Supporting evidence-informed policy work on added sugar

Report prepared for the Victorian Health Promotion Foundation (VicHealth)

by Alexandra Jones and Tailane Scapin, The George Institute for Global Health, UNSW, Sydney.

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Contact

For more information about this report, please contact:

Dr Alexandra Jones
Research Fellow, Food Policy and Law, Food Policy
The George Institute for Global Health

T +61 2 8052 4300
E ajones@georgeinstitute.org.au

The George Institute for Global Health – global headquarters
ABN 90 085 953 331

Level 5,
1 King Street
Newtown, Sydney NSW 2042
Australia

T +61 2 8052 4300
info@georgeinstitute.org
www.georgeinstitute.org

EXECUTIVE SUMMARY

Excess consumption of added sugars has been identified as a concern in Australia and New Zealand. There is consistent public guidance to limit intake of added sugars. Sugars are carbohydrates that occur naturally in foods such as milk and fruit, and can also be added to food and drinks by the manufacturer or consumer. Australian and New Zealand dietary guidelines currently recommend avoiding added sugars, whereas World Health Organization guidance relates to 'free' sugars, which includes all added sugars plus all nonintact (i.e. juiced or pureed) fruit and vegetables. Foods and drinks high in added and free sugars may be lower in micronutrients compared to whole or less processed foods, and can displace more nutritious foods and drinks in the diet. Currently, manufacturers in Australia and New Zealand are required to provide only 'total sugars' information in the mandatory nutrition information panel, meaning consumers have no easy way to identify the added or free sugars they should be avoiding.

In 2011, the Labelling Logic review recommended improvements to added sugars labelling, specifically that added sugars be grouped in the ingredients list using the generic term 'added sugars', followed by a bracketed list of relevant ingredients (e.g. added sugars (fructose, glucose syrup, honey)[1]. In 2017, the Australian and New Zealand Ministerial Forum on Food Regulation (Forum) began looking at sugar labelling and regulatory options for improving information provided by manufacturers on labels. This work is intended to support Australians and New Zealanders with clearer information about added sugars in food and enable them to make informed choices.

In August 2019, the Forum requested Food Standards Australia New Zealand (FSANZ) to review nutrition labelling for added sugars. At that time, the Forum noted that the option to quantify added sugars in the Nutrition Information Panel (NIP) best met the objective of providing adequate contextual information to enable consumers to make informed choices consistent with dietary guidelines recommendations. Forum Ministers also noted that an option for pictorial display (e.g. teaspoons) applied to sugary drinks warranted further consideration, along with other options.

FSANZ is currently reviewing whether and how the Food Standards Code should be amended, including technical issues such as how 'added sugars' should be defined in any regulatory updates. There are plans for key stakeholders to be consulted during the review.

VicHealth commissioned The George Institute to conduct work to inform the development of a regulatory definition of added sugars for Australia and New Zealand. Desk-based research has been used to conduct a comparative analysis of definitions of 'added' and 'free' sugars currently used elsewhere in law and policy. These definitions have been mapped against available evidence on the relationship between specific sugars and ill health to make recommendations on which groups of sugars should be the focus of any definition for Australia and New Zealand and any labelling reform.

Ultimately we suggest that to genuinely inform consumers about the sugars they need to limit in the diet for health reasons, a proposed definition must be comprehensive in capturing all food components covered by the term 'free' sugars as most recently applied in the United Kingdom. It should also incorporate additional components that draw on the latest health evidence and respond to industry innovation to 'future proof' the definition where possible. We test out a proposed comprehensive definition against selected sample products to demonstrate how this may look on labels in practice, and highlight potential loopholes at stake. We also consider answers to commonly raised practical challenges related to implementing improved sugars labelling.

Outcomes of this work will be of use to public health and consumer stakeholders making consistent submissions on evidence-informed public health policy while FSANZ is developing regulation.

APPROACH

A desk review was conducted in May 2020 to explore global best-practice in identifying and labelling sugars that are harmful to health. In 2023, we conducted a rapid review of recent scientific evidence and relevant policy action to update Section 2 and 3 of this report.

1. Identifying existing definitions of added or free sugars and their components

The first step was to search websites of government and authoritative scientific agencies (e.g., World Health Organization (WHO), United States Food and Drug Administration (US FDA), United Kingdom's Public Health England (UK PHE), Australian National Health and Medical Research Council (NHMRC), and FSANZ) to identify existing regulations, policies, guidelines, reports or similar documents that contained guidance on the definition of 'added' and/or 'free' sugars for use in public health nutrition interventions. We extracted these definitions, noting their key features and any food components specifically included or excluded.

2. Mapping the scientific basis for different sugars classifications

In step two, food components considered as added or free sugars in the previous step were mapped against available health evidence. Particular focus was given to evidence on those components where classification has not been consistent to understand the scientific basis for this treatment. In this updated version, we incorporate additional relevant studies on these components published between 2020–2023.

3. Developing a preferred definition of added sugars for Australia and New Zealand

Combining the findings of the above steps, we have made suggestions for a comprehensive definition of added sugars that could be applied in forthcoming Australian and New Zealand regulation. We break down which food components we believe this definition should cover to reflect current policy and scientific evidence on health harms. In this version, we have updated our table of included and excluded food components to reflect the latest evidence. We suggest it is these included sugars that consumers must be provided additional information about in order to make genuinely informed choices.

4. Testing definitions across sample products

To provide insight into the practical implications of our proposed definition, we tested it across a range of sample products to highlight how these products would be affected. For this purpose, we extracted products' total sugar content as currently displayed, and estimated added sugar content using an approach adapted from Ng et al[2] that draws upon ingredients lists and linear programming.

5. Practical considerations for implementing and monitoring changes to sugar labelling

To supplement these findings, we drew on recent international experience to provide answers to commonly raised challenges in implementing and monitoring updates to sugar labelling requirements.

RESULTS

1. Existing definitions of added or free sugars and their components

(a) Available international and Australasian policy guidance

Ten relevant international documents were identified that contained a definition of added or free sugars. Four documents contained definitions currently being used in food labelling regulations, from the USA, Canada, Uruguay, and Mexico. The other six documents were reports or guidelines from WHO, the Pan American Health Organization (PAHO), European Food Safety Authority (EFSA), Public Health England (PHE), and American Health Association (AHA). These results are presented in ***Table 1.***

There is currently no regulatory definition of added or free sugars in the Australia New Zealand Food Standard Code (Food Standards Code). In the absence of this definition, we extracted relevant existing guidance, including requirements for a 'no added sugars' claim in the Food Standards Code, recommendations in the Australian Dietary Guidelines and the Eating and Activity Guidelines for New Zealand Adults (hereafter referred to jointly as Dietary Guidelines), and other relevant government-led nutrition policies operating in both jurisdictions.

Taken together, these documents reveal that neither 'added sugars' nor 'free sugars' are currently defined in a wholly consistent manner. Variations may occur for a variety of reasons, including different purposes of definitions (e.g. to quantify in the nutrient declaration, indicate presence in the ingredients list, measure intake in dietary surveys), evolving health evidence, and/or be the result of political compromise. Despite small areas of variation, both terms have common components that include all monosaccharides and disaccharides, as well as honey, syrups and fruit juice concentrates when used as ingredients. Both terms also exclude all sugars that occur naturally in dairy products and intact fruits and vegetables. The main difference between the terms as currently defined is that free sugars is more precise – it includes all added sugars, plus fruit juices in a non-concentrated form. In this way, it captures more accurately all sugars are harmful to health.

Few existing definitions provide an extensive list of food components covered by their definitions. This creates space for potential ambiguity or 'loopholes', particularly around novel ingredients. One attempt to 'future proof' regulations can be seen in Canada, where new regulations for the ingredients list require grouping of 'sugars-based ingredients' to improve identification of 'hidden sugars' in foods. The definition of sugars-based ingredients includes not only monosaccharides, disaccharides and sweetening agents (such as syrups, honey), but also considers ingredients that are ***functional substitutes*** for sweetening agents.[3] For example, Canadian legislation would classify fruit juice, fruit purees, condensed milk and malted milk added to replace sugars in foods as 'sugars-based ingredients' which must be grouped to improve their visibility in foods.

