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Food & Allergy Consulting & Testing Services

CONSULTING REPORT

To:	Hahn & Hahn Inc P.O Box 55675 Arcadia 0007	**Date:**	May 2016
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INTRODUCTION

Hahn & Hahn Inc, on behalf of *Pioneer Foods Groceries (Pty) Ltd,* has requested that the following services are provided:

Provide a scientific opinion on the following points:

1. How do local and international regulations, and scientific literature, define sugars and added sugars?
2. Define 100% fruit juice blends as per the DAFF fruit juice regulation.
3. Identify the beverage category and compare the nutritional difference between the typical soda drink, a vitamin water product and 100% fruit juice blends.
4. Summary of the nutritional differences of fruit juices in comparison to other options in the identified beverage category.

Please note: FACTS has provided additional points to consider which were identified as important during the compiling of this document but not necessarily requested.

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REPORT

A. DEFINITION OF "SUGARS" AND "ADDED SUGARS" - IN SCIENTIFIC LITERATURE, LOCAL AND INTERNATIONAL REGULATIONS.

According to the "2016 budget people's guide" released by the South African National Treasury and Revenue Services on Sugar-Sweetened Beverages' Tax: "Obesity is a worldwide concern. South Africa has the worst obesity ranking in sub-Saharan Africa. This has led to greater risk of heart disease, diabetes and cancer. Government proposes to introduce a tax on sugar-sweetened beverages on 1 April 2017 to help reduce excessive sugar intake."

The specifics of this tax and which drink categories the Treasury regards as "sugar-sweetened beverages" has to date not been clarified. To determine which sugar sweetened drinks may be subject to a levy, in view of the statement quoted above, it will be beneficial to consider definitions of "Sugar-Sweetened Beverages", in addition to how "sugars" and "added sugars" are defined in scientific papers and by regulatory bodies.

1 DEFINING "SUGAR SWEETENED BEVERAGES"

1.1 SCIENTIFIC PAPERS AND OPINIONS

The paper "Effects of Sugar-Sweetened Beverages on Children" defines:

> "Sugar-sweetened beverages" (SSBs) as beverages containing *added caloric sweeteners* such as *sucrose*, *high-fructose corn syrup* (HFCS), or *fruit-juice concentrates*, which include but are not limited to *soft drinks*, *fruit drinks*, *sports drinks*, *energy* and *vitamin water drinks*, *sweetened iced tea*, and *lemonade*, among others."[1]

From a South African Perspective: A sugar tax has also been advocated for some years by Prof. Karen Hoffman of Priceless SA - a unit of Wits University's School of Public Health[2]. She defines sweetened sugar beverages (SSBs) as including the following:

> "Still and carbonated soft drinks, fruit juices, sports drinks, energy drinks and vitamin waters, sweetened ice tea, lemonade, cordials and squashes."[3]

1.2 SOUTH AFRICAN REGULATIONS

Currently there exists no definition for the term "Sugar-sweetened beverages", however there are some regulatory definitions for the elements contained in the definition from the scientific paper "Effects of Sugar-Sweetened Beverages on Children" quoted above, namely:

1.2.1 'SOFT DRINKS, FRUIT DRINKS, SPORTS DRINKS, ENERGY AND VITAMIN WATER DRINKS, SWEETENED ICED TEA, AND LEMONADE'

According to the Foodstuffs, Cosmetics and Disinfectants Act 54 of 1972, *Soft drinks*, R.1769/1985, as amended:

"**soft drink**" shall mean any powder or liquid intended for sale as a drink for human consumption, either without or after preparation or dilution, and shall include—

(a) any fruit or vegetable drink;

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[1] **Effects of Sugar-Sweetened Beverages on Children,** Andrew A. Bremer, MD, PhD; Robert H. Lustig, MD**,** *Pediatric Annals*, January 2012 - Volume 41 · Issue 1: 26-30,Posted January 1, 2012, DOI: 10.3928/00904481-20111209-09

[2] http://www.sabc.co.za/news/a/912421804c78a78a9928db3b0fa74342/Sugar-tax-could-sweeten-SA-coffers:-Priceless-SA- -20162004

[3] http://www.fin24.com/Budget/the-secrets-out-sa-to-get-a-sugar-tax-20160224 Also see: **The Potential Impact of a 20% Tax on Sugar-Sweetened Beverages on Obesity in South African Adults**: A Mathematical Model, Mercy Manyema , Lennert J. Veerman, Lumbwe Chola, Aviva Tugendhaft, Benn Sartorius, Demetre Labadarios, Karen J. Hofman: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0105287#s1 – which defines SSBs as: 'carbonated sweetened drinks, sweetened fruit juices and squash concentrates'.

(b) soda water, Indian or quinine tonic water, natural spring water and any sweetened artificially carbonated water, whether flavoured or unflavoured;
(c) ginger beer and any herbal or botanical beverage; but shall not include—
  (i) water (except as aforesaid);
  (ii) fruit juice, sweetened or unsweetened, controlled under the Marketing Act, 1968 (Act 5 9 of 1968), whether sweetened or unsweetened, and whether concentrated or frozen or not;
  (iii) milk or any preparation of milk;
  (iv) tea, coffee, cocoa or chocolate, or any preparation thereof;
  (v) any egg product;
  (vi) any cereal product, except—
    (aa) flavoured barley water and liquid products used in the preparation of barley water; and
    (bb) any liquid produced from cereal and containing alcohol, which does not fall within one of the following categories:
      (aaa) drinks referred to in subparagraph (viii) hereof;
      (bbb) drinks falling within the provisions of the Sorghum Beer Act, 1962 (Act 63 of 1962);
      (ccc) drinks traditionally known as maheu with a maximum total alcohol content of 1% by volume;
  (vii) meat or yeast extracts, soup or soup mixtures;
  (viii) any drink falling within the provisions of the Liquor Act, 1928 (Act 30 of 1928);
  (ix) any other unsweetened drink; or
  (x) any drink falling within the provisions of the Wine, Other Fermented Beverages and Spirits Act, 1957 (Act 25 of 1957); and

1.2.2 'ADDED CALORIC SWEETENERS'
- According to the Foodstuffs, Cosmetics and Disinfectants Act 54 of 1972, *Soft drinks*, R.1769/1985, as amended:
"**sweetened**" shall mean containing any added permitted sweetener, and "unsweetened" shall mean containing no added permitted sweetener.

