physical environment, including parks, roads, footpaths, gymnasiums and other physical activity facilities, cycleways and communities.

Interventions to increase physical activity range from those focused on the individual to those targeting communities and populations. These include advocating for and developing healthy public policy, public education (including media campaigns), personal skill development, empowering communities to be more physically active through community development initiatives (eg, establishing walking groups and exercise classes), exercise prescription in primary healthcare, and improving the physical environment. Local councils in particular play a very important role in terms of providing safe and accessible environments for physical activity (eg, swimming pools, parks, cycleways, skateboard parks, street lighting, etc).

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3 Obesity

Key Messages

- Aim to maintain a healthy weight throughout life.
- Promote and foster the development of environments that support healthy lifestyles.

The issue

Obesity is a major and growing global public health problem. New Zealand along with many other countries is considered to be in the throes of an obesity epidemic. More than 1000 people die each year from obesity-related health problems (Ministry of Health 1999), more than double the annual road toll (Land Transport Safety Authority 2003). The annual cost of obesity to the New Zealand health sector was conservatively estimated to be around $135 million per year in 1991 (Swinburn et al 1997). This figure was arrived at using 1991 data on the health care costs of six conditions related to obesity. This was 2.5 percent of health expenditure in 1991. Using this percentage attributable to obesity, the cost in 2000/01 would be $247.1 million per annum.[5] The World Health Organization (WHO) has estimated that the cost of obesity for a country is 2–7 percent of the annual health budget, which equates to $303 million in New Zealand (WHO 2000).

Current situation

Causes of obesity

Obesity is a condition in which the fat stores (adiposity) are excessive for an individual's height, weight, gender and race to an extent that it produces adverse health outcomes. Excessive adiposity results from an imbalance in energy such that energy intake (food and beverages) either has been or is greater than energy expenditure (physical activity). Accumulation of fat around the abdomen, in particular, increases the risk of obesity-related disease. Men have twice the amount of abdominal fat that is generally found in pre-menopausal women, as oestrogen appears to be protective against abdominal fat deposition (WHO 2000). However, after menopause body fat distribution in women more closely mirrors fat distribution in men and the risk of obesity-related disease increases (Caterson 2002; Tchernof and Poehlman 1998).

Obesity has been described as 'a normal response to an abnormal environment' (Swinburn et al 1997). Current environmental factors are conducive to more sedentary lifestyles at work and during leisure hours. For many people, lives are

[5] Based on 2000/01 figures of $9.884 billion spent on health and disability support services in New Zealand.

busier with more disposable income. For others, working hours are longer, often with little or no disposable income, making less time available for leisure or other physical activities. Loss of cooking skills, easier access to food outlets, larger portion or serving sizes and easier access to pre-prepared foods which tend to be higher in fat, salt and sugar lead to a greater exposure to an energy-dense diet (Kumanyika et al 2002). Media influences, particularly television advertising, are very strong, especially on children (Borzekowski and Robinson 2001; McLellan 2002).

Measurement of obesity

Indices developed to measure obesity include:

- body mass index (BMI)
- waist-to-hip ratio (WHR)
- waist circumference.

BMI (defined as weight kg/height m^2) is the mostly widely used. The normal BMI range is 18.5–24.9. Adults with a BMI of 25.0–29.9 are considered overweight, and those with a BMI of 30 or greater are considered obese. In the NNS97 the BMI cut-off points for overweight and obesity were increased for Māori and Pacific peoples. A BMI of 32 or more was used to define obesity for Māori and Pacific people (Russell et al 1999).

There is some concern, however, that these cut-offs may not be the optimal choice for defining health risk in different ethnic groups, and further work is required here.

The association between BMI and type 2 diabetes and cardiovascular disease is continuous down to BMI values as low as 19 and 20. WHO recommends that a mean population BMI should be between 21.0 and 23.0 kg/m^2 for optimum health (WHO 2000).

Waist circumference is a convenient and simple measurement that correlates with BMI and WHR. Unrelated to height, it is an approximate index of intra-abdominal fat mass. Changes in waist circumference reflect changes in risk equivalents for cardiovascular disease and other chronic diseases (WHO 2000). Suggested cut-offs for obesity using waist circumference are men > 102 cm and women > 88 cm (Lean et al 1995).

WHR is used as a measure of abdominal obesity. In Caucasians a WHR > 0.9 for men and WHR > 0.8 for women is used to identify those with abdominal fat accumulation (Anonymous 1994).

Burden of disease

Overweight and obesity are important risk factors for a wide range of medical and psychosocial problems. A summary of the main consequences of obesity is listed in Table 4.

Table 4: Consequences of obesity

Metabolic Impaired glucose tolerance and type 2 diabetes Dislipidaemia: • increased VLDL, triglyceride, LDL cholesterol, apo B lipoprotein • decreased HDL cholesterol Metabolic syndrome – increased insulin, hypertension, raised triglyceride, reduced HDL cholesterol Fatty liver Gallstones Infertility in women
Cardiovascular Hypertension Coronary heart disease Varicose veins Peripheral oedema
Mechanical Osteoarthritis Spinal problems Obstructive sleep disorder Infertility
Social Low self-esteem Discrimination Depression
Cancer Breast Colorectal

Source: Caterson 2002; Kumanyika et al 2002

Apart from the chronic debilitating conditions that lead to disability and death, obesity can also drastically reduce an individual's quality of life (Kumanyika et al 2002). Obesity is highly stigmatised in many industrialised countries both in terms of perceived undesirable appearance and the character defects it is supposed to indicate. Obese people are likely to complete fewer years at school and are less likely to enter desirable professions (WHO 2000). The psychosocial problems associated with obesity are very much tied in with social values and social norms, and will differ significantly between and within countries and between different ethnic groups.

One of the most prevalent health consequences of overweight and obesity is type 2 diabetes. The likelihood of developing type 2 diabetes rises steeply with increasing body fatness. Approximately 85 percent of people with diabetes can be classified as type 2; of these, 90 percent are obese. People with type 2 diabetes are at high risk of a range of disabling conditions, including heart disease, hypertension, amputation, stroke, renal failure and blindness. Type 2 diabetes reduces life expectancy by approximately seven years in Europeans and 12 years in Māori and Pacific peoples (Ministry of Health 2002).

Adults

In 1997 overweight (35%) and obesity (17%) affected more than half of New Zealand adults. Māori and Pacific peoples have considerably higher levels of obesity than New Zealand Europeans (see Table 5).

Table 5: Percentage of adults classified as obese or overweight

	NZ European and Others		Māori		Pacific peoples		Total population	
	Male	Female	Male	Female	Male	Female	Male	Female
Overweight (%)	41.0	29.8	30.0	32.7	59.2	28.8	40.4	30.1
Obese (%)	12.6	16.7	27.0	27.9	26.2	47.2	14.7	19.2

Source: Russell et al 1999
Notes: Obese: BMI > 29.9 for NZ European and Others; BMI > 31.9 for Māori and Pacific peoples.
Overweight: BMI 25–29.9 for NZ European and Others; BMI 26–31.9 for Māori and Pacific peoples.

