



nz nutrition  
FOUNDATION

# The role of Sugar in the diet of New Zealanders

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## EXECUTIVE SUMMARY

“Evidence suggests advice relating to sugars is a relevant component of a strategy to reduce the high incidence of dental caries, overweight and obesity and cardiometabolic risk in most countries” (18)

In the debate on the role of sugar in diet of New Zealanders, sugar should be discussed in terms of the whole foods which make up what New Zealanders are eating. Sugar is classified as a carbohydrate and along with fat and protein these three macronutrients in varying proportions make up the foods eaten each day. However if any of these three nutrients – carbohydrate, fat or protein – are consumed in excess of what is required by the body then this will cause the excess to be stored by the body as fat.

With the increasing levels of obesity seen within New Zealand and internationally society is looking for answers and for something to blame. However the cause of obesity cannot be blamed on a single nutrient, such as sugar, as other issues such as portion sizes, lack of physical inactivity and life style choices are all part of the confusing mix of increasing obesity rates.

Sugars defined as ‘Intrinsic sugars’ are found naturally in the cell structure of foods such as fruit, vegetables and milk. ‘Free sugars’ are added to foods by food manufacturers, chefs or consumers but also include sugars naturally found in honey, syrups and fruit juices. It is the free sugars that organisations including, WHO, are offering recommendations for to decrease intake levels and improve awareness. The most common food sources of free sugars in New Zealand diet are non-alcoholic beverages and sweets or lollies. These foods contain no nutritional value but plenty of energy and are regularly over consumed as they do not offer the feeling of satiety or fullness.

Research is now showing that excess consumption of free sugars has a negative impact on current health issues in New Zealand, such as dental decay, obesity and heart disease. The strongest evidence is with oral health where it has been proven that dental decay increases with free sugar consumption. Also Sugar Sweetened Beverages (SSB) have been linked as a determinant of weight with increased consumption of these types of beverages causing an increase in body weight. A recent study has also identified the negative effect that sugar has on risk factors for blood pressure and heart disease, however in this case there seems to be a link with sugars even when there is no change in body weight.

In the following paper the New Zealand Nutrition Foundation provides science-based information on the role of sugar in New Zealand diet. In addition the paper outlines key messages and practical ideas to assist New Zealanders in making healthy food choices.

## INTRODUCTION

The purpose of this paper is to provide evidence-based information from the New Zealand Nutrition Foundation (NZNF) on the role of free sugars in New Zealand diets. Currently sugar is a hot topic with views and opinions appearing in a range of publications and social media, making it difficult for the New Zealand public, and even those working in the health and education sectors, to identify facts from fiction. This paper offers recommendations based on science to assist New Zealanders to make informed and healthy food and lifestyle choices.

As the number of New Zealanders who are obese or over weight continues to increase (1), researchers look to study causes while the others look for someone or something to blame. It would appear that sugar has become the most recent number one evil in the obesity debate. Much of the media attention has stemmed from discussions on the impact that Sugar Sweetened Beverages have on the health and wellbeing of the population. In addition new research is being published on trials with sugar and its impact on a range of health issues including obesity, diabetes and heart disease. It is important current research findings be clearly explained and not distorted to fit with particular agendas.

The philosophy of NZNF is to consider whole foods rather than individual nutrients. The NZNF focuses messages on the whole diet rather than singling out one food item as being essentially 'bad' to eat or suggesting a complete removal of a food from the diet. These concepts have been applied in our review of the sugar debate as we look to offer advice about the role of sugar in a health-promoting diet.