- According to the Foodstuffs, Cosmetics and Disinfectants Act 54 of 1972, *Regulations relating to the use of sweeteners in foodstuffs*, R.733/2012:
"**non-nutritive-sweetener**" means a sweetener or a mixture of non-nutritive sweeteners, of which the level of sweetening equals 5 g of sucrose and does not have an energy value of more than 8 kJ;
"**sweetener**" means any food additive which is used or intended to be used—
(a) To impart a sweet taste to foodstuffs; or
(b) To be added to a foodstuff as a table-top sweetener.

- According to The Foodstuffs, Cosmetics and Disinfectants Act 54 of 1972, *Regulations relating to foodstuffs for infants and young children*, R.991/2012, as amended:
"**sweeteners**" means any substance listed as a sweetener in table 1 of the General Standard for Food Additives (GSFA) of the Codex Alimentarius Commission, or a mixture of two or more thereof;

Please see the list of sweeteners as an excerpt from General Standard for Food Additives (GSFA) of the Codex Alimentarius Commission[4], in table A.1 below:

[4] P 233 of 271: *CODEX STAN 192-199:* Codex Alimentarius Commission

Food Category No. 11.6	Table-top sweeteners, including those containing high-intensity sweeteners			
Additive	INS	Year Adopted	Max Level	Notes
ACESULFAME POTASSIUM	950	2007	GMP	188
ALITAME	956	2007	GMP	
ASPARTAME	951	2007	GMP	191
BENZOATES	210-213	2003	2000 mg/kg	13
CARAMEL IV - SULFITE AMMONIA CARAMEL	150d	2011	1200 mg/kg	213
CYCLAMATES	952(i), (ii), (iv)	2007	GMP	17
ETHYLENE DIAMINE TETRA ACETATES	385, 386	2005	1000 mg/kg	21 & 96
NEOTAME	961	2007	GMP	
PHOSPHATES	338; 339(i)-(iii); 340(i)-(iii); 341(i)-(iii); 342(i),(ii); 343(i)-(iii); 450(i)-(iii),(v)-(vii); 451(i),(ii); 452(i)-(v); 542	2009	1000 mg/kg	33
POLYETHYLENE GLYCOL	1521	2001	10000 mg/kg	
POLYVINYLPYRROLIDONE	1201	1999	3000 mg/kg	
SACCHARINS	954(i)-(iv)	2007	GMP	
SORBATES	200-203	2010	1000 mg/kg	42 & 192
STEVIOL GLYCOSIDES	960	2011	GMP	26
SUCRALOSE (TRICHLOROGALACTOSUCROSE)	955	2007	GMP	

1.3 INTERNATIONAL DEFINITIONS:

Mostly, the International definitions are not currently regulated, and are made by national health care agencies and organisations:

1.3.1 THE WORLD HEALTH ORGANISATION (WHO)

The World Health Organisation (WHO) provides the following definition of SSBs:

> Sugar-sweetened beverages contain added sugars such as sucrose or high fructose corn syrup and a 330ml or 12oz portion of sugar-sweetened carbonated soft drink typically contains some 35g (almost nine teaspoons) of sugars and provides approximately 140 kcal of energy, generally with little other nutritional value.[5]

1.3.2 AUSTRALIA

Australian National Preventive Health Agency states in their report "Obesity: Sugar-Sweetened Beverages, Obesity and Health" that "the term:

> 'sugar-sweetened beverages' is defined differently in different surveys and by different researchers. It usually encompasses sugar-sweetened soft drinks as well as cordials, sugar-sweetened fruit drinks, sports drinks, iced teas and energy drinks. It sometimes includes flavoured milks, milkshakes and smoothies and very occasionally 100% fruit juice. In Australia, the added sugar is predominantly sucrose.

[5] World Health Organization (2014) Reducing consumption of sugar-sweetened beverages to reduce the risk of unhealthy weight gain in adults: http://www.who.int/elena/bbc/ssbs_adult_weight/en/

Sugar-sweetened beverages do not include artificially sweetened (or sometimes termed "intense sweeteners") versions of those drinks.

A number of newer beverages such as play and vitamin waters, iced frappes and iced lattes have not been captured in previous surveys but are sweetened with sugar and thus would be considered as sugar sweetened beverages.[6]

Sugar-sweetened beverages such as soft drinks, cordials and sports drinks are easy to identify and define; they do not constitute an integral part of a meal; consumption requires a conscious decision; and there are direct substitutes. These drinks are of limited nutritional value and there is general acceptance by health professionals of the value of reducing their consumption."[7]

1.3.3 UK

The British Medical Association (BMA) defines SSBs as:

"All non-alcoholic water based beverages with added sugar, including sugar-sweetened soft drinks, energy drinks, fruit drink, sports drinks and fruit-juice concentrates."[8]

While the research paper "Taxing Sugar Sweetened Beverages: a Comparative Perspective" states that:

"The broader industry category of SSBs includes carbonated drinks, still drinks, juice drinks, squash-style drinks, pure fruit juices and bottled waters (flavoured and unflavoured; carbonated and un-carbonated)."[9]

1.3.4 USA:

1.3.4.1 The Public Health Law Center provides the following definition, in relation to policies to reduce the consumption of sugar drinks:

"Sugar drinks" includes all beverages that are sweetened with various forms of sugars that add calories. Sugar drinks include, but are not limited to, carbonated sodas, sports and energy drinks, sweetened rice and dairy beverages, lemonade and other fruit-ades (sic), sweetened teas and coffees and other sweetened fruit drinks. They do not include liquids containing only naturally-occurring sugars, such as natural fruit juices."[10]

1.3.4.2 The Federal Agency; Centers for Disease Control and Prevention (CDC), in its 'Guide to Strategies for Reducing the Consumption of Sugar-Sweetened Beverages' defines"

"Sugar-Sweetened Beverages" as those that contain caloric sweeteners and include:

- Soft drinks: Non-alcoholic, flavored, carbonated or non-carbonated beverages usually commercially prepared and sold in bottles or cans
- Soda, pop, soda pop: Same as soft drink
- Fruit drinks, punches, or ades: Sweetened beverages of diluted fruit juice
- Sports drinks: Beverages designed to help athletes rehydrate, as well as replenish electrolytes, sugar, and other nutrients
- Tea and coffee drinks: Teas and coffees to which caloric sweeteners have been added
- Energy drinks: Most energy drinks are carbonated drinks that contain large amounts of caffeine, sugar and other ingredients, such as vitamins, amino acids, and herbal stimulants
- Sweetened milks or milk alternatives: Beverages prepared by blending sweetened powder or syrup and milk*

[6] p12 of of Obesity: Sugar-Sweetened Beverages, Obesity And Health https://sydney.edu.au/medicine/public-health/menzies-health-policy/publications/Evidence_Brief_Sugar_sweetened_Beverages_Obesity_Health.PDF

[7] p16 of Obesity: Sugar-Sweetened Beverages, Obesity And Health https://sydney.edu.au/medicine/public-health/menzies-health-policy/publications/Evidence_Brief_Sugar_sweetened_Beverages_Obesity_Health.PDF

[8] BMA (2015) Food for thought: promoting healthy diets among children and young people: http://bma.org.uk/working-forchange/improving-and-protecting-health/food-for-thought/sugary-drinks-in-the-media

[9] Taxing Sugar Sweetened Beverages: a Comparative Perspective: http://www.niassembly.gov.uk/globalassets/documents/raise/publications/2015/hssps/13815.pdf

[10] http://publichealthlawcenter.org/topics/healthy-eating/sugar-sweetened-beverages

**Though the body's response to added sugar in milk may differ from that of other SSBs because of the presence of protein and other nutrients, adding sugar to milk substantially increases the calories per serving.*[11]

1.3.4.3 As an example of regulatory definitions of SSBs: The Californian Senate Bill of 2013: SB 622. Taxation: sweetened beverage tax: Children's Health, has the following definitions:

"Sweetened beverage" means any sweetened non-alcoholic beverage sold for human consumption that has caloric sweeteners and contains more than 25 calories per 12 ounces (105 kJ per 350 mls), including, but not limited to, the following: soda water, ginger ale, root beer, all beverages commonly referred to as cola, lime, lemon, lemon-lime, and other flavored beverages, including any fruit or vegetable beverage containing less than 50 percent natural fruit juice or natural vegetable juice or combined natural fruit juice and natural vegetable juice, and all other drinks and beverages commonly referred to as "soda," "soda pop," "soft drinks," "sports drinks," "energy drinks," "juice drinks," "ice teas," and "vitamin fortified waters.

"Sweetened beverage" does not include any of the following:

(A) Any product sold in liquid form for consumption by infants, which is commonly referred to as "infant formula" or any product whose purpose is infant rehydration.

(B) Any product sold in liquid form for use for weight reduction.

(C) Water, to which no caloric sweeteners have been added.

(D) Milk or milk products.

(E) Medical food.

(F) Any sweetened beverage containing 50 percent or more of natural fruit juice or natural vegetable juice or combined natural fruit juice and natural vegetable juice.

(u) "Syrup" means the liquid mixture of ingredients used in making, mixing, or compounding sweetened beverages using one or more other ingredients including, without limitation, water, ice, a powder, simple syrup, fruits, vegetables, fruit juice, vegetable juice, or carbonation or other gas." [12]

SUMMARY OF HEALTH CARE ORGANISATION DEFINITIONS FOR SSBS:

Country	Common factors listed in definitions		Beverages specifically excluded from definitions
AUSTRALIA (Australian National Preventive Health Agency)	-sugar-sweetened soft drinks -cordials, -sugar-sweetened fruit drinks, -sports drinks, -iced teas -energy drinks.	- sometimes includes: flavoured milks, milkshakes and smoothies - very occasionally 100% fruit juice	artificially sweetened versions of SSBs
UK (British Medical Association)	-non-alcoholic water based beverages with added sugar, -sugar-sweetened soft drinks, -energy drinks, -fruit drink, -sports drinks -fruit-juice concentrates	- carbonated drinks, -still drinks, -juice drinks, -squash-style drinks, -pure fruit juices - -bottled waters (flavoured and unflavoured; carbonated and un-carbonated)	none
USA (Public Health Law Center and CDC)	Beverages containing caloric sweeteners ('SSBs' definition)		liquids containing only naturally-occurring sugars, such as natural fruit juices ('sugar drinks' definition)

[11] http://www.cdph.ca.gov/SiteCollectionDocuments/StratstoReduce_Sugar_Sweetened_Bevs.pdf

[12] SB 622. Taxation: sweetened beverage tax: Children's Health: (2013-2014) https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201320140SB622