From 1989 to 1997 there was a 55 percent increase in the prevalence of obesity among New Zealand adults (Russell et al 1999).

Obesity is more prevalent among women than among men, but obesity in men is almost always abdominal, which is associated with greater health risks (Caterson 2002). According to projections, at the current rate of increase, by the year 2011 there will be a 73 percent increase in the prevalence of obesity in New Zealand – from 17 percent of the population to 29 percent (Ministry of Health 2002).

Children

New Zealand

There are no nationally representative data on rates of obesity in New Zealand children, but these data are currently being collected in the Children's Nutrition Survey.

However, a study of 2273 Auckland schoolchildren aged 5–10.9 years found 14.3 percent of children to be obese, based on heights and weights (Tyrrell et al 2001). There is also evidence that the prevalence of obesity is increasing in children and young people in New Zealand. A recent study of Christchurch children aged 10–14 years found that body weight increased in both boys and girls from 1991 to 2000 and fitness levels deteriorated significantly during the same period. Boys increased by a mean of 1.2 BMI units and girls by 1.1 BMI units (Dawson et al 2001). The authors suggested that increases in weight and decreases in physical fitness may be the result of higher levels of television watching, and greater use of computers and video games (Dawson et al 2001).

International

The limited New Zealand data on childhood obesity are consistent with overseas data. Rates of childhood obesity have more than doubled in the last 25 years in the United States, more than doubled in England in the last 10 years, and increased four-fold in Egypt over the last 18 years (Ebbeling et al 2002).

Childhood obesity is associated with a number of conditions, including hypertension, dyslipidaemia, chronic inflammation, increased blood clotting, hyperinsulinaemia, type 2 diabetes and glucose intolerance (Ebbeling et al 2002). Childhood obesity also increases the risk of adult obesity and predicts morbidity and mortality decades later. In a British cohort, overweight in childhood increased the risk of death from ischaemic heart disease in adulthood two-fold over 57 years (Gunnell et al 1998). Also, type 2 diabetes now accounts for as many as half of all new diagnoses of diabetes in some populations of children (Fagot-Campagna et al 2000).

Although some researchers suggest that breastfeeding offers protection against obesity in later life (Gillman et al 2001; Liese 2001; von Kries 2000), others argue that the results are controversial given the mixture of effects, study design and control for confounding variables. Further work is required to determine the extent (if any) of the protective effect in relation to other environmental influences.

In children one to two years old, the primary predictor of obesity in adulthood was parents' obesity status; the child's obesity status was not an indicator of the risk of adult obesity. Thus, overweight children of this age should not be targeted for intervention unless their parents are overweight. For children three to nine years of age, both the child's and the parent's obesity status were important predictors of adult obesity, although the child's obesity status became the more important predictor as the child aged. For older children and adolescents, parental obesity has a much more limited effect on a child's risk of future obesity such that decisions to treat overweight children after they reach 10 years of age can be made on the status of the child's obesity (Whitaker et al 1997).

Television viewing is thought to promote weight gain not only because it is a sedentary activity, but because consumption of energy-dense snacks increases during hours of television watching (Ebbeling et al 2002; Tanasescu 2000), and some (but

not all) suggest that resting metabolic rate is reduced (Dietz 1994). In addition, advertising could adversely affect dietary patterns (Ebbeling et al 2002), and children who watch television during meals have diets poorer in nutritional quality than children who do not (Coon et al 2001).

Increasing portion size may be important in influencing energy balance in children. Rolls et al (2000) demonstrated that four-to-six-year-old children ate a greater amount of food at a single sitting when offered larger portions of that food. Although this study only investigated the effect of one meal, portion size has also been related to increased energy intake and body weight in young children from cross-sectional survey data (McConahy 2002).

People with disabilities

Obesity is more prevalent among adults with disabilities, particularly adults with disabling sensory, physical and mental health conditions (Weil et al 2002). Estimates of the overall prevalence for obesity among people with an intellectual disability range from 29 to 50 percent (Simila and Niskanen 1991; Rubin et al 1998). Individuals with Down syndrome are 1.5 times more likely to be obese than people with other intellectual disabilities.

Other ethnic groups

Although there are limited New Zealand data on rates of obesity among other ethnic groups, anecdotal reports appear to suggest that a number of other ethnic groups, including the rapidly growing Asian populations, may also be experiencing adverse health in part attributable to a growing obesity problem. In the United Kingdom Asian men and women have been reported to have a greater degree of central obesity than Europeans (British Nutrition Foundation 1999).

Low income groups

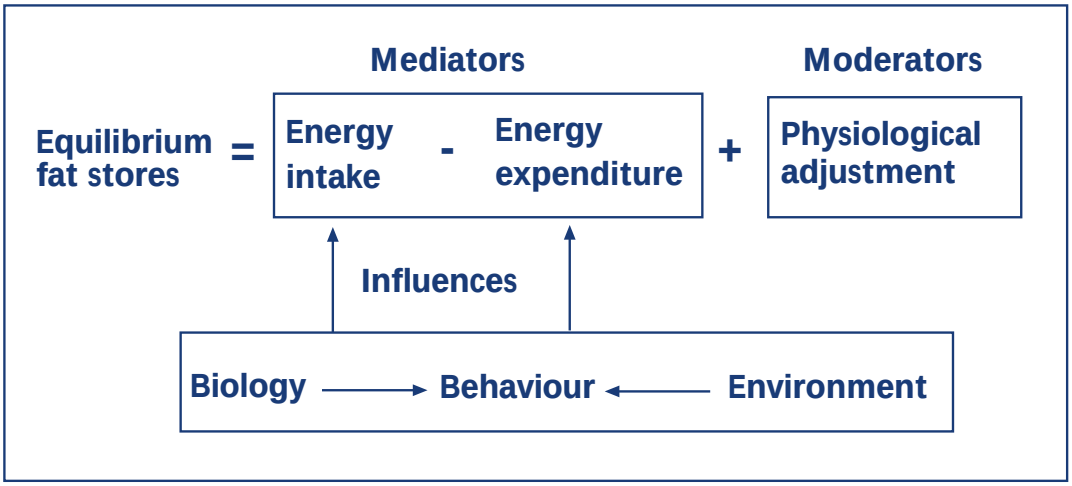
In affluent societies, obesity levels tend to be highest in the lower socioeconomic groups, especially among women (Kumanyika et al 2002). Socioeconomic disadvantage can lead to a lack of food security, which increases the likelihood of poor nutrition, overweight and obesity. Internationally the diets of households of lower socioeconomic status tend to be energy dense, and high fat intakes are a prominent feature; the more expensive vegetables, fruit and wholegrain cereals are eaten more sparingly (WHO 1997).

Results from the NNS97 identified that for females there was a strong relationship between obesity and those living in the most deprived areas. No relationship was observed in males. Women living in the most affluent areas had the lowest level of obesity (13%) but more than 25 percent of women living in the most deprived areas were obese (Russell et al 1999).