Table 1. International regulations, reports, and guidelines that include a definition of added or free sugars.

REGULATIONS				
Source	**Location**	**Type of sugar**	**Definition**	**Given examples of components**
Food and Drug Administration (FDA) [Food Labelling law][4]	USA (2016)	Added sugar (also mention free sugar in the definition)	Added sugars are either added during the processing of foods , or are packaged as such,[A] and include sugars (free, mono and disaccharides), sugars from syrups and honey, and sugars from concentrated fruit or vegetable juices that are in excess of what would be expected from the same volume of 100 percent fruit or vegetable juice of the same type, except that fruit or vegetable juice concentrated from 100 percent juices sold to consumers, fruit or vegetable juice concentrates used towards the total juice percentage label declaration or for Brix standardization, fruit juice concentrates which are used to formulate the fruit component of jellies, jams, or preserves, or the fruit component of fruit spreads shall not be labelled as added sugars	Brown sugar, corn sweetener, corn syrup, dextrose, fructose, fruit juice concentrates, glucose, high-fructose corn syrup, honey, invert sugar, lactose, maltose, malt sugar, molasses, raw sugar, turbinado, sugar, trehalose, and sucrose (this is not an exhaustive list)
Health Canada [Food and Drug Regulations, Food labelling law][5]	Canada (2016)	'Sugars-based' ingredients	(a) an ingredient that is a monosaccharide or disaccharide or a combination of these; (b) an ingredient that is a sweetening agent other than one referred to in paragraph (a); and (c) any other ingredient that contains one or more sugars and that is added to the product as a functional substitute for a sweetening agent;. "Functional substitute for a sweetening agent" means, in respect of a prepackaged product, a food — other than any sweetener or sweetening agent, including any sugars — that replaces a sweetening agent and that has one or more of the functions of the sweetening agent including, sweetening, thickening, texturing or caramelizing	Provides an extensive list with all food components included in the definition[B] (this is not an exhaustive list)
Uruguay Norm 272/018 [Warning label regulation][6]	Uruguay (2018)	Sugar (added to foods)	Monosaccharides and disaccharides present in foods, except lactose and sugars naturally present in fruits and vegetables. Sugars from polysaccharides hydrolysis, honey, and ingredients that contain one of the previous components are also included in the definition	Monosaccharides, disaccharides, sugars from polysaccharides hydrolysis, and honey
Updated Mexican Norm NOM-051 [Warning label regulation][7]	Mexico (2020)	Free sugar (also mention added sugar in the definition)	Monosaccharides and disaccharides available and added to food and non-alcoholic beverages by the manufacturer, plus the sugars that are naturally present in honey, syrups, and fruit or vegetable juices. Added sugars: free sugars added on foods and non-alcoholic beverages during industrial processing	Table sugar, honey, syrups, fruit and vegetable juices
FAO/WHO [Diet, nutrition and the prevention of chronic diseases][8]	Global (2003)	Free sugar	All monosaccharides and disaccharides added to foods by the manufacturer, cook or consumer, plus sugars naturally present in honey, syrups and fruit juices	Monosaccharides, disaccharides, honey, syrups, and fruit juices
American Health Association [Scientific statement on dietary sugar][9]	USA (2009)	Added sugar	Sugars and syrups added to foods during processing or preparation and includes sugars and syrups added at the table	Monosaccharides, disaccharides, white, brown and raw sugar, molasses, honey, corn syrup, and other syrups
The European Food Safety Authority (EFSA)[10]	European Union (2010)	Added sugar	Sucrose, fructose, glucose, starch hydrolysates (glucose syrup, high fructose syrup) and other isolated sugar preparations used as such or added during food preparation and manufacturing	*As found in the definition*
Public Health England [Carbohydrates and Health][11]	UK (2015)	Free sugar	All monosaccharides and disaccharides added to foods by the manufacturer, cook or consumer, plus sugars naturally present in honey, syrups and unsweetened fruit juices. Lactose naturally present in milk and milk products and sugars contained within the cellular structure of foods would be excluded[C]	Monosaccharides, disaccharides, honey, syrups, and fruit juices
World Health Organisation (WHO) [Sugar guideline][12]	Global (2015)	Free sugar	Free sugars include monosaccharides and disaccharides added to foods and beverages by the manufacturer, cook or consumer, and sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates	Monosaccharides (fructose, glucose, and galactose), disaccharides (sucrose, lactose, and maltose), honey, syrups, and fruit juices
Pan American Health Organisation (PAHO/WHO) [Nutrient Profile Model][13]	Americas (2016)	Added sugar (also mention free sugars in the definition)	Added sugars are free sugars added to foods and beverages during manufacturing or home preparation. Free sugars are monosaccharides and disaccharides added to foods and beverages by the manufacturer, cook, and/or consumer plus sugars that are naturally present in honey, syrups and juices	Monosaccharides (fructose, glucose, and galactose), disaccharides (sucrose, lactose, and maltose), honey, syrups, and fruit juices

A Supplementary documents published after the final rule removed the 'packaged as such' condition for declaring added sugar on the label of single-ingredient products, i.e. bottle of honey.

B *https://www.inspection.gc.ca/food-label-requirements/labelling/industry/list-of-ingredients-and-allergens/eng/1383612857522/1383612932341?chap=7*

C There is a complementary paper discussing detailed question regarding free sugar definition for UK (*https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5962881/*).

1. Existing guidance on added or free sugars in Australia and New Zealand

Although Table 1 does not include an explicit definition of added or free sugars in Australian or New Zealand regulation, it is important to consider existing official documents that reference these concepts in both countries.

Dietary Guidelines

The 2013 Australian Dietary Guidelines (ADG), recommend people limit intake of foods and drinks containing added sugars.[14] The ADGs provide examples of types of products high in added sugars, however no explicit definition of added sugars is provided. Broadly, the ADGs define sugars as carbohydrates and divide them into intrinsic (occurs naturally in foods such as fruit, vegetables and dairy products) and extrinsic sugars (added to foods). Fruit juices, including pulps, and dried fruit are recommended in 'to be consumed only occasionally and in small amounts.' Specifically, the ADGs state:

> *Fruit should mostly be eaten fresh and raw because of the low fibre content of fruit juice and the high energy density and 'stickiness' (which may have implications for dental caries) of dried fruit…*
>
> *Fruit juice, including pulp, is a good source of vitamins such as vitamin C and folate and also provides fibre and carbohydrates, particularly natural sugars. Whole fruit is preferable to fruit juice however the occasional use of fruit juice may assist with nutrient intake when fresh, frozen or tinned fruit supply is sub-optimal. Fruit juice is energy-dense and if consumed in excess, it can displace other nutritious foods from the diet and may lead to problems such as obesity.*
>
> *A small serve (125ml) of 100% fruit juice can be used occasionally as substitute for serve of whole fruit.*

Fruit juice is also not recommended for infants under 12 months of age.