2 DEFINING "SUGARS"

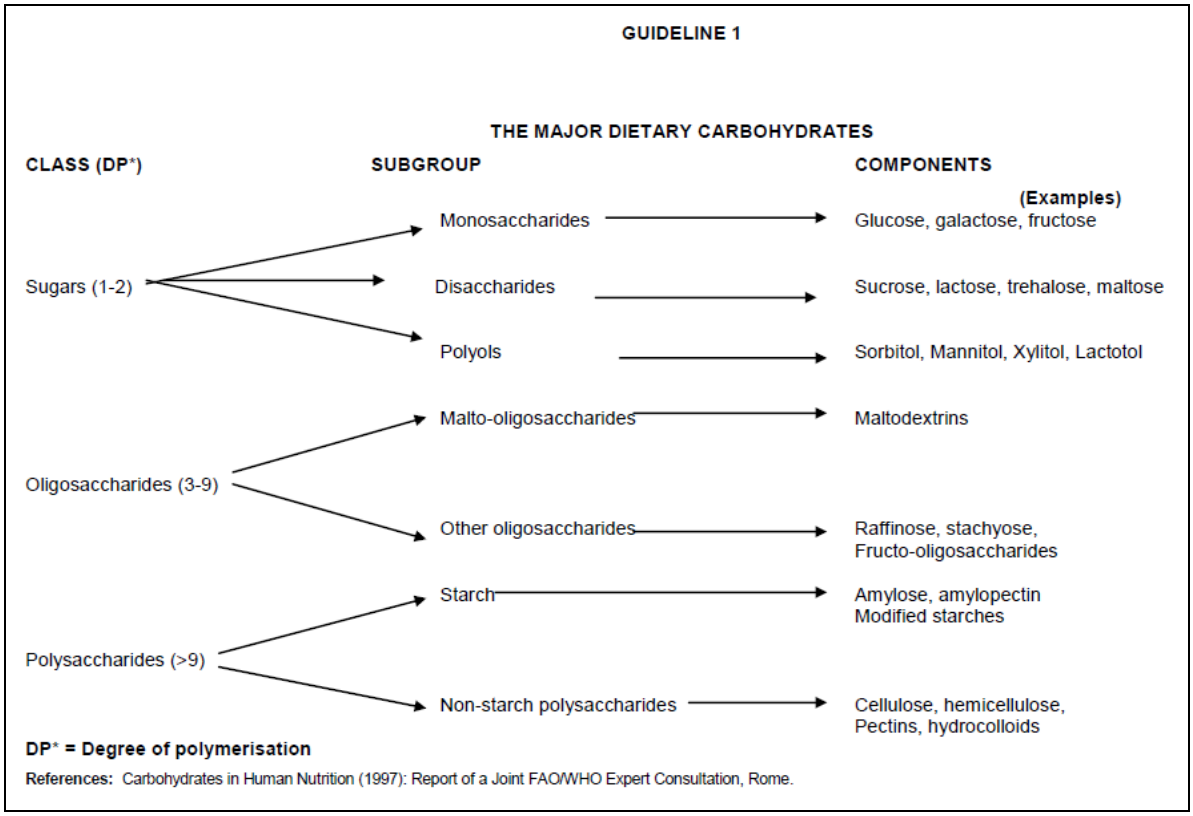
2.1 SCIENTIFIC PAPER

The FAO/WHO Scientific Update on carbohydrates in human nutrition published in the supplement of the European Journal of Clinical Nutrition in 2007 included a paper on "Carbohydrate terminology and classification." authored by well-respected opinion leaders Cummings and Stephen. The publication states: "*Many terms exist to describe sugars in the diet. The most useful are total sugars and their division into mono- and disaccharides. The use of other terms creates difficulties for the analyst, confusion for the consumer and suggests properties of foods that are not related to sugars themselves, but to the food matrix.*"

2.2 SOUTH AFRICAN REGULATIONS

- The Foodstuffs, Cosmetics and Disinfectants Act 54 of 1972, *Regulations on labelling and advertising of foodstuffs* R.146/2010, as amended, (R.146), includes the following definitions:

- "**total carbohydrates**" means the sum of the mono-, di- oligo- and polysaccharides as indicated in Guideline 1. See Guideline 1, in table A.2 below:



- "**total sugar**" means the sum of all intrinsic and added sugars (the definition for "added sugar" is detailed in section 3.2 below).
- "**intrinsic sugar**" means sugars that are naturally occurring and which form an integral part of certain unprocessed foodstuffs, the most important being whole fruits and vegetables, that are enclosed in the cell, (mainly fructose, glucose and sucrose) and which are always accompanied by other nutrients.

- According to The Foodstuffs, Cosmetics and Disinfectants Act 54 of 1972, *Regulations regarding food, drugs and disinfectants*, R.575/1930, as amended:

27. Sugar, confectionery, dextrose and icing sugar.—(1) Sugar (sucrose) is the product obtained from the juice of the sugar cane and/or the sugar beet.

(a) Refined sugar shall be white, dry, odourless, granulated sucrose, readily soluble in cold water. It shall have no taste other than sweetness. Its sulphated ash content shall not exceed 0,03 per cent and not more than 0,03 per cent of reducing sugars. It shall not contain more than 0,06 per cent of moisture.

(b) Mill-white sugar shall be almost white, dry, odourless, granulated sucrose, soluble in cold water. Its sweet taste shall be not more than slightly suggestive of that of molasses. Its sulphated ash content shall not exceed 0,10 per cent and not more than 0,03 per cent of reducing sugar shall be present. It shall not contain more than 0,06 per cent of moisture.

(c) Government grade sugar shall be not more than light golden brown in colour, and shall be readily soluble in cold water. The taste shall be sweet and may be suggestive of molasses.

(d) Castor sugar shall be refined sugar of such fineness of grain that not more than 3 per cent will fail to pass through a sieve with 35 meshes to the inch and not more than 5 per cent shall pass through a sieve with 150 meshes to the inch. It may contain tricalcium phosphate in an amount not exceeding 1 per cent or starch in an amount not exceeding 3 per cent.

- According to The Foodstuffs, Cosmetics and Disinfectants Act 54 of 1972, *Regulations governing microbiological standards for foodstuffs and related matters*, R.692/1997, as amended:
"**sugars**" means dextrose, dextrose syrup, fructose, fructose syrup, glucose, glucose syrup, invert sugar, lactose, maltose, maltose syrup, sucrose and xylose; and

2.3 INTERNATIONAL DEFINITIONS:

CODEX ALIMENTARIUS STANDARD	EUROPEAN UNION REGULATIONS	AUSTRALIAN & NEW ZEALAND REGULATIONS
The *CODEX STANDARD FOR SUGARS* (CODEX STAN 212-1999) applies to the following sugars: • White sugar • Plantation and mill white sugar (or any other equivalent name accept in the country of origin in which it is sold) • Powdered sugar (icing sugar) • Soft white sugar • Soft brown sugar • Dextrose anhydrous • Dextrose monohydrate • Powdered dextrose (icing dextrose) • Glucose syrup • Dried glucose syrup • Lactose • Fructose (laevulose) • Raw cane sugar	The *COUNCIL DIRECTIVE 2001/111/EC* of December 2001 relating to certain sugars intended for human consumption applies to the following products: • Semi-white sugar • Sugar or white sugar • Extra-white sugar • Sugar solution • Invert sugar solution • Invert sugar syrup • Glucose syrup • Dried glucose syrup • Dextrose or dextrose monohydrate • Dextrose or dextrose anhydrous • Fructose Fruit juice regulations of countries that follow Codex, such as the UK refer to the EU definition for sugars.	The *Australia New Zealand Food Standards Code* (Standard 2.8.1 – Sugars) provides specific definitions for sugar and related products. The Standard also sets a compositional requirement for white sugar. In the *Australia New Zealand Food Standards Code* sugars means – (a) hexose monosaccharides and disaccharides, including dextrose, fructose, sucrose and lactose; or (b) starch hydrolysate; or (c) glucose syrups, maltodextrin and similar products; or (d) products derived at a sugar refinery, including brown sugar and molasses; or (e) icing sugar; or (f) invert sugar; or (g) fruit sugar syrup; derived from any source, but does not include – (h) malt or malt extracts; or

		(i) sorbitol, mannitol, glycerol, xylitol, polydextrose, isomalt, maltitol, maltitol syrup or lactitol.