## KEY MESSAGES

- Obesity is the result of an energy imbalance – more energy consumed than used, with the extra energy stored as fat. While the causes of obesity are multifactorial, excess sugar intake can contribute to this imbalance and therefore it is important to increase New Zealanders' awareness of the presence of sugar in the foods that they eat.
- Choosing low glycaemic Index (GI) foods or those that offer a feeling of satiety or fullness is important part of eating balanced diet. Sugar sweetened beverages (SSBs) are easily digested and rapidly absorbed into the blood which may cause blood glucose (sugar) concentrations to rise rapidly. Sugar sweetened beverages (SSB) or sweets do not offer a feeling of fullness, often have few of the nutrients essential for life but they do contribute energy to the diet
- In line with WHO recommendations NZNF supports the message that less than 10% of energy in the diet should be from 'free sugars'. (2) In an adult with a healthy BMI this equates to a maximum of 50g of sugar per day or 12 teaspoons (Figures show that NZ adult men currently consume 120g of total sugar i.e. intrinsic plus free sugars, per day and adult women 96g)
- New Zealanders should continue to eat recommended servings of food from all four food groups including fruits and low fat dairy products. Although some of these foods when unprocessed contain natural (intrinsic) sugar such as fruit and milk sugars, they also provide important sources of other essential nutrients for health.
- The three food groups that contribute most to free sugar intake are sugar and sweets, non-alcoholic beverages and muffins, cakes & biscuits. These foods need to be identified in the New Zealand diet as treat foods and not considered everyday foods.
- Sugar sweetened beverages such as soft drink are a major factor in dental decay and add energy but no other nutritional value to the diet. NZNF recommends reducing the intake of SSB especially for children and replacing with water or milk.
- Recent research has shown that sugar intake has a negative effect on the risk factors for heart disease. With increased sugar intakes, unhealthy blood fat and blood pressure increased.

## CONSUMER MESSAGES

- Sugar and the four food groups:
  - Fruit and vegetables – Sugar naturally occurs in foods in this group. Fruit and vegetables are an important source of vitamins, minerals and fibre. The inclusion of fruit and vegetables in diets has been proven to have positive health benefits.
  - Grains and cereals – choose foods that contain wholegrains. Inspect the ingredient list and avoid foods e.g. muesli bars where sugar is included.
  - Milk and milk products - Lactose is present in milk naturally. Milk and milk products are an important source of protein, calcium and other vitamins and minerals. Choose milk products which are unsweetened.
  - Meat and other good sources of protein– be wary of sauces used to coat meat dishes. Check the label for sugar in the ingredient list.
- Sugar and beverages:
  - Tap water is always the best choice. There are no kilojoules or sugar in tap water.
  - Milk is also a good beverage choice especially for children. Milk is a good source of protein and calcium along with other important vitamin and minerals.
  - If drinking juice it is recommended to have a small quantity and to dilute with water.– Whole fruit is a better alternative
  - In a 330 mL can of soft drink there are approximately 9 teaspoons of sugar – almost your quota of sugar for the day.
  - For dental health, if you do treat yourself to a sugary drink then have it with a meal or make sure you rinse your mouth with water or brush your teeth afterwards. If you add sugar to hot drinks try cutting down slowly. Go from 1 teaspoon to half teaspoon and then a pinch of sugar over weeks to adjust your tastes.
- Sugar and food labels:
  - Check the nutrition information panel to determine how much sugar is in every 100g of a packaged product and compare products so you can choose the product with lower sugar
  - Look on the ingredients list for “sugars” – these are the added or free sugars
  - To compare different products look at the nutrition information panel and compare products /100g column.
  - Some guidelines:
    - Cereals – choose wholegrain cereals with under 20g sugar / 100g.
    - Tinned Fruit – replace fruit in syrup with fruit in juice or water or frozen unsweetened fruit.
    - Yoghurt – choose unsweetened yoghurts
    - Sauces – these are foods where we might not expect much sugar but can contain quite high amounts. Check the ingredients list.
- Think about the foods you eat with sugar added to them. Do they contain other good things e.g. whole grains, fruits and vegetables, milk? If so, choose these over the sugary drinks and foods which have no other nutrition benefits.
- When you use sugar in cooking or add it to food, use it sparingly (or not at all).

## WHAT IS SUGAR?

Carbohydrates consist of building blocks called 'saccharides' or 'sugars'. Glucose is a common example of the simplest type of sugar called a monosaccharide (one sugar). Fructose is another example, which occurs naturally in fruit. Two monosaccharides joined together are called disaccharides. The most common of these is sucrose and in New Zealand sucrose or 'white sugar' comes from sugar cane. (3)

## TYPES OF SUGAR

Sugars are found in various forms in foods, for example, glucose, fructose, sucrose, lactose, and sorbitol. An important point to consider in the sugar debate are intrinsic sugars and free sugars. Sugars defined as 'intrinsic sugars' are found naturally in the cell structure of foods such as fruit, vegetables and milk. 'Free sugars' are added to foods by food manufacturers, chefs or consumers but also include sugars naturally found in honey, syrups and fruit juices. (2).