Guidance in New Zealand is provided by the Eating and Activity Guidelines for New Zealand Adults (EAGNZ). The EAGNZ were published in 2015, one year after the publication of updated WHO guidelines centred on 'free sugars' intake, and incorporate reference to this work. Nevertheless, the EAGNZ recommendation to consumers is to choose and/or prepare foods and drinks with little or no added sugar. The document does not contain a clear definition of added sugars but does refer to sugars added to foods in the form of white, brown or raw sugar, honey, syrups and extracts. Fruit juice is listed as a 'high-sugar' drink, alongside the recommendation to eat fresh fruit and drink plain water rather than drinking it. Dried fruit is listed as a 'very high-sugar' snack, which sticks to teeth increasing cavities. It is recommended to limit the amount of dried fruit in the diet.[15]

Criteria for making a 'no added sugars' claim in the ANZ Food Standards Code

While the Food Standards Code does not contain a definition of 'added sugars', it does contain criteria for making a claim of 'no added sugars' on pack. Conditions set in the Code for making a 'no added sugars' claim, are that the food contains no added 'sugars[D]' and no added honey, malt and malt extracts, concentrated fruit juice or deionised fruit juice (with some exceptions in relation to these juices).[16]

Healthy Food Partnership

At its establishment in 2017, the Healthy Food Partnership (HFP) recognised added sugars (along with sodium and saturated fat) as a priority focus for reformation based on dietary guidelines. However, in 2018, the HFP Reformulation Working Group published a document with evidence informing the approach, draft targets and modelling outcomes for food reformulation in Australia. Ultimately the HFP elected

D Sugars in this context means: i) hexose monosaccharides and disaccharides, including dextrose, fructose, sucrose and lactose; (ii) starch hydrolysate; (iii) glucose syrups, maltodextrin and similar products; (iv) products derived at a sugar refinery, including brown sugar and molasses; (v) icing sugar; (vi) invert sugar; (vii) fruit sugar syrup.

to use total sugars as a proxy for added sugars in setting sugar reformulation targets, given the absence of added or free sugar amounts currently labelled. The food categories of focus for sugar reformulation are those determined by the Australian Bureau of Statistics as most contributing to free sugar intake based on data from the Australian Health Survey. They include soft drinks and flavoured waters, sweetened yoghurt, muesli bars, breakfast cereal, and flavoured milk.[17]

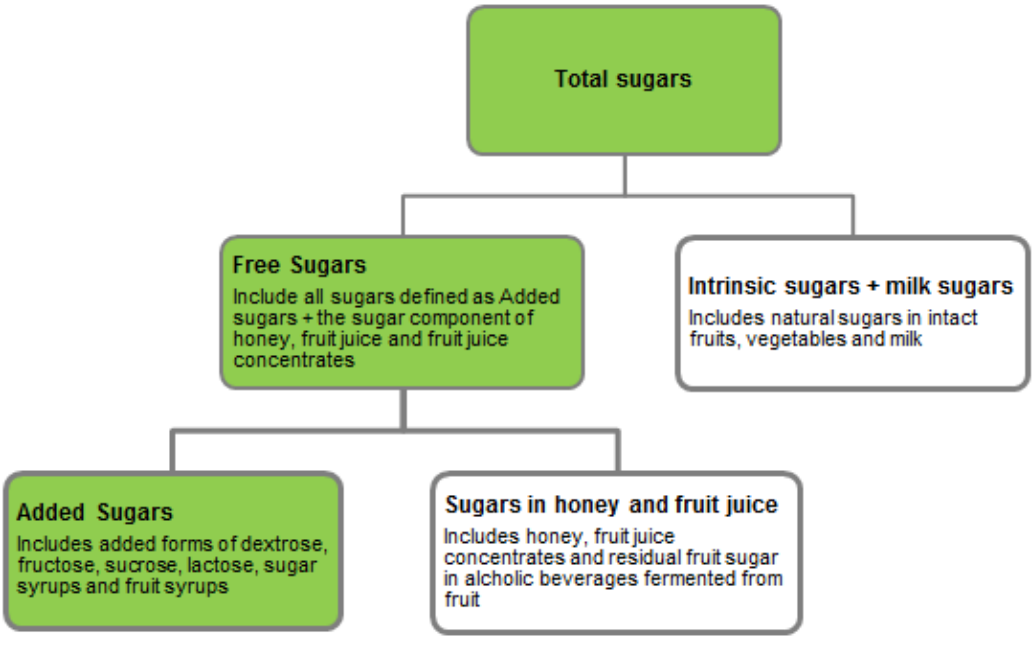
Health Star Rating

In 2014, Australia and New Zealand adopted the Health Star Rating front-of-pack nutrition label. Within its scoring criterion, Health Stars consider total sugar information. During earlier phases of development, a report commissioned by the NHMRC recommended that Health Stars consider added sugar information,[18] but this recommendation was not adopted, and no publicly available reasons were provided. During a Five-Year governmental review of Health Stars, public health and consumer groups again argued that Health Stars' performance would be improved by incorporation of added sugar information in scoring criteria.[19] However, this recommendation was not adopted in the outcomes of the Five Year Review, in part due to inconclusive modelling about whether this would improve alignment with dietary guidelines in practice, and at least in part because added sugar information was not yet required on the label.[20]

AUSNUT 2011–2013

AUSNUT 2011–13 is a set of files that enables food, dietary supplement and nutrient intake estimates to be made from the 2011–13 Australian Health Survey (AHS). Both added and free sugar have now been estimated in the AUSNUT dataset developed by FSANZ with input from the Australian Bureau of Statistics (ABS). In this process, FSANZ used the free sugar definition from WHO, and applied a definition of 'added sugars' that does not include honey or fruit juice, including fruit juice concentrates for practical reasons set out on the FSANZ website.[21]

Figure 1. Total sugars, free sugars and added sugars as used in the AUSNUT database



Source: *https://www.foodstandards.gov.au/consumer/nutrition/Pages/Sugar.aspx*

Nutrient Reference Values

The Nutrient Reference Values (NRV) published by the NHMRC contain recommendations only on overall carbohydrate intake. While acceptable carbohydrate intake is set at 45% to 65% of energy (predominantly from low energy density and/or low glycaemic index foods), sugar or added/free sugar reference values are not mentioned.[22] Unlike the Australia and New Zealand NRVs, the US has reformed their labelling and has updated recommendations for daily added sugars. Public health nutrition policy progress in the UK and Canada has also related to updated dietary intake recommendations for sugar. In Europe, EFSA has been working on updated advice on added sugars intake for a number of years, with a report due in 2021.

(b) Food components considered added or free sugars in these documents

Table 2 below extracts food components included in the term added and free sugars from the previous documents. Food components clearly covered by both terms included cane and beet sugar, molasses, honey, syrups and fruit juice concentrates.

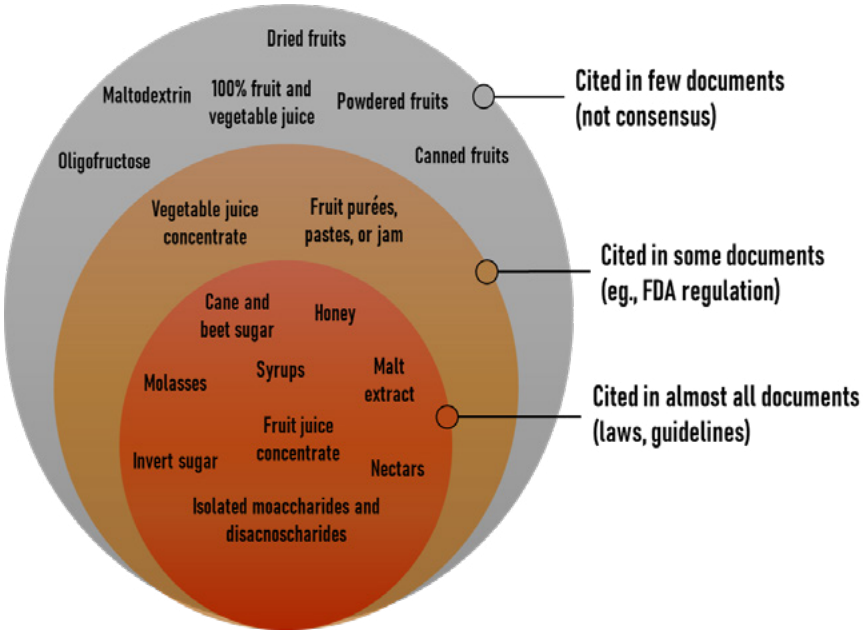
The main difference identified in the definitions above was their treatment of fruit juices, concentrates, pastes and purees. Some components are less commonly discussed in the literature and used inconsistently among lists of terms of added and free sugars, including vegetable extracts (juice, puree, or pastes), maltodextrin, dried fruits, and oligofructose. These terms were included in what we have called the 'grey area' (see Figure 2 below) and selected to be further investigated against health evidence.

