Non-Communicable Diseases Watch

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The Bitter Truth about Sugars

Key Messages

※ Sugars may not be so sweet when it comes to its effects on human health. Beyond adding non-nutritive energies, excessive sugar consumption can lead to obesity, insulin resistance and diabetes, as well as cardiovascular diseases and dental caries.

※ There is no dietary requirement for sugars. The World Health Organization (WHO) strongly recommends a reduced intake of free sugars throughout the life-course. Adults and children should limit free sugars intake to less than 10% of total energy each day. For additional health benefits and optimal dental health, a further reduction of the daily intake of free sugars to below 5% of total energy intake is recommended.

※ Free sugars include monosaccharides and disaccharides that are added to foods and beverages by the manufacturers, cooks or consumers, and sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates.

※ In Hong Kong, studies find that many foods and beverages favoured by the locals are high in sugar content; many local people have a sweet tooth and consume too many added sugars.

※ There is sufficient evidence of the potential health benefits resulted from reducing free sugars consumption, which warrants actions on this issue. For optimal health, members of the public should also be proactive to decrease sugar consumption.

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The Bitter Truth about Sugars

Sugars are simple carbohydrates. Based on the chemical structure, sugars are mainly divided into monosaccharides (one single sugar molecule) and disaccharides (two single sugar molecules bound together) (Table 1).While 'intrinsic' sugars are those naturally present in whole foods (such as fruits, vegetables and grains) and milk, 'extrinsic' sugars are those typically added to foods.[1, 2] Regardless of their sources, forms (solids as lump, granulated and powdered sugar, or liquids as syrups) or colours (white, brown or red), each gram (g) of sugars provides about 4 kilocalories (kcal) of energy.[2] Nevertheless, our body metabolises different sugars by various mechanisms and assimilates at different rates. For example, metabolism and absorption of glucose is controlled by the pancreas through secretion of insulin. Fructose is absorbed from the gastrointestinal tract at a slower rate than that for glucose and primarily metabolised in the liver.[2, 3]

Table 1: Main categories of sugars and examples

Monosaccharides	Disaccharides
Glucose	Maltose (glucose + glucose)
Fructose	Sucrose (glucose + fructose)
Galactose	Lactose (glucose + galactose)

There is No Dietary Requirement for Sugars

There is no dietary requirement for sugars.[2] The Healthy Eating Food Pyramid places free sugars at the tip of the pyramid (the 'Eat Less' level), indicating that they should be used sparingly. Based on the totality of evidence regarding the relationship between free sugars consumption and body weight as well as dental caries, the WHO strongly recommends a reduced intake of free sugars throughout the life-course. Adults and children should limit free sugars intake to less than 10% of total energy each day (Table 2). For additional health benefits and optimal dental health, a further reduction of the daily intake of free sugars to below 5% of total energy intake is suggested. Free sugars include monosaccharides and disaccharides added to foods and beverages by the manufacturers, cook or consumer, and sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates.[4]

Table 2: Calculation of daily sugars intake by 10% of total energy intake

Total energy required per day	Maximum daily sugar intake	Example of food conversions
1 600 kcal	10% of 1 600 kcal = 160 kcal 160 kcal ÷ 4 = **40 g of sugar** (equivalent to 8 teaspoons of sugars *or* 8 sugar cubes)	~ 1¼ cans (355 ml) of cola drink ~ 1 cup (330 ml) regular version of red bean icy drink ~ 1 unit (201 g) of Swiss roll
2 000 kcal	10% of 2 000 kcal = 200 kcal 200 kcal ÷ 4 = **50 g of sugar** (equivalent to 10 teaspoons of sugars *or* 10 sugar cubes)	~ 1½ cans (355 ml) of cola drink ~ 1¼ cups (330 ml) regular version of red bean icy drink ~ 1 large bar (100g) of milk chocolate
2 400 kcal	10% of 2 400 kcal = 240 kcal 240 kcal ÷ 4 = **60 g of sugar** (equivalent to 12 teaspoons of sugars *or* 12 sugar cubes)	~ 1¾ cans (355 ml) of cola drink ~ 1½ cups (330 ml) regular version of red bean icy drink ~ 4 scoops of ice-cream