Different types of sugar in the food and drink we consume have different effects on the body and keeping blood glucose within normal limits. Intrinsic sugars take more time to be digested because the sugar is part of the cellular structure and other nutrients present, such as fibre, also slow digestion. The sugar from foods high in free sugars (such as SSB) pass through the digestive system very quickly and are absorbed into the blood almost as soon as they are consumed.

## DIGESTING SUGARS

Sugars are digested in the small intestine where they are converted to their monosaccharide units, which are varying combinations of glucose, fructose and galactose. From here they are absorbed into the blood stream and travel to the liver. This glucose can then be used by the body in three ways – transported through the bloodstream to cells to be used as energy, stored in the liver and muscles as glycogen, or if an excess amount is present, this glucose is converted to fat and stored in adipose (fat) tissue stores. Fructose on the other hand is metabolised in the liver and may be converted directly to fat.

When the glucose concentration in the blood rises the pancreas is stimulated to produce the hormone insulin. Insulin allows glucose to leave the blood and enter cells which provides the cells with energy and at the same time keeps blood glucose stable. Eating greater amounts of sugar means more insulin needs to be produced to process the glucose.

## WHY ARE SUGARS INCLUDED IN FOOD?

Sugar adds sweetness and intensity to the flavour of foods but there are also many other reasons why sugar is part of food preparation. In bread and bakery products that use yeast as a raising agent sugar may assist the fermentation process and the production of carbon dioxide to make the product rise. In jams and preserved fruit a high concentration of sugar stops microbes and yeasts from contaminating the food. In bread, sugar helps retain water to keep bread fresher extending the shelf life. Sugar also aids texture and enhances colour in some foods. (4).

Reformulation of some foods to remove fat and to maintain the palatability for the consumer has meant that sugar has been added instead. The marketing of these products has focused on 'low fat', overlooking the high sugar content. This highlights the issues that can occur when one nutrient rather than a whole food is the focus.

## HOW MUCH SUGAR SHOULD WE EAT?

The Ministry of Health Guideline Statements directs New Zealanders to '*Prepare foods or choose pre-prepared foods, drinks and snacks with little added sugar; limit your intake of high-sugar foods.*' (5)

The American Heart Association (AHA) recommends a daily intake for added (free) sugars of approximately nine teaspoons\* for men and six for woman. Currently in the US Americans consume about 22 teaspoons of added sugar a day which has increased steadily over the past three decades, with teenagers and men consuming the most added sugars. The AHA notes that a major contributor of added sugars to American diets are soft drinks and other sugar-sweetened beverages. (6)

World Health Organisation's (WHO) current recommendation, from 2002, is that free sugars should make up less than 10% of total energy intake per day (both food and drink). It further suggests that a reduction to below 5% of total energy intake per day would have additional benefits. Five per cent of total energy intake is equivalent to around 25 grams (around 6 teaspoons) of sugar per day for an adult who weighs 70 kg. (2)

The suggested limits on intake of sugars in the draft guideline apply to all monosaccharides (such as glucose, fructose) and disaccharides (such as sucrose or table sugar) that are added to food by the manufacturer, the cook or the consumer, as well as sugars that are naturally present in honey, syrups, fruit juices and fruit concentrates.

## HOW MUCH TOTAL AND ADDED SUGARS ARE NEW ZEALANDERS EATING?

The 2008/9 Adult Nutrition Survey found the daily intake of total sugars (free plus intrinsic sugars) in New Zealand was around 120g (30 teaspoons) for men and 96g (24 teaspoons) for females. Of particular note is that the younger age groups consumed significantly more sugar than older people. Assuming at least 32% of total sugar intake comes from free sugars. This means for men the mean daily intake of free sugars would be at least 38g (10 teaspoons) and 30g (7.5 teaspoons) for women. Adults aged 19 – 30 years have a mean free sugar intake of at least 44g (11 teaspoons) for men and 38.5g (9.5 teaspoons) for women. Both of these values are in excess of the AHA and WHO recommendations. The top 4 foods contributing sugar to the diet of NZ adults are fruit (18%), non-alcoholic beverages (17%), sugar and sweets (15%) and milk (10%).