Table 2. Components included in existing definitions of added and/or free sugars

Food components	Added sugar					Free sugar		
	ANZ Food Standard Code* [16]	Canadian food label rule [3]	USA food label rule [4, 23]	Pan American Health Org [13]	Uruguayan food label rule [6]	Public Health England** [24]	World Health Organization [12]	Mexican food label rule [7]
Isolated mono and disaccharides	✓	✓	✓	✓	✓	✓	✓	✓
Cane / beet sugar	✓	✓	✓	✓	✓	✓	✓	✓
Honey	✓	✓	✓***	✓	✓	✓	✓	✓
Syrups (corn, agave, maple, etc)	✓	✓	✓***	✓	✓	✓	✓	✓
Molasses / treacle	✓	✓	✓	✓	✓	✓	-	-
Fruit sugar (e.g., coconut sugar)	✓	✓	✓	✓	✓	✓	-	-
Malt extract	✓	✓	✓	-	-	✓	-	-
Invert sugar	✓	✓	✓	-	-	✓	✓	-
Nectars	-	✓	-	-	-	✓	✓	-
Fruit juice	-	✓	✗	✓	-	✓	✓	✓
Fruit juice concentrate	✓	✓	✓	✓	-	✓	✓	✓
Fruit purées, pastes, or jam	-	✓	✗	-	-	✓	-	-
Vegetable juice	-	-	✗	-	-	✓	-	✓
Vegetable juice concentrate	-	-	✓	-	-	✓	-	✓
Vegetable purées, pastes, or jam	-	-	-	-	-	✓	-	-
Maltodextrin	✓	✓	✓	-	✓	✗	-	-
Dried fruits	-	-	✗	-	-	✗	-	-
Canned fruits	-	-	-	-	-	✗	-	-
Powdered fruits and vegetables	-	-	-	-	-	✓	-	-
Oligofructose	-	-	-	-	-	✗	-	-

Legend: ✓ included in the definition; ✗ excluded from the definition; - not mentioned in the definition. *ANZ Food Standard Code requirement for 'no added sugar' claim, i.e. if a product contains this component it contains added sugar and cannot make the claim. **According with Swan et al., 2018.[24] ***Except when sold as a single-ingredient item.

Figure 2. Food components commonly included in definitions of added and free sugars



2. Mapping the scientific basis for different sugar classifications

Based on results found in the previous section, we originally selected food components with more inconsistencies regarding their classification as added or free sugars to search for evidence about their relationship with health outcomes. In 2023, we conducted a rapid review to search for additional relevant studies on selected food components that are likely to be the focus of upcoming policy consultations. In this updated version, we combined and summarise our findings and, where relevant, provide context on any associated industry funding of this work. When appropriate, we have also included arguments to include or exclude these food components in a definition of added sugars for Australia and New Zealand.

100% Fruit and vegetable juices

The WHO's guideline recommends that intake of free sugars should not be more than 10% of energy intake per day (or 5% for maximum oral health benefits). The definition of free sugars in this guideline includes both fruit juices and fruit juice concentrates.[12] However, discussions on the classification of fruit juices are controversial, mainly because of general dietary recommendations to eat fruit.

The potential argument for fruit juice as a healthy item centres on the fact that a significant proportion of the population doesn't meet the daily fruit intake recommendation. On the other hand, fruit juice contains a large amount of sugars. These sugars are naturally present in fruit but removed from their natural cellular structure by the juicing process. One juice may contain the sugar equivalent of several pieces of whole fruit. Fruit juices also contain much less fibre than whole fruit.[25] According to data from the 2011–2012 Australian National Nutrition and Physical Activity Survey, fruit juices are one of the main sources of sugar intake for adults and children in the country.[26]

As noted above, the ADGs place significant caveats around fruit juice consumption, and NZ Guidelines do not recommend juice consumption at all. Despite lobbying by the Australian citrus industry for juices to be recognised as healthy (e.g. to receive 5.0 stars in the Health Star Rating system), the full recommendations of both countries' Dietary Guidelines create a strong argument that the sugar in fruit juices be included in future public health nutrition action. In 2021, this was reflected in agreement from Food

Ministers to update to the HSR algorithm and reduce the score of fruit juices, including 100% fruit juices, most of which now receive a HSR of 2.5 to 4.0 depending upon sugar content.[27]

In the United Kingdom, all sugars in drinks aside from naturally present lactose and galactose in dairy drinks are classified as free sugars. This includes the sugars in 100% juices. The basis for including all the sugars in drinks is that drinks have the potential to deliver large amounts of sugar and they have lower satiety effects than do solid foods.[24]

Elsewhere in the global literature, a 2018 review gathered evidence from systematic reviews and meta-analysis about 100% fruit juice and chronic health conditions. Mixed results were found and consumption of 100% fruit juice was associated with an increased risk of caries in children, small increases in long-term weight gain in young children and adults that are likely not clinically significant in normal weight individuals, and a decreased risk of ischemic stroke in a single individual study.[28] Two meta-analyses[29,30] compared the relative risks of 100% fruit juice to sugar-sweetened beverages (SSBs), suggesting there are substantially lower health risks from 100% fruit juice consumption compared with SSBs, however it is worth noting that neither of these drinks is recommended by Dietary Guidelines.

A systematic review with eight prospective cohort studies in children and adolescents and nine randomized controlled trial (RCT) studies in adults assessed the relationship between 100% fruit juice and dental caries or tooth erosion in humans. Overall, prospective cohort studies in children and adolescents found no association between 100% fruit juice intake and tooth erosion or dental caries, but RCT data in adults suggests that 100% fruit juice could contribute to tooth erosion and dental caries.[31]

Our updated literature search identified five additional reviews published during 2020-2023. Three systematic reviews of cohort studies examined 100% fruit juice intake with body size in children, cancer risk in adults and mortality in adults. The body of evidence from 16 cohort studies for children ≤10.9 y indicates that 100% fruit juice consumption makes little or no difference to increased BMI, percentage body fat, or the risk of overweight/obesity (evidence graded low certainty).[32] There is suggestive evidence for 100% fruit juice in raising the risk of cancer, based on two cohort studies examining overall cancer risk but evidence was graded as low certainty.[33] One cohort study comparing those with lower intakes of 100% fruit juice to those with higher intakes found that the latter group was associated with an increased risk of CVD mortality, but authors deemed there to be insufficient number of studies to draw conclusions.[34] We flagged two further reviews as potentially conflicted by industry funding. One systematic review and meta-analysis found 100% orange juice may reduce inflammation, but the authors deemed that results should be interpreted with caution due to moderate risk of bias, very low strength of evidence, and the low number of subjects.[35] One further meta-analyses funded by the European Fruit Juice Association found that RCTs where 100% fruit juice was given to participants for at least seven days found a significant reduction in blood pressure.[36]

Few studies have investigated the sugar content of vegetable juices and its relationship with health outcomes. We identified a literature review of studies about vegetable juices and health outcomes, indicating consumption of vegetable juice can reduce blood pressure.[37] However, most of the studies included had an antioxidant focus and did not pay attention to the sugar content of these beverages. Some vegetables are used as feedstock to produce sugars in syrups due to their high sugar content (e.g., beet, potato, and corn). Peer-reviewed studies on sugar content of packaged food and beverages have demonstrated that fruit and vegetable juices are one of the food categories with highest amounts of free sugar.[38,39] In the United Kingdom, the definition of free sugars includes both fruit and vegetables subject to blending, pulping or macerating which breaks down the cellular structure. The definition states that vegetable purees should be treated in the same way as fruit purees as there is no scientific basis for treating processed fruit and vegetables differently.[24,40]

Maltodextrin

Maltodextrins are carbohydrates produced by enzymatic or acid hydrolysis of different sources of starch (corn, rice, tapioca, potato, or wheat). They consist of a mixture of saccharides, mainly D-glucose, maltose and a series of oligosaccharides and polysaccharides. Since the content of sugar in the maltodextrins can vary (dextrose equivalent), they can play the role of sugar (digestible) or fibre (non-digestible) in a food.[41] Although confusing to the average consumer, both digestible and resistant-to-digestion type of maltodextrins are commercially included as food ingredients under the same name.[42] This may be one of the reasons why maltodextrin is found in the grey area in the discussion about food components included in the added or free sugar definition.