Sugars are No Ordinary Commodities

Sugars are regarded as no ordinary commodities because of their pervasiveness throughout societies, high levels of consumption and harmful effects on human health for excessive intake.[5]

Pervasiveness throughout society

Sugars are found in our diet in a variety of ways.[2, 6] To make foods more palatable, sugars are widely used as sweeteners. Other than flavouring, sugars also act as preservatives and bulking agents.[2] So very often they are added to manufactured foods (including confectioneries, cakes, biscuits, jams and other preserves, ready-to-eat desserts and breakfast cereals) and beverages (especially carbonated or soft drinks and fruit juices) at various amounts during preparation and processing. Sugars are insidiously added in canned products (such as canned soup), savoury processed foods (such as bread and pickles), sauces and condiments (such as barbecue sauce, plum sauce, sweet chilli sauce and hoisin sauce).[2, 7]

High levels of consumption

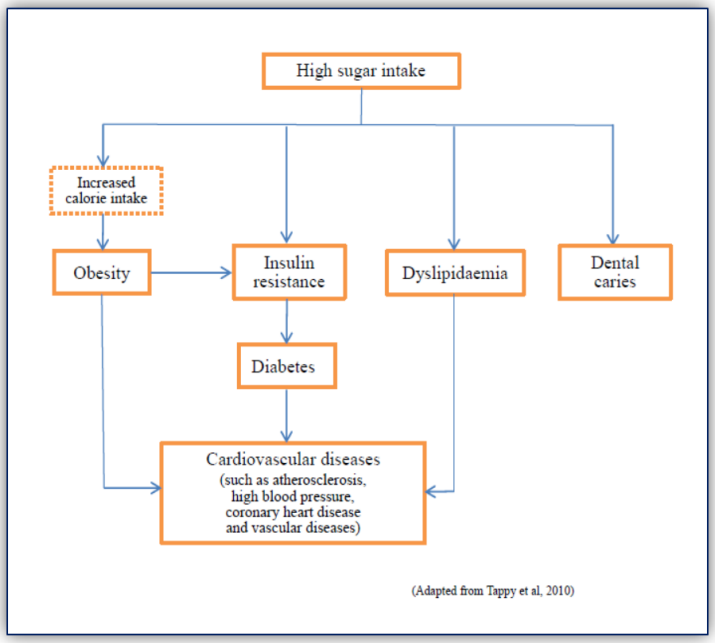
Globally, the daily average consumption of sugars and high fructose corn syrup per person is now 70 g (about 17 teaspoons), up 46% from 48 g per day since 30 years ago.[8] In 2014/15, approximately 171 million metric tons of sugars were consumed in total throughout the world.[9] More importantly, global consumption of sugars is projected to grow at around 1.9% per year and reach 214 million metric tons in 2024.[10]

While intake of free sugars varies with age, setting and country, many populations consume sugars at levels that exceed the WHO's guideline. For example, free sugars intake is about 16% to 17% of total energy intake among adults in the United Kingdom and Spain. Intake is much higher among children, ranging from about 12% in countries like Denmark and Sweden to nearly 25% in Portugal.[11] In the United States (U.S.), the average consumption of added sugars by persons two years and older was 83.9 g per day. The top three food sources of added sugars were 'soft drink, soda', 'candy, sugars, sugary foods' and 'cake, cookies, quick bread, pastry, and pie', which accounted for 21.8%, 13.4% and 10.3% of total sugars in diet respectively.[12]

Harmful effects on human health for excessive intake

Sugars may not be so sweet when it comes to its effects on human health. Other than adding non-nutritive energy, high sugars intake is associated with a number of health problems and diseases (Figure 1).[4, 5, 13] Excessive sugars intake can lead to obesity. Meta-analysis of 10 trials that involved increasing dietary sugars was associated with significantly greater weight gain of 0.75 kg.[14] Independent of its effects on body weight, dietary sugars can influence serum lipids and blood pressure.