In terms of NZ children the 2002 National Children's Nutrition Survey found average daily intake for sucrose for boys 67g (17 teaspoons) and girls 61g (15 teaspoons). It was determined that a quarter (approximately 4 teaspoons) of the sugar intake was from non-alcoholic beverages, while one fifth was from sugar and sweets. (7)

*\*NB: 1 teaspoon sugar = 4g*

## AVERAGE QUANTITIES OF SUGAR IN EVERYDAY FOOD

Suggesting that no sugars be eaten in the diet is flawed as sugars are present intrinsically in the foods that we are recommended to eat for health and wellbeing. According to the NZ Food and Nutrition Guidelines, every day we should eat at least five servings of fruit and vegetables (ideally two fruit, three vegetables) and 2-3 servings of dairy products. Including these recommended foods contribute a considerable amount of intrinsic sugars to the diet but these foods also offer nutritional value in terms of nutrients such as protein, fibre, vitamins and minerals.

Table 1: Sugar content of common food choices in line with Food & Nutrition Guidelines. (8)

Food Item	Sugar content
1 apple	14g
1 kiwifruit	9g
1 carrot boiled	2.6g
80g peas	0.8g
1 medium boiled potato	1.9g
250ml trim milk	12.8g
1 pottle of low fat yoghurt	4.3g

*The Concise New Zealand Food Composition Tables 2012*

## IS SUGAR ADDICTIVE?

People naturally like the taste of sweet food, even as babies. Sweetness in food can lead to increased consumption, with consumers often choosing and eating a food product which is sweeter than its rival. There is little evidence that sugar is addictive “Addiction” refers to physiological and psychological processes which cause dependence and withdrawal symptoms on cessation of intake, such that the person actively seeks the material to prevent withdrawal (9) There is a difference between individuals overeating a food; compared to specific foods or nutrients being ‘addictive’. Although food addiction has been suggested as a cause of obesity, scientific research has found that overweight individuals do not have behavioural or neurobiological characteristics that resemble addiction. Rather than addiction it would appear that an environment where fatty and high sugar foods are readily available means that these are eaten rather than foods that are more nutritious but also are more expensive and require safe storage.

## HYPERACTIVITY

It is a widely held belief amongst many parents that too much sugar can contribute to their children’s hyperactivity, but this relationship is not supported by scientific evidence from controlled experimental studies (10). In the early 1970’s studies which make this link between sugar and hyperactivity used flawed methods. The perceived association is also influenced by parental beliefs and expectations. This was evident in one study, where parents were told their child was given a drink containing sugar rated and so proceeded to rate their child’s behaviour as more hyperactive; even though all drinks served were sugar-free.(11)

## WHAT ABOUT SUGAR SWEETENED BEVERAGES (SSB)?

The National Nutrition Survey (1) showed that in adults aged 30 years or younger, 25% of the sugars consumed was from beverages. 15% males and 8% of female adults consumed SSB daily, while over half of males and third of females consumed three or more SSB per week.

When it is considered that a 330ml can of SSB, which is described on pack as one serve, can contain approximately 10 teaspoons of sugar (12) the amount of sugar consumed in beverages quickly adds up to exceed recommended sugar intake levels. Sugary drink portion sizes have risen dramatically over the past 40 years, and children and adults are drinking more soft drinks than ever. (13)

The calories from SSB are described as ‘empty’ as the only nutrient present is sugar. The sugars in SSB are high GI, rapidly digested and do not give you the same sense of fullness as an equivalent amount of food. (14) So a large number of kilojoules can be consumed without a person being aware of this in the same way as if they ate the equivalent kilojoules in food. Any excess energy consumed, in this case from sugar, will have an effect on weight gain and obesity.