When in digestible form, each gram of maltodextrin has 16 kJ (same as table sugar) and is metabolised in humans in a similar way to sugar.[43,44] Although no causal relationship between consumption of maltodextrin and negative health effects has been reported yet, this does not mean that overconsumption of foods containing maltodextrin will have no effect[44] – especially because maltodextrin is metabolized in a similar way to sugars.

In Canada, maltodextrins (in digestible form) are considered a 'sugars-based ingredient' by Canadian regulation[3] when added to foods or used as a substitute for sweetening agents. In the US, when an ingredient containing mono- and disaccharides created through controlled hydrolysis (e.g. maltodextrin or corn syrup) is added to a food during processing, these mono- and disaccharides contributed by the ingredient need to be declared as added sugars on the label.[45]

In Australia and New Zealand, a food that contains maltodextrin cannot make a 'no added sugars' claim.[16]

Oligofructose

Oligofructose can be considered as an oligosaccharide (fructan). It is usually extracted from chicory root or made by enzymatic hydrolysis of sucrose, and is considered as a natural sweetener. Technologically, oligofructose has properties comparable to those of sucrose and glucose syrups because it has free sugars. However, its sweetness in pure form is 30–50% of that of sucrose, with approximately 5% of sugar content and with approximately 6 kJ/g.[46] It can be used as sugar replacer in bakery products, dairy products, frozen desserts, breakfast cereals, among others.[47,48] Studies evaluating intake of oligofructose have focussed on their prebiotic aspect[49,50] and seem not to evaluate the sugar components of the oligofructose. Public Health England excluded oligofructose from their free sugar definition,[24] and no other regulations currently explicitly mention oligofructose in their added or free sugar definitions. It is possible to suggest that a precautionary approach is relevant, given increasing use of this component as a sugar replacer without high-quality evidence about health effects.

Dried fruits and vegetables

Although the content of nutrients in dried fruits remains similar to the equivalent fresh fruit, technological processes make these fruits rich in sugar simply because the drying process increases the nutrient density, including the sugar content.[24] Some types of dried fruits do not have sugars added during the drying process, e.g. dates, figs, raisins, apricots, peaches, apples, and pears; while others have sugars added, such as cranberries.[11, 24]

Two literature reviews investigating the relationship between dried fruits and dental health found only low-quality evidence available addressing the association of intake of dried fruits and development of dental caries. Potentially positive attributes of dried fruit for teeth are related to the production of saliva (protection for dental caries) but the cariogenic potential of the dried fruits cannot be discarded.[51,52] It is important to note both literature reviews were funded by food companies that produce dried fruits and,

therefore, have a conflict of interest. The ADGs note that dried fruits have high energy density and 'stickiness' which may have implications for dental caries.[14] Similarly, the New Zealand dietary guidelines classify dried fruits as 'very high in sugar' snacks and recommend limiting intake.[15]

In the US nutrition facts label final rule, the FDA said that dried fruits which have not had any sugar added to them should not be considered to contain added sugars. However, if additional sugar is added to the dried fruit then this added amount must be declared on the label as added sugars.[4] In the UK, the Scientific Advisory Committee on Nutrition (SACN) advised that sugars from dried, canned, stewed, or pressed fruits and vegetables fall outside the definition of free sugar. However, if these products are also processed by another method (e.g., blended, pulped, puréed, extruded, or powdered) that breaks the cellular structure, then these fruits and vegetables are treated as free sugars.[11, 24]

In our updated 2023 literature review we found nine systematic reviews that examined the relationship between dried fruit intake and health outcomes including blood pressure, uric acid, adiposity, non-alcoholic fatty liver disease, cancer, inflammation, glucose control and cardiovascular disease. Five reported no associations (all five with authors that may have potential conflict of interest)[53,54,55,56,57] and four reported beneficial relationships (one has several authors that may have a conflict of interest).[58,59,60,61]

Of the three reviews reporting a beneficial effect without any obvious conflict of interest, there was suggestive evidence from 10 RCTs finding that dried fruit intake results in reductions in fasting glucose among those with diabetes mellitus but studies were of low to moderate quality.[58] One review reported dried whole grape intake (raisin alone, raisin within a cardioprotective diet or grape powder) may result in a small significant reduction in systolic blood pressure from pooled data in eight RCTs[59]; and one review of seven observational studies demonstrated a protective effect for weekly dried fruit consumption and some cancers (pancreas, prostate, stomach, bladder and colon), noting that these relationships may not be causal due to reliance on observational data.[60]

In light of the mixed evidence, presence of conflicts of interest, and lack of consistent indications for the health benefits of dried fruit, we feel it important to take a precautionary approach and include dried fruit in a comprehensive added sugars definition. This aligns with dietary guideline recommendations in Australia and New Zealand, and may have benefits in educating consumers that despite any potential health benefits, dried fruit products are very high in sugar and easy to over consume.

Canned fruits and vegetables

No relevant studies investigating canned fruits and vegetables on health outcomes were found.

The ADGs note that 'some processed fruits and vegetables, such as those that are canned or frozen in natural juices, are nutritious alternatives as long as they are produced without added salt, sugar (including concentrated fruit juice) or fat (in particular saturated fat).[14] Canned fruits follow the same logic for dried fruit for the UK free sugar definition,[11, 24] but are not mentioned in US regulation. This suggests that the content of fruit in canned fruit would not be considered added sugars, but any extra sugars or syrups added to preserve this fruit would be.

Powdered fruit and vegetables

No relevant studies investigating powdered fruits and vegetables on health outcomes were found.

Powdered fruit and vegetables are often found in commercial baby foods.[62] Some or all sugars contributed by a powder made from fruit or vegetable juices must be declared as added sugars on the label as required by the US nutrition facts label final rule, depending on the degree of reconstitution in the finished food. These rules consider powdered fruit and vegetable juices made from 100 percent juices sold to consumers with instructions to use water to reconstitute the juice to single strength (100 percent) to be the same as non-powdered 100 percent fruit or vegetable juices. Therefore, sugars in powdered fruit and vegetable juice made from 100 percent juices sold with instructions to reconstitute to single strength do not need to be declared as added sugars, but powdered fruit and vegetables added to replace sugars in other foods (e.g. cacao spreads with date powder) would arguably need to be declared.[4, 45] For the UK, as previously mentioned, sugars naturally present in fruit and vegetables that have been powdered should be treated as free sugars, and this includes single monosaccharides and disaccharides added to foods as an ingredient (including lactose content of whey powder).[24]

Fruit and vegetable purées

Fruit and vegetable purées follow the same logic as dried or powdered fruits – they have a high naturally free sugar content. Because of this, fruit and vegetable purées are included in the UK free sugar definition,[24] and fruit purees are listed as a functional substitute for sweeting agents in Canadian regulation.[3]

Fruit and vegetable purées are a common ingredient in commercial baby and infant foods.[63] The puréeing process used to produce smooth baby foods breaks down intrinsic sugars from fruit and vegetables, making them readily available as free sugars.[24] In addition, baby and infant foods containing purées also commonly contain other added sugar components – concentrated fruit juice being the most common – in their formulation, increasing the free sugar content of these products. Even savoury meals may have fruit purée in their composition.[63] In Australia, the majority of baby and toddler foods sold in supermarkets are ready-made fruit-based products high in sugar from fruits.[64] One study published in 2023 that explored ready-to-use infant pouches in Australia found that of the 276 products analysed, 71% had added fruit puree, and 17% had added fruit juice.[65]

In 2022, the WHO European Regional Office published its final nutrient promotion and profile model to support the appropriate promotion of foods products for infants and young children that includes specific recommendations around fruit purée:[66]

- A threshold allowing only a limited amount (≤ 5% by weight) of processed or concentrated 100% fruit (whole fruit that is puréed or dried) to be used as ingredients (for instance, dried apple and purée of dried strawberries) is proposed in certain categories such as meals;
- Fruit and vegetable purée only to be marketed to infants up to 12 months old and not toddlers;
- No fruit purée to be added to vegetable purées.