Contributors to obesity

Overweight and obesity are the result of a positive energy balance, which is a chronic excess of energy intake over energy expenditure. Although some people are genetically more susceptible to weight gain than others (Bouchard 1997), the rapid increase in prevalence of overweight and obesity during the last two decades has occurred too quickly to be explained by genetics. The real causes of obesity are still incompletely understood. However, Egger and Swinburn have proposed an ecological model to aid the understanding of obesity and overfatness (Egger and Swinburn 1997). Figure 1 gives an overview of this model, and its specific elements are described below.

Figure 1: The ecological model of the causes of obesity



Source: Egger and Swinburn 1997

Mediators

At a population level energy intake has not been reduced sufficiently to match the decrease in physical activity. The result is a large energy imbalance, with excess energy being stored as fat.

Moderators

'Physiological adjustments' are changes that follow an imbalance between energy intake and energy expenditure. A response to loss of weight may be an appetite increase, or physical activity may decrease.

The resting metabolic rate may decline until a new energy balance is achieved. A lower metabolic rate means that a person would then need less food (energy intake) to remain the same weight.

Biological influences

Factors known to influence body weight and fat levels include:

- ethnicity – some population groups appear to have a greater genetic predisposition to weight gain
- gender – women carry more fat than men
- age – maintenance of a healthy body weight becomes more difficult with age
- hormonal factors
- genetics.

These biological influences explain the variance in body fat in individuals but do not explain why obesity has recently increased so significantly at a population level.

Behavioural influences

Eating behaviour is the result of complex physiological, economic, psychological and cultural factors, including habits, emotions, conditioning and attitudes.

Environmental influences

Probably the most important cause of the rapid global rise in obesity rates lies in the profound and rapid changes to the environment and society now affecting large parts of the world.

Modernisation, urbanisation and changing occupational structures are creating societies in which physical activity levels are low and the availability of high-fat, high-sugar, energy-dense foods has increased. Populations now live in environments that inadvertently promote sedentary lifestyles and overconsumption of energy-dense foods. Maintaining a healthy weight and optimal fat stores requires considerable effort, which is difficult to maintain in an unsupportive environment.

Strategies to address environmental factors are essential because they recognise the multifactorial nature of obesity and the need to use a multitude of approaches.

Economic costs of obesity

The economic costs of obesity have been summarised as follows (Swinburn et al 1997):

- *Direct cost:* the cost to the *community* through the diversion of resources to the diagnosis and treatment of diseases related to obesity. Obesity treatments, such as drug therapy, are costly and widespread advertising increases the pressure on health professionals to prescribe drug treatment for obesity
- *Intangible cost:* the cost to the *individual* because of the impact of obesity on the quality of life generally, and on health specifically
- *Indirect cost:* the impact of the reduced quality of life on the productive potential available to the rest of society. Usually these costs are measured as lost production due to work-related absenteeism and premature death.

Scope for health gain

A Ministry of Health and Auckland University study (in preparation) estimated that in 1997 a total of 3155 deaths in adults aged 25 years and over (12 percent of all deaths) were attributable to higher than optimal BMI. The study also estimated that 384 deaths, summed across all diseases, could be avoided each year by 2011 if initiatives were introduced now to limit the increases in BMI projected based on historical trends (ie, a 0.3% increase in BMI per year instead of a 0.4% increase per year). It should be remembered that the avoidable burden is measured as deaths avoided in a particular year (2011), not cumulative deaths avoided over a period of years. The only way to limit the increase in BMI is to reduce energy intake (food and beverages) and increase energy expenditure (physical activity). Changes to the food and physical environments will be necessary for this to be achieved.

Appropriate body weight

While health concerns about the growing rates of obesity abound, there remain serious health consequences associated with underweight. There are vulnerable sectors of the population for whom messages about body weight become distorted in an attempt to attain the perfect body. Eating disorders particularly affect young women but are also of concern for males. Eating disorders can significantly impact on the lives of people for many years, and in severe cases can result in death (Austin 1999). The development of any focused actions on overweight and obesity must be mindful of those susceptible to eating disorders.

Treatment and management of obesity

Many treatment strategies for overweight and obesity have not adequately addressed the continuing global increase in obesity. A recent review of the management of overweight and obese adults identified that many health care professionals fail to address obesity. The reasons claimed include cynicism about effectiveness of weight loss treatments, perceived non-compliance of obese individuals, and general lack of training in counselling and behaviour modification by health care professionals (Noel and Pugh 2002).

There is limited evidence to support sustained, effective, weight-loss programmes. However, evidence from randomised controlled trials indicates that international weight-loss and lifestyle interventions can help prevent and control chronic illnesses, such as type 2 diabetes and cardiovascular disease (Knowler et al 2002; McAuley et al 2002). A number of recent guidelines and recommendations by health professional organisations recommend weight reduction for obese and overweight patients who have obesity-related co-morbidities (Nawaz and Katz 2001; National Audit Office 2001; National Taskforce on the Prevention and Treatment of Obesity 2002).

Restricting energy intake and increasing physical activity are key in most weight loss strategies. Pharmacotherapeutics can assist with modest weight loss and maintenance in obese people. Surgical procedures can be effective, but should only be considered for people with severe or morbid obesity (National Institute of Health 1998).

Skills and training in behavioural modification and ongoing support are key elements in any weight-loss and management approach.

Obesity management covers long-term strategies, ranging from prevention, through weight maintenance and the management of obesity co-morbidities, to weight loss. A co-ordinated approach requires close collaboration between the public health and primary care settings as well as co-ordination with other sectors, including the food, weight loss, and fitness industries.

The treatment and management of obesity in children is even more difficult. Most efforts to reduce obesity in children have focused on family-based or school-based interventions, with limited long-term success, though pharmacological and surgical treatments are also available (Epstein et al 1998; Ebbeling et al 2002).

Evidence for effective interventions

The prevention and treatment of obesity are complex. Treatment of obese individuals has enjoyed little long-term success (Crawford 2002). There has been very little emphasis on public health interventions to prevent obesity, and little evaluation of what has been trialled (WHO 2000). This lack of an evidence base is problematic. However, the fact that obesity rates are rising rapidly and unchecked in almost all parts of the world casts doubt on whether it is possible to prevent excessive gains in body weight in the long term. Indirect evidence that obesity-prevention strategies can play a positive role in combating the escalating problem of obesity is therefore of particular importance, and comes from a variety of sources.

For a start, obesity rates are still low in a number of populations around the world and many people are able to control their weight successfully over long periods. Also, although there has been a consistent secular increase in obesity rates in most countries, such increases in body weight often vary in magnitude between sexes and social classes. This suggests there are environmental conditions as well as genetic factors that can protect populations, and individuals within populations, from excessive weight gain (WHO 2000).

It is also of interest that the dramatic increase in obesity rates has followed the pattern of similar epidemics of non-communicable diseases such as coronary heart disease, which are now abating in countries where preventive strategies have been adopted. Comprehensive obesity prevention programmes have been introduced very recently in Singapore and a few other countries, but there has been insufficient time to evaluate their long-term success.