3. DEFINING "ADDED SUGARS"

3.1 SCIENTIFIC PAPER

The Cummings and Stephen's paper "*Carbohydrate terminology and classification*" in the European Journal of Clinical Nutrition in 2007 state "Added sugars are defined as those sugars added to foods and beverages during processing or home preparation. This would include sugars listed in the ingredient list on a food product, including honey, molasses, fruit juice concentrate, brown sugar, corn sweetener, sucrose, lactose, glucose, high-fructose corn syrup and malt syrup."

3.2 SOUTH AFRICAN REGULATIONS

R. 146 states that the claim "no sugar added" or "no added sugar" or other words with a similar meaning shall not be made on the label of a foodstuff that contains added sugars defined by these regulations.

"**Added sugar**" means any sugar added to foodstuffs during processing and includes but is not limited to sugar as defined by Regulations Relating to the Use of Sweeteners in Foodstuffs under the Act, honey, molasses, sucrose with added molasses, coloured sugar, fruit juice concentrate, deflavoured and/or deionised fruit juice and concentrates thereof, high-fructose corn syrup and malt or any other syrup of various origins. *(Commentary: this definition of "**added sugar**" is interpreted by FACTS to be honey, molasses, sucrose with added molasses, coloured sugar, fruit juice concentrate, deflavoured and/or deionised fruit juice and concentrates thereof, high-fructose corn syrup and malt or any other syrup of various origins PLUS sugar as defined by Regulations Relating to the Use of Sweeteners in Foodstuffs under the Act.)*

3.3 INTERNATIONAL DEFINITIONS:

EUROPEAN UNION REGULATIONS	CODEX ALIMENTARIUS STANDARD
REGULATION (EC) No 1924/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 December 2006 on nutrition and health claims made on foods: With regards to "WITH NO ADDED SUGAR": A claim stating that sugars have not been added to a food, and any claim likely to have the same meaning for the consumer, may only be made where the product does not contain any added mono- or disaccharides or any other food used for its sweetening properties. If sugars are naturally present in the food, the following indication should also appear on the label: 'CONTAINS NATURALLY OCCURRING SUGARS'. In 2012 the specific provisions of Directive 2001/112/EC concerning the labelling of fruit juices and similar	In 2012 the Codex Alimentarius Commission adopted amendments by adding a section on "non-addition of sugar" to the Guidelines for the use of nutrition and health claims (CAC/GL 23-1997): *"7. Non-addition of sugars* *Claims regarding the non-addition of sugars to a food may be made provided the following conditions are met.* *(a) No sugars of any type have been added to the food (Examples: sucrose, glucose, honey, molasses, corn syrup, etc.);* *(b) The food contains no ingredients that contain sugars as an ingredient (Examples: jams, jellies, sweetened chocolate, sweetened fruit pieces, etc.);*

products was amended (by DIRECTIVE 2012/12/EU) in line with the Codex standard on juices to reflect the new rules on authorised ingredients, such as those pertaining to the addition of sugars, which are no longer authorised in fruit juices. "Sugars" refers to: • sugars as defined by Council Directive 2001/111/EC of 20 December 2001 relating to certain sugars intended for human consumption (see point 1.3 above); • fructose syrup; and • sugars derived from fruits. Since the addition of sugars was previously allowed, it was common that food business operators labelled the absence of added sugars in the fruit juices for commercial reasons by means of nutrition claim "with no added sugars". Prohibiting the addition of sugar to juices however also has consequences for labelling of juices as industry will no longer be able to make "no added sugar" claims on any juices. This is because it would contravene food labelling rules by suggesting that a juice possesses special characteristics (i.e. no added sugar) when in fact no juices will contain any added sugars.	*(c) The food contains no ingredients containing sugars that substitute for added sugars (Examples: non-reconstituted concentrated fruit juice, dried fruit paste, etc.); and* *(d) The sugars content of the food itself has not been increased above the amount contributed by the ingredients by some other means (Example: the use of enzymes to hydrolyse starches to release sugars)."*

SUMMARY OF THE DEFINITION OF "SUGARS" AND "ADDED SUGARS"- IN SCIENTIFIC LITERATURE, LOCAL AND INTERNATIONAL REGULATIONS:

Codex and international regulations are similar in that there is a general consensus of how sugars are defined, being those sugars added to foods and beverages during processing or home preparation, with some regulatory authorities having only a few sugars on the list, and others including more. In contrast, South African regulations have classified sugars based on chemistry.

B. Definition of "100% fruit juice blends"
- as per the DAFF fruit juice regulation.

1. BACKGROUND INFORMATION

The industry body SAFJA (South African Fruit Juice Association) states that:

"all fruit juice contains sugar because fruit itself naturally contains sugar. The natural sugar content of fruit is between 8% and 12%, but the actual levels vary from fruit to fruit and with the stage of ripeness of the fruit as well as the geographical location where the fruit was grown.
Some form of sugar, based on the amount already present in the juice, is also added to the fruit pulp when making commercial fruit juice and serves two main purposes.

The first is that clarified apple, pear or grape juice is added to fruit pulps such as guava and mango to obtain a drinkable fruit juice. This is because these fruits generally contain so much pulp, that they are too thick to drink and so need to be diluted.