Figure 1: Potential relationships of excessive sugars intake (such as fructose) with human disease



A systematic review and meta-analysis of randomised controlled trials reported that 'higher' compared with 'lower' consumption of dietary free sugars significantly raised serum lipids, including triglyceride concentrations, low-density lipoproteins and total cholesterol. 'Higher' compared with 'lower' consumption of dietary free sugars for 8 weeks or more in duration significantly raised systolic blood pressure by 6.9 mmHg and diastolic blood pressure by 5.6 mmHg.[15] With a nationally representative sample of U.S. adults, a prospective cohort study also observed a significant relationship between high consumption of added sugars and increased risk of death for cardiovascular diseases. In comparison with people who derived less than 10% of their energy from added sugars, people who derived 10% to 24.9% and 25% or more of their energy from added sugars was about 1.30 and 2.75 times as likely to die from cardiovascular diseases respectively.[16] Excessive free sugars consumption is an important determinant of dental caries. The evidence suggests higher rates of dental caries at levels of free sugars intake of more than 10% of total energy intake compared to levels of free sugars intake of less than 10% of total energy intake.[17]

Sugar-sweetened beverages include, but are not limited to, carbonated or soft drinks, fruit ades and fruit drinks, and sports and energy drinks.[18] Heavy marketing of these beverages has in fact led to a steady increase in their global consumption.[19] They are of particular concern for high added sugars (especially fructose) content, low satiety and incomplete compensation for total energy, thereby promoting unhealthy weight gain and increasing obesity-related diseases.[20] A meta-analysis of prospective cohort studies revealed that one daily serving (12 fluid ounces or 355 ml) increment of sugar-sweetened beverages was associated with a 0.06-unit increase in body mass index over 1-year period among children. In adults, an increase in consumption of sugar-sweetened beverages by 1-serving per day was associated with an additional weight gain of 0.22 kg over one year.[21] High fructose consumption increases the likelihood of insulin resistance, a condition that can progress to type 2 diabetes and increase the risk of cardio-vascular diseases.[22, 23] Compared with individuals in the lowest category (none or less than 1 serving per month) of sugar-sweetened beverage consumption, those in the highest category (most often 1 to 2 servings per day) had 26% and 20% increased risk of developing type 2 diabetes and metabolic syndrome respectively.[24] Another meta-analysis of 4 prospective studies also found that people in the highest category of sugar-sweetened beverages consumption had 17% increased risk of coronary heart disease compared with those in the lowest category of sugar-sweetened beverages consumption.[25]

Many Locals Consume Too Much Added Sugars

In Hong Kong, studies find that many foods and beverages favoured by the locals are high in sugars content; many people have a sweet tooth and consume too many added sugars.