It is important to recognise that the concept of obesity prevention does not simply mean preventing normal-weight individuals from becoming obese, but also encompasses a range of strategies that aim to prevent:

- the development of overweight in normal weight individuals
- the progression of overweight to obesity in those who are already overweight
- weight regain in those who have been overweight or obese in the past but who have since lost weight.

It seems that the most realistic approach is to try to slow the rate of weight gain in the population. The WHO considers the only effective means of tackling the obesity epidemic is through a combination of environmental, social and behavioural interventions (WHO 2000).

Current and future work

The Ministry of Health has developed a toolkit to provide DHBs with contextual information and practical advice on key interventions to best reduce obesity (Ministry of Health 2001). This toolkit is used in the development and implementation of services to help prevent and reduce obesity and promote the benefits of a healthy body weight.

The Ministry has commissioned an evidence-based review of international programmes targeting obesity (Hider 2001), which has been used in policy development work.

The Ministry purchases services from Agencies for Nutrition Action (ANA), a national organisation comprising the major NGOs that work to improve health status through advocating for the improvement of nutrition, an increase in physical activity and the reduction of obesity. *Healthy Weight New Zealand 2001* is a report produced by ANA to provide an update of the current scientific understanding of weight as an index of health and health risk (Agencies for Nutrition Action 2001). It is a resource to assist in public health promotion.

Recently (2002) the Ministry has supported the establishment of an obesity coalition to advocate actions that may help reduce the rates of obesity. The membership and future direction of the coalition are currently being developed.

There is likely to be a focus for future public health services in population-based programmes that support the promotion of a healthy body weight and reduction in obesity. There is significant scope for co-ordinated programmes between government and non-government groups and across the different sectors. The potential role of the food, weight loss and fitness industries in such programmes is well recognised. Programmes and services that are appropriate for Māori and Pacific peoples will be supported because of the significant disproportion of these groups affected by obesity and overweight.

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4 Māori

The issue

Māori are more likely than non-Māori to experience poor health as a consequence of inappropriate nutrition. There could be significant health gains if Māori were able to eat well, and if there were fewer barriers to regular physical activity.

The Treaty of Waitangi

Māori health needs to be understood in the wider context of the social, economic, cultural and political position of Māori. Integral to working with Māori is an understanding of the special relationship between iwi and the Crown, and the Treaty of Waitangi. The Crown recognises the three guiding principles of the Treaty of Waitangi as the basis of any health strategies for Māori. The three principles are:

- partnership – working together with iwi, hapū, whānau and Māori communities to develop strategies for Māori health gain, and appropriate health and disability services
- participation – involving Māori at all levels of the health and disability sector, in decision-making, planning, development and delivery of health and disability services
- protection – ensuring that Māori have at least the same level of health as non-Māori and safeguarding Māori cultural concepts, values and practices (Ministry of Health 2002a).

Māori models of health

Māori approaches to health are primarily based on the view that hauora, or holistic health, is the product of wellbeing at a physical, spiritual, psychological and social level. There are many Māori models of health in use that encompass this approach, including Te Whare Tapa Whā (the four cornerposts of health [Pōmare et al 1995]), Te Pae Mahutonga (the Southern Cross [Durie 1999]), and Te Wheke (the octopus [Pōmare et al 1995]), to name but a few. Public health services being delivered to Māori need to reflect an understanding of hauora Māori and approaches that appropriately address Māori health needs. *He Korowai Oranga: Māori Health Strategy* (Minister of Health and Associate Minister of Health 2002a) aims for whānau ora: Māori families being supported to achieve their maximum health and wellbeing, and identifies four pathways that need to be addressed in order to progress whānau ora:

- Development of whānau, iwi and Māori communities.
- Māori participation in the health and disability sector – active participation by Māori at all levels of the health and disability sector.
- Effective health and disability services ie:

  - timely
  - high quality
  - effective
  - culturally-appropriate services to improve health and reduce inequalities.
- Working across sectors – with the health and disability sector taking a leadership role across Government sectors and Government agencies to achieve whānau ora by addressing the broader determinants of health.

Whakatātaka: Māori Health Action Plan 2002–2005 (Minister of Health and Associate Minister of Health 2002b) is the implementation plan for *He Korowai Oranga*, and provides a framework and specific priority action areas to improve Māori health outcomes over the next two to three years.

Current situation

Current status of Māori nutrition, physical activity and obesity

Obesity rates among Māori are higher than among Europeans: 57 percent of adult Māori men and 60 percent of adult Māori women are either overweight or obese. The men predominantly have abdominal obesity and therefore have a higher risk of poor health (Russell et al 1999).

Māori tend to have higher mean dietary energy intakes from fat than non-Māori, particularly saturated fats. Māori women have higher total sugar and sucrose intakes than non-Māori women.

Some of the food choices may reflect socioeconomic factors. A significant number of Māori report they could afford to eat properly only 'sometimes', and 20 percent of Māori women reported that their households used foodbanks or grants to provide food. People living in more deprived areas, in particular Māori, were most likely to have poor nutrition, and not be meeting the Ministry of Health's Food and Nutrition Guidelines, and to report running out of food or being unable to eat properly because of lack of money (Russell et al 1999).

Māori consultation has also identified that geographical isolation is an important barrier to enabling access to appropriate food and physical activity facilities.

Māori rates of 'full' breastfeeding are lower than those for European or Pacific New Zealanders (see Chapter 1: Nutrition). The validation phase of the Child Nutrition Survey also supports concerns that poor nutrition and obesity are significant problems for Māori children (Chal 2001).

A Hillary Commission survey found that Māori and non-Māori are about equally

active, and that Māori children are much more likely than non-Māori or other ethnic groups to be regularly active. However, more Māori than non-Māori are 'sedentary' (Hillary Commission 2000).

Te Puni Kōkiri has found a number of barriers for Māori wanting to increase activity levels. In addition to cost, transport difficulties, work and whānau commitments, and lack of childcare, a number of other separate issues were raised, including:

- lack of whānau support for Māori women taking time out of childcare for active leisure
- lack of appropriate programmes for Māori
- whakamā (sense of shame or embarrassment)
- low self-esteem
- communication difficulties
- transience due to seasonal work
- perception of cost
- low awareness of the impact on their own lives, and of the facilities and opportunities available (Te Puni Kōkiri 1995).

Changes in Māori diet and activity over time

The traditional diet of pre-European Māori society was high in complex carbohydrates such as kūmara, and major sources of protein were from fish and birds. Foods with a high fat content, or which were considered delicacies, were not usually consumed on a regular basis, but were saved for special occasions or people, such as pregnant or breastfeeding women (Pōmare et al 1995). People needed to work hard to gather and prepare food, and there were times when food supplies were inadequate.