Cereal, nut and seed milks

We included a new search for evidence from any time period on the health outcomes of cereal, nut or seed milk consumption in our 2023 update. We found no published systematic reviews. One narrative review and one position paper reported impacts on children. These works reported that aside from soy, most plant milks are lower in nutritional quality (energy, protein, fat, micronutrients) and bioavailability compared to cow's milk.[67] More than 30 published cases demonstrate that replacing breast, cow's milk or infant formula with plant milk (e.g. rice, almond, soy) for infants between 2.5 to

22 months can lead to severe adverse nutritional outcomes (i.e. rickets, failure to thrive, kwashiorkor, anaemia, scurvy).[68] Neither of these studies looked specifically at the sugar content of these products.

In the UK, all sugars in drinks, with the exception of lactose and galactose naturally present in milk and other dairy-based drinks, are defined as free sugars. This includes the sugars naturally present in dairy-alternative drinks such as soya, nut, rice and oat drinks. The basis for including all the sugars in drinks is that drinks have the potential to deliver large amounts of sugar and they have lower satiety effects than solid foods.[24]

Summary of policy treatment and available health evidence in 'grey' areas

We summarize the evidence gathered in this section and some insights from the previous discussion about these food components in Table 3.

Table 3. The scientific basis of sugar classifications for specific food components

Food components	Recommendation to include or exclude from public health nutrition interventions targeting harmful sugars consumption	Arguments
100% fruit juice	Included	High content of free sugar Considered free sugars by WHO Health evidence with tooth erosion and dental caries ADG recommends limiting consumption to occasionally in small servings (125 mL) EAGNZ considers a 'high-sugar' drink, does not include in recommendations for fruit Updates to HSR algorithm in 2021 reduced 100% juice scores
100% vegetable juice	Included (precautionary approach)	Few studies consider the sugar content (most focus on antioxidant content) and health effects Public Health England considers as free sugars when blending, pulping or macerating Contribution to free sugars intake
Maltodextrin	Included	Metabolised in humans in a similar way to sugar (when in a digestible form) Considered as a sugar-based ingredient by Canadian regulation Considered as an added sugar by US food label rule Considered an added sugar by ANZ Food Standards Code for 'no added sugar' claim
Dried fruits	Included (precuationary approach)	High content of sugar Potential dental health harms Results for potential health benefits are mostly from studies with conflicts of interest ADGs recommends limiting consumption EAGNZ classifies as 'very high in sugar' and recommends limiting consumption Public Health England considers as free sugars when processes are applied e.g. concentrates, smoothies, purées, pastes, powdered, extruded
Powdered fruits	Included	High content of free sugar Few studies considering the sugar content and health effects Public Health England considers free sugars
Fruit puree	Included	High content of free sugar Public Health England considers free sugars Considered as a functional substitute for sweetening agents by Canadian regulation
Oligofructose	More evidence needed	Few studies considering the sugar content (most with prebiotic focus) and health effects Not included in any regulatory definition
Sugars in cereal/ nut/seed milks	Included	Public Health England includes all sugars in drinks except lactose and galactose in dairy products

3. A comprehensive definition of 'added' sugars for Australia and New Zealand

FSANZ is currently considering a definition of 'added' sugars to be used in potential improvements to food labelling regulation, for example requirements for added sugars to be quantified in the NIP. Drawing upon the above analysis of existing definitions, the evidence of health harms associated with specific sugar components and an updated literature search, we propose that any definition of 'added' sugars for use in Australia and New Zealand include the food components set out in Table 4 below.

While FSANZ's current directive relates to 'added' sugars, we argue that to genuinely inform consumers and promote healthier choices, a comprehensive definition must capture food components included in 'free' sugar definitions promoted by WHO and most recently applied in the United Kingdom. It should also incorporate additional components that draw on the latest health evidence and respond to industry innovation to 'future proof' the definition where possible. .

While acknowledging that FSANZ's existing mandate is linked to current dietary guidelines, we note New Zealand dietary guidelines already reference free sugars, and that an update of Australian Dietary Guidelines is underway. As the term 'free' sugars becomes more widely used in law and policy, we believe FSANZ's work should be forward-looking and not unduly limited by the semantics of dietary guidelines that have been formally recognised as ready for update. Whatever name these sugars ultimately go by on pack, consumer communication materials will be needed to emphasise that reforms are being implemented to assist them to identify sugars that are harmful to health.

Table 4. List of food components proposed to be included and excluded in a comprehensive definition of 'added' sugars

Included	Excluded
Sugars in whatever form and from whatever source (e.g., cane sugar, beet sugar, white sugar, brown sugar, granulated sugar, icing sugar, fruit sugar, invert sugar, coconut sugar) Monosaccharides and disaccharides isolated from their original food sources and added as an ingredient to foods or drinks (e.g., lactose, lactose in whey powder, galactose, fructose, maltose, isomaltose, glucose, sugar alcohols) All sugars naturally present in processed fruit and vegetables (blended, full strength and diluted juices, pastes, pulps, extruded, puréed, powdered (from juice or any other fruit source), concentrates, nectars) when sugars are no longer in their natural cellular structure Concentrated fruit or vegetable juice Deionised fruit or vegetable juice Dried fruits Syrups derived from plants (e.g., maple syrup, golden syrup, high-fructose corn syrup, glucose syrup, agave syrup, tapioca syrup, coconut syrup, rice syrup), honeys, molasses, treacle, malt and malt extract, starch hydrolysate, maltodextrin and similar products Low energy sugars, including D-Tagatose and D-Allulose Monosaccharides and disaccharides formed or residual from processing, including from hydrolysis and fermentation during the production of a food All sugars naturally present in dairy-alternative drinks such as soya, rice, oat and nut-based drinks	Monosaccharides and disaccharides naturally present in: • Milk and dairy products, specifically lactose and galactose • Fresh and some minimally processed (cut, sliced, diced, peeled, stewed, canned and frozen) fruit and vegetables (including beans and pulses) when sugars remain in their natural cellular structure and no form of sugar has been added • Cereal grains including rice, pasta and flour regardless of processing (other than cereal-based drinks) • Nuts and seeds regardless of processing (other than nut and seed-based drinks) Sugar substitutes that do not contains sugars, such as polyols (sorbitol) and other non-nutritive sweeteners*

*However, complementary approaches to improved labelling of these non-nutritive sweeteners may be considered as part of sugar labelling reforms. See further in practical considerations below.

The exact wording of any definition would be a matter for legislative drafters and will have flow-on effects for reform or repeal of existing requirements e.g. for a 'no added sugar' claim, to ensure consistency across the Food Standards Code.

4. Case Studies – How would the proposed definition play out?

We selected ten products from different food categories where various types of sugars are present. To demonstrate how our proposed definition of 'added' sugars would impact products in practice, we compared which ingredients would be considered as added sugars for the purpose of existing Food Standards Code 'no added sugar' claim requirements, and whether they would be considered as added sugars under our alternative proposal. We then compared the total sugar content currently declared by these products with estimated added sugars content by our proposed definition ***(Table 6)***. We use a method of estimating added sugars content that builds on Ng et al[2] for estimating the weight of ingredients and Louie et al[69] for systematically estimating added sugars content. Further details on these estimates can be requested from the authors.