The second reason for adding clarified apple, pear or grape juice, is because many consumers demand a sweeter product than the natural juice sweetness. Sucrose, in the form of a sugar syrup, or clarified juice is used to obtain a cheaper beverage such as a nectar or fruit drink. The regulations have a set sugar content for the different types of fruit juice."[13]

2. DEFINITIONS FOR "100% FRUIT JUICE BLENDS"

With reference to the *Regulations Relating to the Classification, Packing and Marking of Fruit Juice and Drink Intended for Sale in the Republic of South Africa*, R.286/1980, as amended (R.286):

There is no specific definition of "100% fruit juice blends" in R.286/1980, however this regulation contains the following definitions and quality standards/classifications which are of relevance:

2.1 "fruit juice and drink" means a substance which is intended to be used as a drink, whether with or without the addition of any other substance, and—
(a) which is solely or partially prepared from fruit or which in appearance, flavour and taste resembles juice derived from fruit; or
(b) on the container of which there appears any depiction or representation of, or reference to fruit, but does not include wine, other fermented beverages and spirits as defined in the Wine, Other Fermented Beverages and Spirits Act, 1957 (Act 25 of 1957);

2.2 When reading R.286 it can be seen that the word 'juice' can only be used for either a 'Fresh Fruit Juice' or 'Unsweetened Fruit Juice' which consists of a 100% fruit juice in the ready to drink form, while the word 'drink' may only be used for a 'fruit drink' product which contains minimum of 6% fruit juice in the ready to drink form; the word 'nectar' for a 'fruit nectar' product which contains minimum of between 12.5 % to 50% (this % depends on the prescribed Brix values per fruit) fruit juice in the ready to drink form; and, the word 'squash' for a 'fruit squash' which contains minimum of 24% fruit juice in the undiluted form. R.286 is particular in that the fruit has to be specified, and classification standards are set for the following fruit/categories, namely: Apple, Apricot, Grape, Granadilla, Guava, Pear, Peach, Pineapple, Citrus, Blended and Unspecified fruit.

According to this classification a 100% 'Unsweetened [specified fruit] Juice' will be one which, among other requirements 'in the ready-to-drink form, has a minimum natural juice content at standard strength of 100%' and a °Brix value of not less than the °Brix value specified for the fruit. While a 100% "Unsweetened X Juice",

[13]SAFJA Frequently Asked Questions: Does fruit juice contain sugar?:http://www.safja.co.za/safja-faq.html

among other requirements, "in the ready-to-drink form, has a minimum natural juice content of 100% and a °Brix value of not less than 12,0 °Brix." Where 'X' is the name of a fruit which is unspecified in R.286.

2.3 Interestingly, the classification standards for 'Fresh Blended Fruit Juice' or 'Unsweetened Blended Fruit Juice' do not specify the percentage (%) minimum natural juice content in their classification, as can be seen from the excerpt from R.286 below:

Fresh Blended Fruit Juice

(5) Blended Fresh Fruit Juice shall consist of the natural juice or purée or pulp of two or more fruit species as extracted from fruit of a good quality and which—
  (a) contains no additives;
  (b) has not been subjected to any preserving process other than chilling;
  (c) is clean and free from foreign matter;
  (d) is practically free from seeds, bits of seed or bits of peel, excluding cases where granadilla juice is contained in a fresh fruit juice blend in which case it may contain granadilla seeds; and
  (e) is intended to be sold for consumption within two hours of extraction thereof and is so sold.

Unsweetened Blended Fruit Juice

(6) Unsweetened Blended Fruit Juice shall consist of the natural juice or purée of pulp of two or more fruit species prepared from fruit of a good quality which—
  (a) contains no additives other than permitted preservatives, natural essence of the fruit concerned, ascorbic acid and carbon dioxide;
  (b) is clean and free from foreign matter other than the additives mentioned in paragraph
  (c) is free from seeds, bits of seed or bits of peel excluding cases where granadilla juice is contained in a unsweetened fruit juice blend in which case it may contain granadilla seeds;
  (d) is free from deterioration or spoilage;
  (e) has the characteristic flavour and colour of natural juice or purée of pulp when blended in the ratio concerned: Provided that this specification shall not apply to unsweetened blended fruit juice intended as an addition to any drink or where deflavoured juices are blended and all relevant information is declared on the container;
  (f) has been effectively treated against deterioration and spoilage by means of any permitted method: Provided that if preserved by heat in hermetically-sealed containers—
    (i) the container, if packed under vacuum, shall have a minimum vacuum of 17 kPa; and
    (ii) the juice shall be free from spoilage in excess of 0,25% of the containers in the consignment; and
  (g) in the ready-to-drink form has a minimum °Brix which, as the case may be, complies with the weighted average of the °Brix values of the different kinds of natural juice, as prescribed in these regulations contained in the blend.

2.4 The percentage of juice, refers to the strength and prescribed °Brix value* of the juice. In this context see the definitions of: "standard strength" or "single strength" in relation to natural juice or purée or pulp, means the strength of natural juice or purée or pulp at—
10,5 °Brix in the case of apple juice;
11,0 °Brix in the case of apricot purée;
12,5 °Brix in the case of grape juice;
9,0 °Brix in the case of granadilla juice;
8,0 °Brix in the case of guava purée;
8,6 °Brix in the case of orange juice;
8,5 °Brix in the case of mandarin juice;
12,0 °Brix in the case of pear purée;

12,0 °Brix in the case of peach purée;
8,0 °Brix in the case of grapefruit juice;
9,5 °Brix in the case of pineapple juice;
7,5 °Brix in the case of lemon and lime juice; and in the case of blended fruit juice, the weighted average of the Brix-values of the fruit juices at standard strength of the species concerned as specified above;

* *Note: there is a dispensation regarding the minimum brix and juice/puree requirements which was released on 25 February 2015.*

2.5 For a definition of °Brix, please see below, as defined by R.286:
"°Brix" means the percentage (m/m) of total dissolved solids as determined either—
(a) directly by means of a suitable hydrometer calibrated and standardised at 20 °C (no correction for acids); or
(b) indirectly by means of a refractometer calibrated at 20 °C on the International Sucrose Scales (plus correction for acids calculated as anhydrous citric acid or the dominant acid of the fruit type concerned);

SUMMARY OF THE DEFINITION OF 100% FRUIT JUCIE BLENDS AS PER THE DAFF REGULATIONS

As described above, the South African DAFF regulations categorise the fruit juices available on the SA market currently, and in doing so, stipulate the °Brix a fruit juice product is permitted to contain, and therefore its sugar content as well.

C. Comparison of the nutritional difference between: - the typical soda drink, a vitamin water product, and 100% fruit juice blends.

Please see below for table C.1: Comparison of the nutritional difference between the typical soda drink, a vitamin water product, and 100% fruit juice blends.