The impacts of colonisation on Māori include the change to increased consumption of fatty and salty meats (eg, mutton, salt pork) and the addition of sugar, tea and potatoes, as well as the introduction and promotion of tobacco and alcohol consumption. Māori dietary patterns have also been affected by the loss of mahinga kai (traditional food-gathering areas), especially the destruction of forest, the pollution of coasts, rivers and lakes, and the decline in many traditional food species (Pōmare et al 1995). The ability of Māori to observe traditional diets has further been eroded by pressure on maitaitai (seafood) stocks with the advent of extensive commercial and recreational fishing, and the loss of those skilled in the practices of traditional food collection, preparation, and storage (Institute of Environmental Science and Research 1998).

Physical activity patterns for Māori have also changed over time, with changes in occupational activity levels, urbanisation, the introduction of non-traditional sports and recreational pursuits, and the introduction of vehicles and other labour-saving devices.

Burden of disease

Health problems related to poor nutrition, obesity and lack of physical activity include cardiovascular disease, type 2 diabetes, and some cancers (eg, colorectal). Māori men and women die from coronary heart disease at more than twice the rate of their non-Māori peers (Ministry of Health 1999).

Obesity is of greatest significance for type 2 diabetes: at least one-third of all diabetes-related deaths are attributable to obesity, and this proportion is much higher for young Māori (Swinburn et al 1997). Māori also suffer higher rates of type 2 diabetes than the general population. Ministry of Health modelling on the lifetime risk of being diagnosed with type 2 diabetes estimates that the risk is 9 percent for Europeans, 25 percent for Pacific people and 30 percent for Māori. The number of people in the total population known to be living with diabetes is expected to rise 80 percent between 1996 and 2011, but the expected rise for Māori and Pacific peoples is 130–150 percent (Ministry of Health 2002). For all-case mortality, approximately 11 percent of all Māori deaths in the 45–64 years age group are attributable to obesity, compared with 6–7 percent for non-Māori (Swinburn et al 1997).

Evidence for effective interventions

Effective interventions for Māori need to recognise the interdependence of people, that the 'collective' and individual wellbeing of Māori are equally important and the need to work with people in their social context beyond the treatment of physical symptoms (Minister of Health and Associate Minister of Health 2002a).

To improve Māori health, effective interventions will need to:

- incorporate the principles of the Treaty of Waitangi
- recognise the needs of Māori
- recognise the cultural diversity of Māori
- recognise the role of whānau
- build on successes of previous interventions.

Nutrition initiatives

Since 1994 the Government has funded four Māori community nutrition initiatives, which were set up by iwi and Māori organisations in collaboration with health agencies and aimed at 'improving nutrition at a community level by training community workers in basic food and nutrition' (Moewaka Barnes et al 1998a; 1998b; 1998c; Pipi et al 1994; Tunks et al 1998). All the initiatives were based on strong community development approaches.

The evaluations found that all of the community nutrition programmes achieved a great deal of Māori community involvement, empowerment and sense of local ownership. There was significant change in each community's awareness of

nutrition issues, and some changes in eating habits and in the kind of food provided at social gatherings. In the Tairāwhiti pilot, for instance, there were significant changes in food offered at participating marae, with more wholemeal bread, fruit, vegetables, lean meat, cereals and water being available. There were also spin-off benefits, such as the extension of smokefree initiatives and safer food-handling practices (Maskill and Hodges 2001).

Physical activity initiatives

He Oranga Poutama is a By Māori for Māori initiative developed by the Hillary Commission in conjunction with communities, and supports 20 kaiwhakahaere who work with iwi in developing programmes and events, mostly carried out on the marae. This was evaluated in 1998 and 2001 (Cram and Pitama 1998; Pitama and Ahuriri-Driscoll 2001). He Oranga Poutama is not a 'brand'-based programme, nor does it have any media campaign associated with it, and at present it does not cover the entire country. It is also intended as a vehicle for other health messages, such as 'auahi kore' (Māori smokefree programme).

Hikoi is another example of an innovative Māori initiative (see Chapter 2: Physical Activity), which builds on Māoritanga and specifically whānaungatanga by encouraging people to walk with their whānau. Evaluations have shown a high and increasing level of participation (Wehipeihana and Burr 2001).

There is a lack of research relating to the effectiveness of physical activity programmes that target Māori, and also resurgence of traditional activities such as waka ama and kapa haka.

Current and future work

Although there is a limited pool of qualified Māori nutritionists/dietitians, there is an increasing number of Māori community health workers who have some working knowledge of both nutrition and health promotion. A number of programmes are available for training community workers in nutrition, such as those run by Te Hotu Manawa Māori and specific community nutrition-based pilot programmes, which have all been evaluated comprehensively. These programmes work on a train-the-trainer type of approach and have focused on both rural and urban Māori communities (see 'Nutrition initiatives' above). There are also a number of publicly funded Māori health promotion services around New Zealand, which have a specific focus on nutrition and physical activity in Māori communities.

There is an issue of limited resources that are appropriate for Māori, which requires attention along with development of appropriate programmes and training.

Current services and programmes are based on promoting the Food and Nutrition Guidelines, and have begun to address the need for promoting improved nutrition, increased physical activity and maintenance of a healthy body weight for Māori, but these need to be supported by further development of initiatives and programmes that encourage Māori to participate in the planning and delivery of nutrition and

physical activity services at a community level. Such programmes should focus on increasing access to nutritious foods and opportunities for physical activity among Māori.

A significant factor in improving nutrition and increasing physical activity for Māori is the development of a comprehensive Māori public health workforce, and future work should support the development of By Māori for Māori approaches to nutrition and physical activity. There is also a need for mainstream providers to address responsiveness to Māori in programme development, implementation and evaluation.

Monitoring and evaluating Māori-specific and mainstream programmes and services is essential to ensure they are effective and to build a more robust research base. Improved data collection is important for building a better picture of the nutrition, activity and health status of Māori and to measure trends over time. In many cases this will require Māori-specific approaches. For example, the validation phase of the New Zealand Sport and Physical Activity Survey has a particular focus on establishing the energy and intensity involved in a number of Māori activities, and optional surveying using te reo Māori.

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5 Pacific Peoples

The issue

The term 'Pacific peoples' refers to populations of Pacific Island ethnic origin (Samoan, Cook Island Māori, Tongan, Niuean, Fijian and Tokelauan are the six main ethnic groups). It incorporates Pacific people born in New Zealand as well as in the Pacific Islands (Statistics NZ 2002).

Pacific populations in New Zealand are heterogeneous and culturally diverse, with different ethnic groups having their own language, customs and traditions. Pacific peoples do, however, share a common migration and assimilation history in New Zealand (Ministry of Health 1997).

In the 2001 census, one in sixteen people in New Zealand were of Pacific ethnicity. This is an increase of 39 percent from the 1991 census. Pacific children under 15 years of age made up 40 percent of the Pacific population (Statistics NZ 2002).

A significant number of Pacific people are affected by lifestyle-related diseases. In particular obesity, diabetes mellitus, hypertension and heart disease are more common among Pacific peoples than among the Palagi/European population, and sometimes more common than among Māori (Scragg et al 1991).