In a systematic review and meta-analysis of randomised controlled trials by the University of Otago, the intake of SSB by children were assessed. Children with highest intake of SSB were at increased risk of being overweight or obese compared to those who had the lowest intake. The higher intake leads to increased risk to an excess intake of energy in the form of sugar. (15)

## SUGAR AND HEALTH ISSUES

Aside from dental caries it is excessive over eating of sugar that can lead to health problems. Over consumption of sugar has been linked to obesity, diabetes and heart disease.

### ORAL HEALTH

Free sugars play role in tooth decay as the bacteria in plaque on the teeth uses sugars as food. The bacteria then produces acids that eat into tooth enamel. When sucrose is metabolised it produces dextrans which stick to teeth more easily.

Dental caries has a high prevalence in New Zealand, causing pain and anxiety and in many cases leads to tooth loss. In the 2011/12 NZ Health Survey 34,000 children (aged 1-14yrs) had a tooth removed in the previous year due to decay, abscesses or infection. Extensive decay was the most common reason for tooth removal and is largely preventable if restrictions on free sugar consumption and frequency of consumption are adhered to.

Research from University of Newcastle (15) show intakes of free sugars below 10% of energy intake are associated with lower risk of dental caries.

### OBESITY

Obesity is a multi-factorial problem and it is simplistic to blame obesity on a single nutrient. Issues such as portion size, inactivity, overeating and poor food choices are all interlinked causes of obesity. However as the third most overweight population in the world it is important to understand the components of obesity, including the role of sugar, so that clear messages can be used to educate the public.

Researchers at University of Otago have concluded that intake of free sugars or SSB is a determinant of body weight. (16) The systematic review and meta-analysis of randomised controlled trials showed that a reduction of free sugars was associated with a small but significant reduction in body weight (0.8kg), whilst an increase in sugar intake was associated with a comparable weight increase (0.75kg). These body weight variations seem to be due to changes in energy intakes, i.e. by reducing free sugar intake there was a corresponding reduction in kilojoules.

The review also identified that reducing fat intake leads to lower body weight in adults and children. This is a reminder sugar is not the only nutrient implicated in weight gain and it is necessary to look at the overall nutrient make up of foods to determine their value to the diet.

### DIABETES

Type 2 diabetes is characterised by cells becoming resistant to the action of insulin, glucose is then unable to enter the cells of the body and remains in the bloodstream. This causes blood glucose levels to rise. Sugar by itself doesn't cause insulin resistance, it is affected through poor diet and inactivity causing excess fat stores. However when sugar is eaten in excess of requirements, it is stored as body fat.

New research from Europe in 2013, has shown that consuming large amounts of SSB is associated with an increased incidence of type 2 diabetes. (17) By drinking an extra can of soft drink each day, the risk

of developing type 2 diabetes increased by 22% in European adults compared with those adults who drank a can a month. Interestingly there was also an increased risk of diabetes linked to drinking artificially sweetened soft drinks, but this link disappeared when Body Mass Index (BMI) was accounted for. This may be because overweight people were more likely to drink artificially sweetened drinks and also more likely to develop diabetes.

### CARDIOVASCULAR DISEASE

Cardiovascular disease (heart, stroke and blood vessel disease) is the leading cause of death for New Zealanders, causing 30% of deaths each year. (18) There is a strong link between obesity and cardiovascular disease, showing the importance of encouraging New Zealanders to make healthy lifestyle and nutrition choices to maintain a healthy weight.

In the latest research from the University of Otago a review and meta-analysis assessed international studies that compared the effects of higher versus lower added sugar consumption on blood pressure and lipid profile (the ratios of different fats including cholesterol circulating in the blood). High blood pressure, blood fats and cholesterol levels are all cardiovascular risk-factors. Dietary intervention trials were reviewed where the only intended differences were the amount of sugars and non-sugar carbohydrates consumed by the participants, and the effects of these diets were measured in terms of lipids and blood pressure. (19)

This review provided evidence that sugars contribute to risk for heart disease independent of the effect of sugars on body weight. Sugar adversely affects lipids and blood pressure which providing some evidence to support the view that sugar may be metabolised differently to other carbohydrates. These results offer support to public health messages that decreasing sugar in the diet is one way to reduce risk of cardiovascular disease.

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