Sugars Contents of Foods and Beverages Available in Local Market

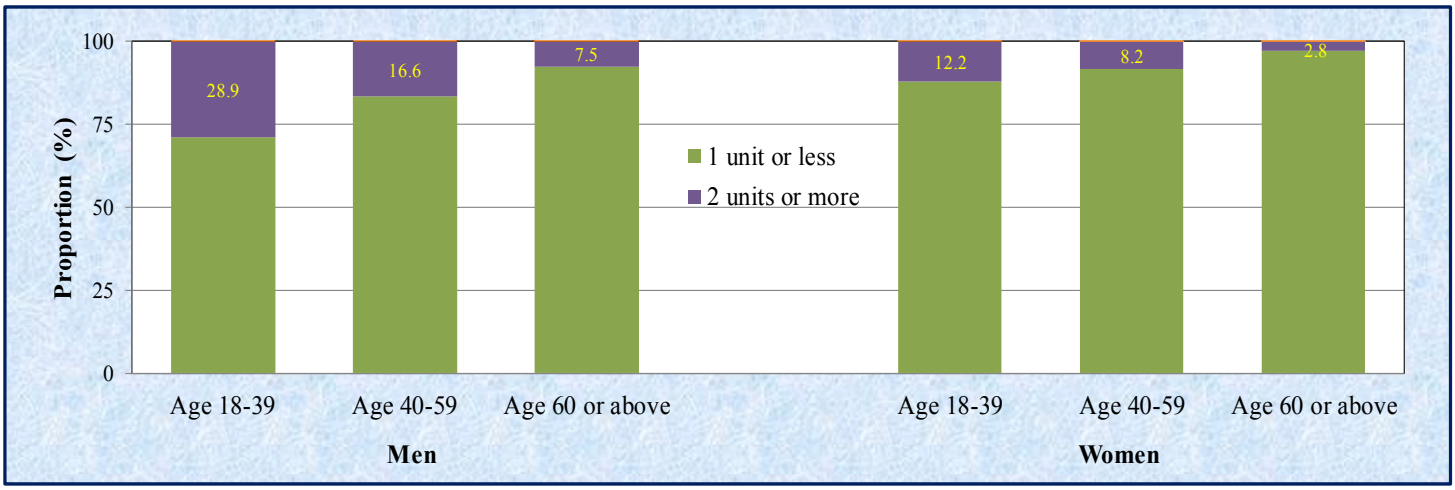
The Centre for Food Safety (CFS) of the Food and Environmental Hygiene Department conducted regular studies to assess sugar content in some common foods and beverages readily available in the local market. For example, a joint study with the Consumer Council on prepackaged non-alcoholic beverages in 2009 reported that lactic acid beverages contained the highest amount of sugars (> 13 g per 100 ml), whereas some carbonated drinks, juice drinks and lemon tea also contained relatively high amounts of sugars (8.1 g to 13 g per 100 ml).[26]

Of some non-prepackaged food, a study published by CFS in 2014 found that the mean sugar content of non-alcoholic cold beverages ranged from 3.7 g per 100 ml (iced caffé mocha for a less sweet version) to 13.0 g per 100 ml (red bean icy drink for a regular version). Of dessert products and bakery products, the mean sugar contents varied from 6.5 g per 100 g (glutinous rice ball with sesame filling for less sweet version) to 39.0 g per 100 g (macaron) and from 5.2 g per 100 g (white bread) to 24 g per 100 g (plain cake), respectively.[27]

Patterns of Sugar Consumption

Local population-based studies on the dietary intake of sugars are limited. In 2012, the Department of Health (DH) surveyed over 7000 primary 4 and 5 students and assessed their dietary patterns, including consumption of foods and beverages high in sugar. Results showed that less than one-fifth of students reported not having any food high in sugar (17.6%) or beverages high in sugar (17.7%) in the week before enumeration.[28] Another community-based cross-sectional survey with 4 629 Southern Chinese adults aged 18-81 working in Hong Kong observed that 20.5% men and 9.5% of women consumed 2 units or more sugar-sweetened beverages per day. The survey also found that the younger the consumers, the more likely that they reported so (Figure 2).[29] In addition, available data from the CFS indicated that non-alcoholic beverages such as carbonated drinks and juice drinks were the major contributors (about 30%) to total sugars intake of the adult population.

Figure 2: Consumption patterns of sugar-sweetened beverages in 4 629 Southern Chinese adults by age group



Source: Ko et al, 2010.