The Pacific concept of health

For Pacific peoples, health is a holistic concept which encompasses spiritual, emotional, mental, physical and social wellbeing. The emphasis is on the total wellbeing of the individual within the context of the family. The family includes both the nuclear family and the extended family (Ministry of Health 1997).

Impact of migration and urbanisation

Traditionally, the diet of Pacific peoples consisted mainly of coconuts, starchy root vegetables, fish, fruits, and occasionally chicken and pork (Pollock 1992). The dietary changes that have accompanied migration and urbanisation include an increase in the proportion of energy supplied by fats, animal proteins and refined carbohydrates, higher intakes of sodium and cholesterol and lower intakes of dietary fibre (Simmons 1996; Tukuitonga and Finau 1997; Ministry of Health 1997).

The sedentary lifestyle and factory work in the new environment has replaced the more physically strenuous jobs in the island (Simmons, Fleming et al 1994). In the New Zealand Health Survey 1997, 42 percent of Pacific peoples were considered physically inactive compared to 38 percent of Europeans (Ministry of Health 1999).

Food, obesity and Pacific culture

Food has a central role in the life of Pacific peoples. Pacific peoples tend to see food as something to enjoy rather than as a source of nutrients needed to keep them healthy. Food is a vehicle to show love and respect, to express hospitality, and to bring people together. Some foods are associated with wealth and prestige, such as taro, yams, pork, fish and povi masima (corned beef). Feasting is an important cultural ritual in Pacific communities, serving as a focus and venue for family, community and social exchange. The concept of food being associated with increased risk of developing adverse health problems is foreign to most Pacific people (Ministry of Health 1997; Hodge et al 1996; Moata'ane 1999).

Obesity among Pacific populations was traditionally regarded as a symbol of high social status and prosperity. Among Pacific people obesity was shown to be positively and independently associated with age, urban residence, high occupational status and higher educational attainment (Hodge et al 1996).

Current situation

Obesity in Pacific adults is very high when compared with the general New Zealand population: 26 percent of Pacific men and 47 percent of Pacific women are obese. An estimated 75 percent of Pacific people in New Zealand are overweight (Russell et al 1999).

Pacific peoples are over-represented in non-communicable disease morbidity and mortality data in New Zealand. The high incidence of these diseases, particularly coronary heart disease and type 2 diabetes, among Pacific peoples is largely preventable and is closely linked to the impact of low socioeconomic status, westernisation, and the subsequent change of lifestyle in their new environment (Simmons 1996; Simmons, Fleming et al 1994; Tukuitonga and Finau 1997; Ministry of Health 1999).

The 1997 National Nutrition Survey (NNS97) showed that Pacific peoples were more than twice as likely to have been diagnosed with type 2 diabetes, and were diagnosed at a younger age, than Europeans (Russell et al 1999). Type 2 diabetes is projected to increase in prevalence by 105 percent over the next 20 years among Pacific peoples (Diabetes New Zealand 2001). It is also possible that genetic factors may predispose Pacific peoples to increased risk of developing diabetes and coronary heart disease (Simmons, Gatland et al 1995).

Other large studies have found that Pacific peoples have multiple cardiovascular risk factors compared to European New Zealanders (Bullen et al 1996). This is consistent with the New Zealand Health survey findings that people in lower socioeconomic groups are more likely to have two or more cardiovascular risk factors (Ministry of Health 1999).

Pacific peoples are over-represented among lower socioeconomic groups compared with other New Zealanders (Statistics NZ 2002). Consequently, food security is a significant issue. About half of the Pacific households in the NNS97 reported that food often or sometimes runs out (Russell et al 1999).

The trends of poor health status, youthful population structure and high fertility rates of the Pacific population have significant implications for New Zealand's health, education and social services, both now and in the future. Unemployment, low income, poor housing and over-crowding, low educational achievement, poor access to health services, urbanisation and the breakdown of traditional family structures serve to exacerbate the poor health status of Pacific peoples (Ministry of Health 1997).

Evidence for effective interventions

Initiatives to encourage and improve nutrition, physical activity and weight control among Pacific communities have had variable outcomes. Successful initiatives have been those that were community-based, incorporated multiple interventions and were specifically designed for, and delivered by, Pacific people for Pacific peoples, within the context of their cultural values, beliefs and social environment (Swinburn et al 1998; Finau 1996).

The key to successful and sustainable Pacific initiatives is the recognition that the community groups play a key role in the success of the programmes, hence strong links were established early between the programme and community structures such as Pacific churches and community leaders (Swinburn et al 1998; Finau 1996). The successful Ola Fa'autauta Project (Samoan Lifewise Project) is an example of such collaboration, where the important role and place of the church among Pacific peoples' beliefs were acknowledged and utilised for maximum community benefit (Finau 1996). The majority of Pacific people belong to a church (Statistics NZ 2002). However, with the increasing number of New Zealand-born Pacific people making up nearly half the Pacific population, it is important to include venues other than churches in order to reach the younger Pacific community.

Current and future work

In 2002 the National Children's Nutrition Survey commenced sampling 1000 Pacific children between the ages of 5 and 14 years. The results will help understanding of the dietary habits of Pacific children, and will link into other initiatives to improve the health status of Pacific peoples.

Nutrition and physical activity services and programmes for Pacific peoples are purchased from some of the public health units as well other providers, including non-government organisations like the National Heart Foundation (Pacific Heartbeat). A number of Pacific providers are now providing community services in nutrition and physical activity.

An example of a recent community initiative is the Childhood Obesity Programme, which was set up by South Seas Kids to encourage participation of children and their families in establishing healthy lifestyles. This initiative also involved schools and the community to encourage Pacific families to become more active, and to learn about healthy eating and exercise. The programme includes ongoing clinical assessment of participants and is overseen by a Pacific pediatrician, Pacific nurses and a Pacific dietitian.

The escalating overweight and obesity levels among Pacific peoples require urgent action, using a range of approaches appropriate to Pacific peoples. This will require approaches designed by and delivered by Pacific people and an appropriately trained workforce. These are the priority areas highlighted for action in the recently released Pacific Health and Disability Action Plan 2002 (Ministry of Health 2002).

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Glossary

Abdominal obesity	Accumulation of fat around the abdomen. This form of obesity is most associated with adverse health outcomes.
Adiposity	Body fatness.
Adult	A person aged 18 to 65 years.
Agencies for Nutrition Action (ANA)	A non-governmental organisation, with members comprising the National Heart Foundation, Cancer Society of New Zealand, Nutrition Foundation, New Zealand Dietetic Association, Diabetes New Zealand, and Te Hotu Manawa Māori. The Ministry of Health and the Sport and Recreation Agency are observers. The mandate of ANA is to serve as a body that has a united voice on key nutrition and physical activity issues in New Zealand, with a key focus on the importance of maintaining a healthy body weight.
Antioxidant	An agent that prevents or inhibits oxidation of a substance (eg, vitamin C).
Attributable burden	An estimate of the current disease burden due to a given risk factor. It depends on accurate assessment of the current risk factor distribution; estimation of the risk factor distribution that confers the minimum overall population risk (not necessarily zero exposure); accurate assessment of risk factor – disease relationships (ie, the increase in disease mortality for each unit increase in exposure to the risk factor); and the accurate recording of current disease mortality.
Auahi kore	A Māori smoking cessation programme that aims to recapture the smokefree status of Māori.
Avoidable burden	An estimate of the future disease burden that might be avoidable if current risk factor levels were reduced. It depends on the reliability of the attributable burden estimate; projection of future disease mortality (extrapolating historical trends); assessment of risk reversibility (how quickly and completely risk of disease is reversed once risk factor levels are lowered); and judgement as to feasible future changes in risk factor distributions.
Body mass index (BMI)	An indicator of body fatness. It is calculated from the formula: weight/height, where weight is in kilograms and height is in square metres.