Our findings show how a broader 'added' sugar definition can take into account food components that are ambiguously perceived as sugar source (e.g., fruit purées), but should be highlighted to consumers to allow them to make informed and ultimately healthier choices.

Table 6. Case study products demonstrating how a proposed definition could apply in practice with estimated added sugar values

Product image and description	Ingredients	Total sugar content (g per 100g), as declared on NIP	Added sugar ingredients		Estimated added sugar content (g per 100g)*
			Considered added sugars for the purpose of 'no added sugars' claim requirements	Considered added sugars within our proposed definition for quantifying in the NIP	
 Toddler food with fruit puree	Wheat Flour, Apple Paste (30%) [Apple Puree Concentrate (48%), Sugar, Glucose, Humectant (Glycerol), Wheat Fibre, Citrus Fibre, Acid (Malic), Natural Flavour, Ground Cinnamon], Dextrose, Water, Wholegrain Oat Flour (5%), Butter (Contains Milk), Sugar, Whey Powder (From Milk), Humectant (Glycerol), Canola Oil, Raising Agent (500, 450, 341, 541), Whey Protein Concentrate (From Milk), Natural Flavour, Emulsifier (Soy Lecithin), Caramelised Sugar, Ground Cinnamon	35.5 g	Sugar Glucose Dextrose Caramelised sugar	Sugar Glucose Dextrose Caramelised sugar Apple puree concentrate Whey powder (from milk) Whey protein concentrate (from milk)	34.7 g
 Common breakfast beverage with maltodextrin	Filtered Water, Skim Milk Powder, Maltodextrin (Wheat, Corn), Cane Sugar, Vegetable Fibre, Soy protein, Vegetable Oils (Sunflower, Canola), Fructose, Cocoa (0.5%), Oat Flour, Mineral (Calcium), Acidity Regulator (332), Flavour, Vegetable Gums (460, 466, 407), Stabiliser (452), Salt, Vitamins (C, Niacin, A, B12, B6, B2, B1, Folate)	6.3 g (n.b. this figure does not include maltodextrin as per food standards requirements for NIP)	Maltodextrin Cane sugar Fructose	Maltodextrin Cane sugar Fructose	6.3 g
 Toddler food with dried fruit	Sultanas, Buckwheat (37%), Organic coconut, Raw Cacao Powder (5%), Organic Coconut Syrup, Omega-3 Fish Oil (1.8%), Sea Salt.	37.0 g	Organic coconut syrup	Organic coconut syrup Sultanas (paste) Organic coconut	37.0 g
 Savoury infant food with fruit no labelled in front	Pumpkin (22%), Tomatoes (20%), Water (16%), Apples (12.5%), Lamb (10%), Sweet Potato (9%), Onion (5%), Cornflour (2.5%), Spinach (1.5%), Ricotta Cheese (1.0%) (Contains Milk), Spice.	3.5 g	None	Pumpkin (purée) Tomato (purée) Apples (purée) Sweet potato (purée) Onion (purée) Spinach (pureé)	3.47 g
 Infant food with mostly fruit puree	Apple (70%), Pea (18%), Broccoli (8%), Spinach (4%)	8.2 g	None	Apple (pureé) Pea (pureé) Broccoli (pureé) Spinach (pureé)	8.2 g

Product image and description	Ingredients	Total sugar content (g per 100g), as declared on NIP	Added sugar ingredients		Estimated added sugar content (g per 100g)*
			Considered added sugars for the purpose of 'no added sugars' claim requirements	Considered added sugars within our proposed definition for quantifying in the NIP	
 Infant food with puree fruit	Banana puree (79%), Strawberry puree (21%)	67.0 g (n.b. there is an asterisk stating: sugars naturally found in the fruit)	None	Banana purée Strawberry purée	67.0 g
 Snack with high amounts of concentrated fruit ingredients	Wholegrain Cereals (30%) (Wholegrain Oats (93%), Wholemeal Wheat Flour), Wheat Flour, White Chocolate (10%) (Sugar, Milk Solids, Cocoa Solids, Emulsifier (Soy Lecithin), Natural Flavour), Invert Sugar, Raw Sugar, Butter (10%) (Cream (Milk), Salt), Raspberry Fruit Pieces (7%) (Fruit (Raspberry Puree (27%), Concentrated Apple Puree (22%), Concentrated Pear Puree (11%), Concentrated Plum Puree (5%), Concentrated Elderberry Juice (0.3%)), Invert Sugar, Sugar, Humectant (Glycerol), Wheat Fibre, Gelling Agent (Pectin), Acidity Regulator (Citric Acid), Natural Flavour), Desiccated Coconut (Coconut , Colour Stabiliser (223 (Sulphites))), Whole Egg Powder, Raising Agents (450, 500), Natural Flavour	28.0 g	Sugar Invert sugar Raw sugar Concentrated elderberry Juice	Sugar Invert sugar Raw sugar Concentrated elderberry juice Raspberry purée Concentrated apple purée Concentrated pear purée Concentrated plum purée Desiccated coconut	27.3 g
 Granola sweetened with dried fruits	Rolled Oats (41%), Dried fruit (17%) (Sultanas, Banana Chips, Sweetened Cranberries, Apple [Preservative (221)]), Sugar, Vegetable Oil, Wheat Flour, Nuts (6%) (almonds, hazelnuts), Coconut, Molasses, Salt, Barley Malt Extract, Cinnamon.	26.0 g	Sugar Molasses Barley malt extract	Sugar Molasses Barley malt extract Dried fruit (Sultanas, Banana Chips, Sweetened Cranberries, Apple) Coconut	21.43 g
 Chocolate with 'no added sugar' claim	Reduced Fat Dark Chocolate [Sweetener (965), Cocoa Mass, Cocoa Butter, Vegetable Emulsifiers (476, 322), Natural Vanilla Flavouring], Orange Pieces (10%) [Apple Puree, Orange Juice, Concentrated Apple Juice, Wheat Fibre, Pectin, Natural Colour (Paprika Extracts), Natural Flavouring], Orange Oil	7.9 g	Concentrated apple juice (n.b. this product makes a no added sugar claim despite presence of fruit juice concentrates in the orange pieces)	Concentrated apple juice Apple puree Orange juice	7.9 g
 Yoghurt with mixed types of added sugars	Milk, Sugar, Milk Solids, Blended Fruit (10%) [Sugar, Mango Puree Reconstituted (25%), Water, Blood Orange Juice Reconstituted (18%), Orange Pulp (10%), Thickener (1442), Natural Flavours, Acidity Regulators (330, 331), Natural Colours (120, 160b)], Yogurt Cultures.	16.6 g	Sugar	Sugar Blended fruit (Mango puree reconstituted, Blood orange juice reconstituted, Orange pulp)	12.7 g

5. *Practical considerations for implementing and monitoring changes to sugar labelling*

Challenges quantifying added sugars

One issue frequently raised by industry stakeholders is that there is no analytical method to distinguish between sugars added to foods and sugars that are naturally occurring in the same product. This issue is potentially relevant to how manufacturers calculate added sugars for labelling requirements, and also how any enforcement body assesses compliance.

Quantifying added sugars without analytical methods

Manufacturers can calculate how much sugar is added to their products using recipe information. In the US, for example, it is the responsibility of manufacturers to determine which ingredients meet the definition of added sugars and to estimate the added sugar content of their products. A variety of supportive tools and databases are provided. Manufacturers may need to work with their suppliers to determine the amount of added sugars in the inputs of a food's formulation.[4,45]

In Australia and New Zealand, manufacturers are currently able to calculate their NIP via a number of prescribed methods.[70] These include laboratory analysis, but also include recipe-based calculations e.g. through the FSANZ Nutrition Panel Calculator, other computer software and food composition tables or databases. These resources could be updated to accompany changes to sugars labelling requirements.