Let's Take Action to Reduce Sugars Consumption

There is sufficient evidence of the potential health benefits of reducing free sugars consumption to warrant actions on this issue. In fact, the Hong Kong Government has policies for encouraging reduced intake of sugars in food so as to promote a healthy diet. The CFS launched the Hong Kong's Action on Salt and Sugar Reduction in 2014 to encourage general public and the food trade on reducing usage of sugars. Since 2012, the Trade Guidelines for Reducing Sugars and Fats in Foods has been issued by the CFS to help food traders manufacturing, promoting and selling foods with lower sugars content. The Nutrition Labelling Scheme has been implemented since 2010 to create an environment enabling consumers to choose products that contain less sugars. Furthermore, a high-level Committee on Reduction of Salt and Sugar in Food has been set up to steer the direction and coordinate the work of reducing salt and sugars intake by the local population. To encourage healthy eating, the DH adopts a life-course setting-based approach and organises the "Startsmart @school.hk", "EatSmart@school.hk" and "Health @work.hk" campaigns, targeting students of pre-primary institutions, primary schools and the working population. DH also works with the catering industry in organising the "EatSmart@restaurant.hk" campaign to encourage food trade to provide healthier food choice with lower sugars, salt and fats for the general public. The Government will continue working with different stakeholders to gradually reduce dietary sugars intake by Hong Kong people to the levels recommended by the WHO.

For optimal health, members of the public should also be proactive in decreasing sugar consumption. The followings are some tips that can help cutting back on free sugars at different occasions —

- Avoid adding extra sugars to foods and beverages, and reduce the amount of sugars used in recipes. Cook with fresh, dried fruits or vegetables with sweeter taste (e.g. chestnut and pumpkin) to increase the sweetness of dishes. Use sauces made with fresh ingredients (such as tomatoes) to replace ready-made sauces (such as ketchup);
- Drink water instead of carbonated drinks and other sugary beverages;
- Choose fruits over fruit juice or fruit drinks. Eat fresh fruits or dried fruits without added sugars (such as raisins and dried apricots) and vegetables (such as corn kernels, cherry tomatoes, baby carrots, cucumbers and celeries) to replace sweets (such as candies, chocolates, cookies and ice-cream) as refreshments;
- Serve bread with low-fat cheese and fresh vegetables (such as lettuces, tomatoes and cucumbers) instead of sugared spreads (such as jam, peanut butter and nutella) and condensed milk;
- Check nutrition labels when shopping for pre-packaged foods and beverages, and select products with lower sugars content;
- Choose low sugar menu items or '3 Less' dishes when eating out. Look up for food premises which have joined the "EatSmart@restaurant.hk" campaign or the "Reduce Salt, Sugar, Oil. We Do!" programme;
- Request to serve syrups/sugars with the foods or beverages separately or ask for a 'less sweet option'.

To select healthier foods and beverages lower in sugars for children, parents and carers can refer to the Nutritional Guidelines for Children Aged 2 to 6 (http://www.startsmart.gov.hk/files/pdf/nutritional_eng.pdf), Nutritional Guidelines on Lunch for Students (http://school.eatsmart.gov.hk/files/pdf/lunch_guidelines_bi.pdf) and Nutritional Guidelines on Snacks for Students (http://school.eatsmart. gov.hk/files/pdf/snack_guidelines_bi.pdf). For more information about contents of sugars in various foods and beverages, please visit the Nutrient Information Inquiry System of the CFS at http://www.cfs.gov.hk/english/nutrient/index.php.

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Recommendation on Salt Intake

Salt is primarily sodium chloride. By weight, 40% of salt is sodium. High salt (sodium) consumption contributes to high blood pressure and increases the risk of heart disease and stroke. Like sugars, the Healthy Eating Food Pyramid places salt at the tip of the pyramid (the 'Eat Less' level), indicating that it should be used sparingly.

For healthy adults, WHO strongly recommends sodium consumption of less than 2 g a day. This equals to 5 g or approximately one teaspoon of salt. For children, the recommended maximum level of daily intake of 2 g sodium in adults should be adjusted downward based on the energy requirements of children relative to those of adults. For practical tips for reducing salt intake, please visit the Change for Health webpage at http://www.change4health.gov.hk/en/healthy_diet/facts/calories_nutrients/salt/index.html.

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