By Māori for Māori	Programmes delivered by Māori providers specifically targeting Māori communities.
By Pacific for Pacific	Programmes delivered by Pacific providers specifically targeting Pacific communities.
Calcium	A mineral that is essential for building strong bones and teeth. The most common dietary source is milk and milk products.
Cardiovascular disease	Diseases of the heart and blood vessels.
Child	A person aged between 3 and 14 years.
Cholesterol	A fat-like steroid found in animal fats, oils, bile, brain tissue, milk, egg yolk, nerve myelin, liver, kidneys and adrenals. Mostly synthesised in the liver, it is important in the synthesis of steroid hormones and bile acids.
Cohort study	A study of a population group which is followed over a period of time to ascertain the incidence of a particular disease or condition.
Community action	Action focused on the implementation of initiatives and programmes within a community to address specific health and other outcomes identified by a community, related to particular health issue(s) (eg, nutrition, physical activity and healthy weight).
Community development	'The process of organising and/or supporting community groups in identifying their health issues, planning and acting upon their strategies for social action/social change and gaining increased self-reliance and decision-making power as a result of their activities'.[6]
Comparative risk assessment (CRA)	CRA is a systematic approach to estimating the burden of disease due to different risk factors. CRA estimates both the attributable and avoidable burden of disease.
Confounding	The situation where the measure of the effect of an exposure on risk is distorted because of an association of the exposure with other factors (confounders) that influence the outcome of interest.
Contaminants	Impurities either naturally occurring in foods or purposely or inadvertently added to foods at any stage along the food chain.

[6] Labonte R. 1993. The view from here: community development and partnership. *Canadian Journal of Public Health* 84: 243–5.

Convenience foods	These include takeaways and pre-prepared foods.
Diabetes type 1	A disease caused by the destruction of insulin-producing cells, resulting in insulin deficiency.
Diabetes type 2	A disease of unknown cause, but associated with a combination of insulin resistance and a relative insulin deficit. The major risk factors for type 2 diabetes are obesity, increasing age, physical inactivity, and nutritional factors such as high intake of saturated fats. Type 2 diabetes makes up about 85–90 percent of all diabetes in developed countries.
Dietary supplements	Food supplements in the form of tablets, liquids or powders that may be consumed in addition to the diet to supplement intakes of vitamins, minerals, herbs or other substances.
Disability	Any self-perceived limitation in activity resulting from a long-term condition or health condition, lasting or expected to last six months or more and not completely eliminated by an assistive device.
District Health Boards (DHBs)	Organisations established to protect, promote and improve the health and independence of geographically defined populations. Each DHB will fund, provide (or ensure) the provision of health and disability services for its population.
Exclusive breastfeeding	Feeding of breast milk only, without water, medications or any other substances.
Exercise	A subset of physical activity that is distinguished by being done to improve or maintain physical fitness or health. Exercise can be done at a variety of intensities, but often involves vigorous activity. It can include moderate-intensity (brisk) walking.
Folate/folic acid	A vitamin of the B group essential for cell division, growth and red blood cell formation. The term 'folate' is a generic name for folic acid (pteroyl monoglutamic acid) and related polyglutamate compounds that exhibit the biological activity of folic acid.
Fono	A Pacific gathering.
Food balance sheets	National accounts of the annual production of food, changes in stocks, imports, exports and distribution of food within the country (prepared by Statistics NZ).

Food banks	Collections of food that are distributed to those who are unable to purchase enough food for themselves and their families. Most food banks are run by volunteer or charitable organisations.
Food security	Reliable access, in economic and practical terms, to the food needed for a healthy life for all members of the household (adequate in quality, quantity, safety and cultural acceptability).
Food Standards Australia New Zealand (FSANZ)	The joint Australian–New Zealand regulatory body with the key function of developing and maintaining joint food standards for Australia and New Zealand.
Fortified foods	Foods that have had nutrients added, usually vitamins and minerals, during manufacture. The types and amounts of these are specified in food legislation.
Full breastfeeding	Feeding of breast milk, water and medication, but not other substances.
Functional foods	Foods similar in appearance to conventional foods but which have been modified to have benefits beyond the provision of simple nutrient requirements.
Glycaemic index (GI)	A measurement used to compare foods based on their immediate effect on blood glucose levels.
Goitre	An enlargement of the thyroid gland occurring with iodine deficiency, often accompanied by swelling in front of the neck.
Green Prescription	A Green Prescription is a health professional's written advice to a patient to be physically active as part of the patient's health management.
Hapū	A social and/or political unit made up of several whānau sharing common descent.
Health impact assessment	Any combination of procedures or methods by which a proposed policy or programme may be judged on the effects it may have on the health of a population.
Highly active	Five hours or more leisure-time physical activity in the previous seven days.
Hillary Commission (now Sport and Recreation New Zealand)	The government body responsible for sport and recreation in New Zealand; disestablished and reconstituted as part of the Sport and Recreation New Zealand (SPARC) in 2002.

Host responsibility	A broad set of strategies designed to create safer drinking environments. The concept originated in the United States, where it is known as server intervention.
Hyperlipidaemia	Raised levels of fat in the blood.
Hypertension	Raised blood pressure.
Hui	A Māori gathering.
Inactive	In the context of physical activity, refers to two categories of inactivity of those surveyed over a seven-day period. Participants stated either that they did no activity (sedentary) or some activity (relatively inactive) but less than the recommendation of 30 minutes of moderate-intensity physical activity contained in the New Zealand Physical Activity Guidelines on most, if not all, days of the week.[7]
Infants	Children aged less than 12 months.
Iodine	An essential micronutrient, where deficiency may result in an enlarged thyroid gland (goitre).
Iron deficiency	Any two or more of the following three: • serum ferritin < 12 mg/L • iron (transferrin) saturation < 14% • red cell distribution width > 14.5%.
Iron deficiency anaemia	Haemoglobin < 120g/L for females and <130g/L for males.
Iwi	A social and political unit made up of several hapū sharing common descent; Māori tribe or nation.
Kai	Food.
Kai moana	Seafood (fish and shellfish).
Kaiwhakahaere	A person who provides leadership and guidance to a group of people or within an organisation.
Kapa haka	Traditional performing art which includes traditional or contemporary waiata (songs), haka (chants), poi, and rakau (spears).
Kaumātua	Wise and experienced older members of the whānau, usually over 55.