Enforcing added sugars labelling without analytical methods

The FDA requires manufacturers to keep records to substantiate the calculations made for the purposes of enforcement. Recordkeeping requirements apply not only to added sugar but all data within the Nutrition Facts panel to ensure declarations made are accurate, truthful and not misleading, and to facilitate efficient and effective action to enforce the requirements when necessary.[4] The FDA can require food recipes to be confidentially submitted for verification without invoking concerns over proprietary information.

The case of added sugars can also draw from previous approaches in the US to allergen declarations. The US Food Allergen Labelling and Consumer Protection Act of 2004, requires common food allergens to be disclosed on food labels.[71] In passing this legislation,[72] the FDA summarized scientific knowledge regarding food allergens, conceding there are "no validated detection methods or commercially available kits for most food allergens or allergenic proteins." In adopting this precautionary approach, they also recognised that it "is likely that there will be significant scientific advances in the near future" to address these limitations.[73] It could be similarly argued that a requirement to quantify added sugars will incentivize scientific innovation to support both industry stakeholders and food authorities responsible for enforcement in this area.

Where added sugars play multiple functions (e.g. texture, shelf life, sweetening) - lessons from Canada's experience

Another argument put forward by food industry stakeholders is that the addition of sugars to foods can play multiple functions – not only sweetening but also appearance, texture and shelf-life. While this may be true, it does not obviate the need to inform consumers about the presence of these sugars and their quantity to enable them to make informed dietary choices.

The function of added sugars ingredients is an essential component of recent Canadian legislative changes to the ingredients list.[3,74] The definition of sugar-based ingredients includes not only general monosaccharide and disaccharide components and sweetening agents, but also ingredients that are functional substitutes for a sweetening agent. Sweetening agents are acknowledged to also have other functions

including flavouring, preservation and browning/caramelization. Since legislation came into force, Health Canada has been compiling a list of functional substitutes for the purpose of legislation. To be classified as a functional substitute for a sweetener, an ingredient can have one or more functions, provided one of these is a sweetening agent.[74] Online guidance from Health Canada suggests it is the responsibility of manufacturers to demonstrate an ingredient performs a function other than sweetening to support any decision not to group the ingredient with sugars under the new law.

What to do with single-ingredient products e.g. honey and maple syrup

While honey and maple syrup added to products are consistently classified added sugars (Table 2), the US example demonstrates that treatment of these products when sold as single-ingredient items (e.g. a bottle of honey) is more challenging.

After initially being covered by the FDA's definition of added sugars, i.e. 'Added sugars are either added during the processing of foods, or are packaged as such (emphasis added)', they were later subject to a compromise exception. Single-ingredient products, such as pure honey and maple sugar, are now not required to declare the number of grams of added sugars but must still include %DV for added sugars.[4] This exception does not take into account the harmful health effects of the sugar in these products when consumed. Rather, it appears to be the result of a compromise made subsequent to the initial release of legislation and during concurrent passing of a new Farm Bill. This compromise followed arguments made by honey and maple syrup manufacturers that drew upon historical concerns around adulteration of these products.[75] In making this compromise, the FDA diverges from WHO Guidance around free sugars - which include sugars naturally present in honey, syrups, and fruit juices - regardless of whether they are sold as a single ingredient or added to another food item. In a somewhat ungainly concession, the FDA encourages manufacturers to use a footnote inside the Nutrition Facts label explaining the amount of added sugars that one serving of the single-ingredient product contributes to the diet as well as the contribution of a serving of the product toward the percent Daily Value for added sugars.[76]

The contest resulting in this compromise suggests it would be prudent for FSANZ to pre-emptively develop a position on how single-ingredient foods should apply any improved sugars labelling requirements in Australia and New Zealand – particularly because according to Australia Health Survey 2011–2013, honey is a major contributor to free sugars intake in Australia.[77]

We recommend that this position be that the sugars in single-ingredient products like honey and maple syrup be treated on an equal basis with all other foods. From a public health perspective, the health effects of eating these products from the bottle or as an added ingredient in products is the same.

If these products fall outside labelling reforms, it will perpetuate their misleading health halo. Fruit sugars, brown sugars, honey and syrups all have a similar energy density to white sugar, but consumers incorrectly believe that these products are healthier alternatives.[78,79,80,81] For example, in the US, a study conducted after added sugar labelling implementation showed that participants incorrectly assumed that an addition of honey or 100% fruit juices to a product would not constitute added sugars.[82] Possible contributors to this finding are that honey and juice are perceived as 'natural' and therefore not harmful, a perception that may be perpetuated by allowing these products to fall outside mandatory added sugar labelling.

What about substitution of sugars with non-nutritive sweeteners?

A potential benefit of public health policies that target added sugars is that they stimulate manufacturers to reformulate to reduce added sugars in the food supply. This kind of food systems response has potential to deliver population health benefits, even for those consumers who do not read labels. At the same time, caution is needed to ensure that reformulation which is occurring is genuinely ***healthier***, i.e. does not substitute one health-harming ingredient with another.

Although possible to reduce added sugar without replacement, current examples worldwide suggest that a common industrial approach is to substitute added sugars in all or part with non-nutritive sweeteners (NNS) to provide an equally sweet taste without adding energy value.[83] While generally regarded as 'safe', evidence of the long term health implications of widespread NNS is still emerging. This makes it prudent to consider the potential health harms of the increased presence of NNS in the food supply, and precautionary labelling approaches which may ensure at a minimum that consumers are clearly informed about the presence of NNS in their foods.[84]

Currently most manufacturers declare the presence and type of NNS in the ingredients list only. However, there are experiences emerging of labelling requirements globally to increase the visibility of this information for consumers. For example, new front-of-pack nutrition labels in Mexico include a warning for products that contain NNS on the basis that these products are not recommended for children.[7] In Israel, which has both mandatory red stop-signs and a green 'healthy choice' front-of-pack label, products that contain NNS are not eligible to have a green label.[85] The PAHO/WHO nutrient profile model used as a basis for many food policies in Latin America does not allow products containing either artificial or natural non-caloric sweeteners (polyols) in their ingredients to be considered as 'healthy' products.[13]

While not explicitly included in the remit of FSANZ's current work, we strongly encourage any changes to sugars labelling in Australia and New Zealand consider potential reformulation impacts, and parallel policy measures (e.g. requirements to improve visibility of the presence of NNS on the label) to support genuinely healthier reformulation. This would also support the aim of informing consumers, given widespread recognition that consumers are interested in receiving this information.

CONCLUSIONS

Misleading food labels trick many people into thinking the food they are buying is healthy, when it is not. Many people in Australia and New Zealand would like to reduce their consumption of harmful sugars but lack sufficient information on food labels to allow them to make informed choices.

It is promising that the Food Regulatory system is currently considering improvements to sugars labelling. Effective regulations will require a robust, evidence-informed definition of exactly which sugars, and which food components, need to be called out further on labels for this purpose.

This report seeks to contribute directly to this process. Review of added and/or free sugar definitions used elsewhere reveals a substantial degree of overlap in existing definitions, and some areas where care should be taken to ensure regulatory drafting captures evidentiary developments and product innovation in order to protect public health. To genuinely inform consumers about harmful sugars, we suggest a comprehensive definition must include all food components commonly included as 'free' sugars, plus additional components that draw upon the latest health evidence and respond to industry innovation to 'future proof' the definition where possible. Case study products are provided to highlight potential 'loopholes' likely to be exploited by industry to the detriment of health if a narrower definition is adopted.

Lessons from improved sugars labelling in other countries demonstrate that it is feasible for governments to develop, implement, monitor and enforce updates to labels to better identify those sugars that are harmful to health. Now is the time to ensure that consumers in Australia and New Zealand receive the same benefits of improved sugars information on labels to make informed, and ultimately healthier choices.

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Supporting evidence-informed policy work on added sugar

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by Alexandra Jones and Tailane Scapin, The George Institute for Global Health, UNSW, Sydney.

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The George Institute for Global Health

@georgeinstitute www.georgeinstitute.org thegeorgeinstitute

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