The data included in the table is based on USDA Table values[14] and shows a comparison of Macronutrients, Minerals, Vitamins, Fats and Other of the 10 products listed below:

1. 'Fruit Juices', consisting of: Apple, Cranberry and cherry, Fruit Cocktail, and Orange; and
2. 'Sodas (Carbonated drinks)', consisting of: Cola, Cream soda, Ginger ale, and Tonic water; and
3. 'Energy Drink', consisting of: Red Bull; and
4. 'Other', consisting of: Vitamin Water.

Please see section D below for a discussion of the values compared in table C.1.

Note regarding USDA Tables: the USDA tables are credible but specific to American products, however relevant inferences can be drawn, in particular where local values are absent, as per suggestions by the Department of Health. Values in the USDA database are either based on the results of laboratory analyses, or calculated by using appropriate algorithms, factors, or recipes, as indicated by the source code in the Nutrient Data file. These values are regularly updated, compared and checked using the procedures described in FAO/INFOODS Guidelines for Checking Food Composition Data prior to the Publication of a User Table / Database (FAO/INFOODS, 2012) and Ahuja and Perloff (2008).[15] However, the methods used to analyse for certain nutrients may not be in line with the SA labelling requirements in R.146.

[14] US Department of Agriculture, Agricultural Research Service, Nutrient Data Laboratory. USDA National Nutrient Database for Standard Reference, Release 28. Version Current: September 2015. Internet: http://www.ars.usda.gov/nea/bhnrc/ndl
[15] http://www.ars.usda.gov/sp2userfiles/place/80400525/data/sr27/sr27_doc.pdf

Table C.1: Comparison of the nutritional difference between the typical soda drink, a vitamin water product, and 100% fruit juice blends (per 100 g)

Nutrients	Fruit Juices				Sodas (Carbonated drinks)				Energy drink	Other
	Apple	Cranberry and cherry	Fruit Cocktail	Orange	Cola	Cream soda	Ginger ale	Tonic water	Red bull	Vitamin water
Macro-nutrients										
Energy (kcal)	46	46	46	47	42	51	34	34	43	0
Energy (kJ)	192	192	192	196	176	213	142	142	180	0
Protein (g)	0.1	0.19	0.46	0.68	0	0	0	0	0.46	0
Total fat (g)	0.13	0	0.01	0.15	0.25	0	0	0	0	0
Carbohydrate (g)	11.3	12.76	11.86	11.01	10.36	13.3	8.76	8.8	10.23	0
Fiber, total dietary (g)	0.2	0.6	1	0.3	0	0	0	0	0	0
Sugars, total (g)	9.62	12.2	10.86	8.76	9.94	13.3	8.9	8.8	10.22	0
Minerals										
Calcium (mg)	8	3	8	10	1	5	3	1	6	0
Iron (mg)	0.12	0.08	0.21	0.1	0.02	0.05	0.18	0.01	0.06	0
Magnesium (mg)	5	1	7	10	0	1	1	0	19	0
Phosphorus (mg)	7	2	14	17	9	0	0	0	0	0
Potassium (mg)	101	24	95	184	5	1	1	0	3	148
Sodium (mg)	4	7	4	4	3	12	7	12	39	0
Zinc (mg)	0.02	0.03	0.09	0.04	0.09	0.07	0.05	0.1	0.01	0
Vitamins										
Vitamin C (mg)	0.9	24.4	2.7	30.1		0	0	0	0	10.2
Thiamin (mg)	0.021	0	0.012	0.039	0	0	0	0	0.04	0
Riboflavin (mg)	0.017	0	0.016	0.021	0	0	0	0	0.103	0
Niacin (mg)	0.073	0.26	0.403	0.201	0	0	0	0	9.827	3.384
Vitamin B_6 (mg)	0.018	0	0.051	0.031	0	0	0	0	2.167	0.338
Folate (µg)	0	37	3	24	0	0	0	0	0	0
Vitamin B_{12} (µg)	0	0	0	0	0	0	0	0	1.97	1.02
Vitamin A (µg)	1	2	15	9	0	0	0	0	0	0
Vitamin E (mg)	0.01	0	0.4	0.2	0	0	0	0	0	0
Vitamin D (µg)	0	0	0	0	0	0	0	0	0	0
Vitamin K (µg)	0	0.1	2.6	0.1	0	0	0	0	0	0
Fats										
Fatty acids, total saturated (g)	0.022	0.001	0.001	0.018	0	0	0	0	0	0
Fatty acids, total monounsaturated (g)	0.006	0.001	0.002	0.025	0	0	0	0	0	0
Fatty acids, total polyunsaturated (g)	0.039	0.001	0.004	0.034	0	0	0	0	0	0
Fatty acids, total trans (g)	0	0.001	0	0	0	0	0	0	0	0
Cholesterol (mg)	0	0	0	0	0	0	0	0	0	0
Other										
Caffeine (mg)	0	0	0	0	9	0	0	0	29	0

D. Summary of the nutritional differences of fruit juices in comparison to other options in the identified beverage category.

From table C.1 above, the following inferences about the Macronutrients and Micronutrients are made:

1. MACRONUTRIENTS:

As this report has described in the above classification of sugars, the total sugar values of the fruit juice products are derived from the naturally occurring sugars of the fruit or intrinsic sugars. In comparison with the soda group and energy type drinks where the total sugar content is from added sugars normally in the form of sucrose or fructose corn syrups.

Statistically speaking, there is no major difference between the total sugars of the different categories of beverages tabled above. Although, in order to be able to get statistically relevant data a bigger sample size will need to be compared (at least 20 products from each category above (80 in total)).