[7] Hillary Commission. 2001. *Movement = Health.* Wellington: Hillary Commission.

Kohanga reo	Māori-language 'nests' – a movement established by Māori to teach the Māori language to Māori children.
Micronutrients	Essential nutrients, including vitamins and minerals, which are usually required in small quantities.
Moderate-intensity activity	The main physical activity population health message recommends 30 minutes of moderate-intensity physical activity on most, if not all, days of the week to benefit health, as recommended in the New Zealand Physical Activity Guidelines.[8]
New Zealand Food and Nutrition Guidelines	The Ministry of Health's guidelines on nutrition for key population groups in New Zealand. They include recommendations for infants and toddlers, children, teenagers, adults, pregnant and breastfeeding women, and older people.
New Zealand Food Safety Authority (NZFSA)	A New Zealand government agency responsible for the regulation and safety of the New Zealand food supply – both domestic food and food for export.
NNS97	National Nutrition Survey undertaken in 1997.
Non-communicable diseases	Those diseases that cannot be transmitted from one person to another. They can be referred to as lifestyle diseases, and include obesity, hypertension, diabetes, cardiovascular disease and gout.
Non-recreational physical activity	Includes active commuting (physical activity as a form of transport), and incidental activity (such as climbing stairs at work, or household domestic activity such as washing windows).
Nutrients	Food components essential to support human life.
NZDep96	An index of deprivation based on the residential address of the individual used by the National Nutrition Survey 1997. The index is based on eight dimensions of deprivation: income, access to a car, living space, home ownership, employment, qualifications, support, and access to a telephone. Quartile I is defined as individuals living in the least deprived areas and quartile IV as individuals living in the most deprived areas.
Obesity	This has been defined as a BMI ≥ 32 for Māori and Pacific peoples and a BMI ≥ 30 for all other New Zealanders.

[8] Hillary Commission. 2001. *Movement = Health*. Wellington: Hillary Commission.

Osteoporosis	A reduction in bone mass, resulting in risk of fracture.
Ottawa Charter	The Charter developed and adopted by the first International Conference on Health Promotion held in Ottawa, Canada, in November 1986. This Charter defines health promotion as the process of enabling people to increase control over, and to improve, their health.
Overweight	This has been defined as a BMI ≥ 26 and < 32 for Māori and Pacific peoples and a BMI ≥ 25 and < 30 for all other New Zealanders.
Partial breastfeeding	Continuation of breastfeeding along with either infant formula and/or solids.
Personal health services	Services offered on an individual basis, including most treatment services, and one-on-one visits to GPs and other health professionals.
Physical activity	Any bodily movement produced by skeletal muscles that results in energy expenditure. It can be analysed in terms of duration, frequency, intensity, type and context.
Povi masima	Salted meat – usually chunks of mainly fat, bone and gristle with very little red meat. The meat is put into brine in plastic buckets. Povi or puli masima is high in fat. Salted beef originated from England and was introduced to the Pacific by European missionaries and settlers.
Pre-prepared foods	Foods that have been manufactured to be partially prepared to enable easy and quick preparation of the final product. They may require the addition of some other ingredients, or just particular heating and serving steps.
Prevalence	The number of cases of a given disease or other condition in a population at a designated time. Prevalence includes both new (incidence) and existing cases of disease.
Primary health care	Usually the health services of first point of contact, based around key health practitioners or providers such as GPs, and generally community-based, but can include hospitals and other health services. Can also refer to essential health care made universally attainable to individuals and families in the community, by means acceptable to them.
Public health services	Services offered on a population basis. These include all programmes, interventions, policies and activities that improve and protect the health of individuals and the community. Public health services intervene at the population or group level, as distinct from the individual personal health services.

Push Play	A SPARC (previously Hillary Commission) national social marketing campaign encouraging New Zealanders to do at least 30 minutes of moderate-intensity physical activity on most, if not all, days of the week. Supported regionally and locally by regional sports trusts and community partners.
Rangatahi	Young Māori, usually aged 15 to 24 years.
Recommended dietary intakes (RDIs)	Recommended levels of nutrient intake based on basal, average or low-risk requirements.
Relatively active	At least 2.5 but less than five hours of leisure-time physical activity in the previous seven days.
Relatively inactive	Some leisure-time activity in the previous seven days but less than 2.5 hours.
Riboflavin	An essential B-group vitamin (B_2), required for the growth and repair of tissues, including skin and eyes.
Risk factor	An aspect of personal behaviour or lifestyle, an environmental exposure, or an inherited characteristic that is associated with an increased risk of a person developing a disease.
Saturated fat / fatty acids	Fatty acids with no double bonds. Many saturated fats / fatty acids tend to raise levels of blood cholesterol. They are common in animal fats, and in coconut and palm oil.
Secondary health care	Specialist care that is typically provided in a hospital setting.
Sedentary	No physical activity in the past seven days.
Selenium	An essential trace element for humans and animals, which is in short supply in the New Zealand environment.
Smokefree	Government-funded initiatives to reduce the incidence of smoking in New Zealand. A number of key strategies have been undertaken, including legislative measures to ensure that public places are 'smokefree'.
Social marketing	A multi-media approach to the marketing of key social issues.
Takeaways	Foods that are purchased in a ready-to-eat form. They tend to be high in fat and salt. Examples include fish and chips, hamburgers, fried chicken and chips, pizzas, and Chinese takeaways.
Tamariki	Māori children aged 0 to 14 years.
Te reo	Language (usually used for the Māori language).

Tertiary health care	Very specialised care, often only provided in a small number of locations.
Thyroglobulin	Thyroid hormones used in the assessment of iodine status.
Treaty of Waitangi	New Zealand's founding document, which establishes the relationship between the Crown and Māori as tangata whenua, and requires both the Crown and Māori to act reasonably towards each other and with utmost good faith.
Toddlers	Infants aged from 1 to 2 years of age.
Total Diet Survey	A periodic survey undertaken in New Zealand which assesses the potential exposure to contaminants and some nutrients in the food supply.
Vigorous activity	The New Zealand Physical Activity Guidelines define vigorous exercise as activity that makes people breathe hard or 'puff'. For young adults, it is activity requiring seven times as much energy as rest, or greater; equivalent to jogging.
Vitamin A (retinol)	An essential fat-soluble vitamin that helps the body fight infections.
Waka ama	Recreational activity, paddling using traditional Māori outrigger waka (canoes).
Wānanga	A Māori tertiary institution.
Walking school bus	A concept to encourage children to walk to school, whereby a parent or adult is the 'bus driver' and collects children from designated points on the way to school and walks with them to school, or home from school.
Whānau	Relationships that have blood links to a common ancestor; extended family.
Whānaungatanga	Maintaining the collective wellbeing of extended whānau/ family networks.
Young people	People aged 15 to 24 years (see also rangatahi).