Beverages	Mean	Median	Conclusion
Total Sugars (g)*			The small difference between the mean and median shows that there is not much distribution or variance between the data for the total sugar and carbohydrates of the beverages, especially among the fruit juice where the mean and median are very close. This shows that the total sugar and carbohydrate values are more or less constant between the different ranges of fruit juices and sodas used in this report.
Fruit Juices	10.36	10.24	
Sodas	10.24	9.42	
Carbohydrate (g)**			
Fruit Juices	11.73	11.58	
Sodas	10.31	9.58	

* 'Total sugars' is the term used for the sum of the individual monosaccharides (galactose, glucose, and fructose) and disaccharides (sucrose, lactose, and maltose). Analytical data for individual sugars obtained through NFNAP were determined by liquid chromatography (AOAC 982.14). Earlier values were also determined using AOAC methods (2010), with either high performance liquid chromatography (HPLC) or gas-liquid chromatography (GLC).[16]

** Carbohydrates used are 'Carbohydrates by difference': which is determined as the difference between 100 and the sum of the percentages of water, protein, total lipid (fat), ash, and, when present, alcohol. Total carbohydrate values include total dietary fibre. Therefore the 'Total carbohydrate by difference' = 100 - [water, protein, total lipid, ash and alcohol in g/100g].[17]

2. MICRONUTRIENTS:

Since fruit juice is derived from fruit, the fruit juice products do contribute to some micro nutritional values. For the purpose of this report the micronutrient values captured were those available from the source used to compare the data. It may be that there are additional nutrients (including phytonutrients) not listed in the source that exist in the fruit juice product. This is different with the soda type product where there is no contribution to any form of micronutrient unless the product has been fortified with micronutrients, as in the case of the vitamin water and energy type products.

When conveying nutritional information on food product labels, it can be useful to display the Nutrient Reference Values (NRVs) of vitamins and minerals. These are a set of recommendations for nutritional intake based on scientific knowledge (as currently available). For labelling purposes the NRV is expressed as a % of the amount per vitamin/mineral prescribed in mg or ug/day. R.146 allows for nutrient content claims of vitamins and minerals where the NRV is above a certain percentage, as this may convey that a nutritional advantage can be gained from consuming the product. From the tables above, the following products may include NRVs / make nutrient content claims for the vitamins/minerals as specified below:

Beverage	NRV	NRV Claim
Cranberry and Cherry	24 % Vitamin C	'Source of Vitamin C' claim allowed, as present at ≥15% of NRV/serving.
Orange	30% Vitamin C	'High in Vitamin C' claim allowed, as present at ≥30% of NRV/serving.
Red Bull	8% Vitamin B2 61% Niacin 127% Vitamin B6 82% Vitamin B12 5% Magnesium	No claim, but Vit B2 may be listed in Nutritional Table, as present at **≥ 5%**. 'Very high in Niacin' claim allowed, as present at ≥60% of NRV/serving. 'Very high in Vitamin B6' claim allowed, as present at ≥60% of NRV/serving. 'Very high in Vitamin B12' claim allowed, as present at ≥60% of NRV/serving. No claim, but Magnesium may be listed in Nutritional Table, as present at **≥ 5%**.
Vitamin Water	21% Niacin 20% Vitamin B6 43% Vitamin B12 10% Vitamin C	'Source of Niacin' claim allowed, as present at ≥15% of NRV/serving. 'Source of Vitamin B6' claim allowed, as present at ≥15% of NRV/serving. 'High in Vitamin B12' claim allowed, as present at ≥30% of NRV/serving. No claim, but Vit C may be listed in Nutritional Table, as present at **≥ 5%**.

[16] p13: US Department of Agriculture, Agricultural Research Service, Nutrient Data Laboratory. **USDA National Nutrient Database for Standard Reference,** Release 27 (slightly revised). Version Current: May 2015. Internet: http://www.ars.usda.gov/ba/bhnrc/ndl

[17] http://www.ars.usda.gov/Main/docs.htm?docid=6233 and p13: US Department of Agriculture, Agricultural Research Service, Nutrient Data Laboratory. **USDA National Nutrient Database for Standard Reference,** Release 27 (slightly revised). Version Current: May 2015. Internet: http://www.ars.usda.gov/ba/bhnrc/ndl

It is important to note that fruit juices are in general 'natural' whereas other SSBs may have 'other' ingredients added to them, such as caffeine, taurine, etc. Also, where caffeine is added to the energy type products, such products will be unsuitable for certain age groups.

Factors to consider when determining what types of beverages to tax

1. The Treasury has not to date defined which categories are included in the definition as SSBs.
   According to the paper: "A typology of beverage taxation: Multiple approaches for obesity prevention and obesity prevention-related revenue generation":

   Options to consider when determining what types of beverages to tax – include taxing: include taxing: (i) only SSBs; (ii) all sweetened beverages; (iii) all/most beverages; or (iv) selected beverages. SSBs include all beverages for liquid consumption sweetened with caloric sweeteners including, but not limited to, calorically sweetened carbonated beverages, ready-to-drink (RTD) packaged teas/coffees, isotonic beverages or sports drinks, energy drinks, less than 100 per cent juice and fruit drinks, and calorically sweetened waters. In choosing to tax only SSBs, governments may decide to tax all SSBs or only selected SSBs (for example, only calorically sweetened carbonated beverages).

   Or they may choose to tax *all sweetened beverages*, including both SSBs and *artificially sweetened beverages* (ASBs). ASBs are sweetened with non-caloric sweeteners (for example, aspartame, saccharin, or sugar substitutes) and include, but are not limited to, diet/no-calorie beverages and artificially sweetened RTD packaged teas/coffees, 0-calorie isotonic beverages, artificially sweetened less than 100 per cent juice drinks, and no-calorie, sweetened waters.

   Alternatively, policymakers may opt to tax *all beverages,* regardless of sweetener, including SSBs, ASBs, 100 per cent juices, and bottled water or *selected beverages* (for example, all carbonated beverages and all juices with <100 per cent juice drinks). A jurisdiction need not tax all beverages at the same rate (see Table 1).

   Besides the specific type of beverage, taxes may vary based on the beverage preparation method (for example, syrup, powder/mix). Sales taxes, however, are generally applied based on quantity (for example, gallons of syrup, per teaspoon of added sugar, per ounce, or gallons of beverage produced from the base product/mix)[18]

2. It is not clear whether the Treasury is simply considering a Sugar Tax as an income derived stream, or whether the tax will also be guided by health imperatives, i.e., calls from sections of the health establishment that a sugar tax may play a role in combating obesity.

3. South African regulations pertaining to the classification and definitions of the various categories of beverages may influence or play a role in inclusion or exclusion of SSBs categories for the proposed Sugar Tax.

END OF REPORT

[18] **A typology of beverage taxation: Multiple approaches for obesity prevention and obesity prevention-related revenue generation,** Jamie F Chriqui, Frank J Chaloupka, Lisa M Powell, and Shelby S Eidsond, Journal of Public Health Policy, Published online 2013 May 23 http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3730238/