EFSA explains **draft scientific opinion on a**

tolerable upper intake level for dietary sugars

Index

Summary

- EFSA was asked by five European countries to set a science-based Tolerable Upper Intake Level (UL) for dietary sugars from all sources.
- While it was not possible to set a UL, EFSA's scientists concluded that the intake of added and free sugars should be as low as possible.
- EFSA is publicly consulting on this draft opinion and welcomes new scientific insights that can contribute to its finalisation by the end of 2021.

Introduction

There are different kinds of sugars in our diet. Some are added to food, others are naturally present in foods like fruit, vegetables, honey and milk. Sugars are a source of energy. Some types of sugar (e.g. glucose) are needed by organs such as the heart and brain to function properly.

Sugar consumption is known to cause **dental caries**. Also, excess sugars in the diet are stored in the body, for example, as fat for later use. If these stores are not used, they can build up over time and lead to **health problems**.

Total sugars can be divided into **sub-categories**:

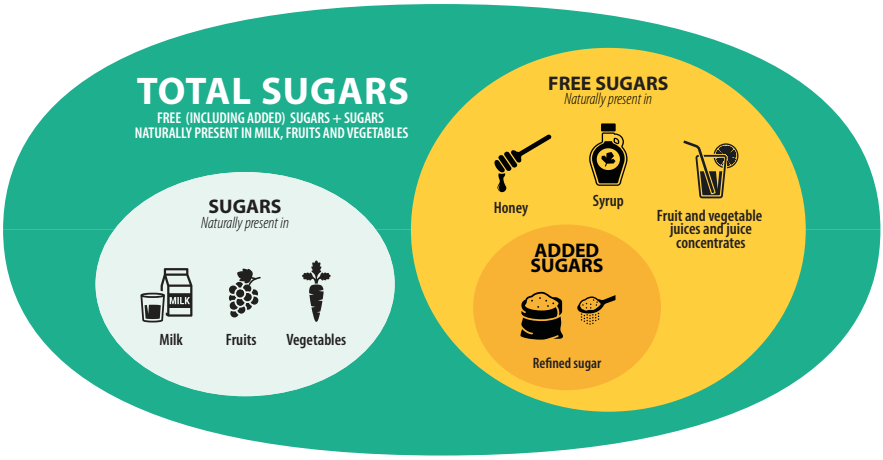

Figure 1: *Categories and sub-categories of dietary sugars*

What is a Tolerable Upper Intake Level (UL)?

The UL is a dietary reference value ('DRV', – see box on the next page). It establishes the maximum level of long-term daily intake of a nutrient (e.g. sugars) from all sources that is judged unlikely to pose a risk of adverse health effects to humans.

The UL is not a recommended level of intake. Rather, it is a scientifically-derived 'threshold' below which the risk of adverse health effects for the general population is negligible, but above which the intake is proven to be linked to adverse health effects, including disease.

If there are no, or insufficient, data on which to base a UL (i.e. no "threshold" can be identified), then a **safe level of intake** could be set. This requires the identification of a level of sugars intake up to which no adverse health effects are observed.

What are Dietary Reference Values (DRVs)?

- A set of reference values for nutrient intake
- Scientific bases for health effects associated with the consumption of nutrients
- Used to establish dietary goals for populations or recommendations for individuals
- Used together with other input to set national food based dietary guidelines (FBDGs) (see below)

See our **Frequently Asked Questions** on DRVs

Figure 2 shows the typical relationship between excessive intakes of nutrients and adverse health effects:

The bottom of the curve represents the safe range of intakes based on observed intakes that do not lead to adverse effects.

On the right, the rising curve shows the increasing risk of adverse effects (e.g. obesity) as a result of excessive intakes of a nutrient; the UL marks the threshold beyond which adverse health effects are likely to occur.

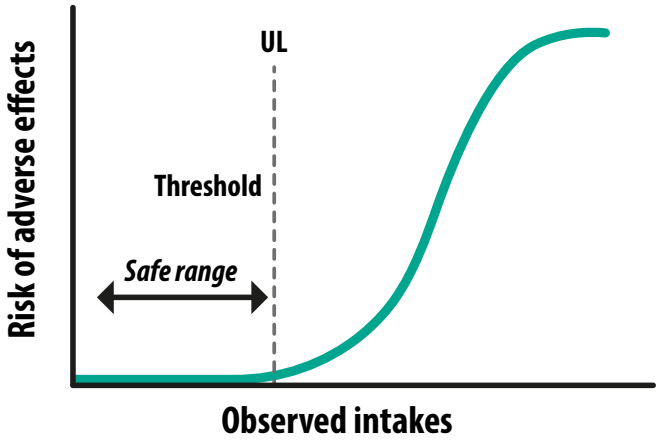

Figure 2: *Difference between a Tolerable Upper Intake Level (UL) and safe level (or range) of intake*

What was EFSA asked to do?

In the area of nutrition EFSA provides advice to public health authorities **based on scientific evidence**. EFSA doesn't make policy recommendations or set public health guidelines.

Five European countries asked EFSA to set a science-based **Tolerable Upper Intake Level** (UL) for dietary sugars from all sources using available data on chronic metabolic diseases, pregnancy-related effects and dental caries (Table 2 for specific types).

N.B. **EFSA was not asked to recommend** how much sugar consumers should include in their diet – this is a task for national public health authorities supported by international bodies like the World Health Organization (WHO).

	EFSA	National authorities
Role in nutrition	To set DRVs for energy and nutrients, including ULs or safe levels of intake depending on the available scientific data	To establish dietary goals for populations and recommendations for individuals
Inputs used	Scientific evidence on the relationship between the intake of the nutrient and health (e.g. data from studies in humans, toxicological studies)	Scientific advice (e.g. DRVs) + public health objectives (i.e. reduction of certain diseases) + nutritionally adequate diets + national eating habits and traditions
Purpose	To set a maximum level of long-term daily intake judged unlikely to pose a risk of adverse health effects to humans	To manage public health and the dietary behavior of the population

Table 1: *Nutrition in Europe – who does what*

How did EFSA conduct its assessment?

EFSA's scientific experts conducted systematic reviews of the literature and screened over 25,000 scientific papers in 2018, then an additional 7,500 in 2020. The literature was scrutinised to identify some 120 eligible studies linking intake of sugars and risk of chronic metabolic diseases, pregnancy-related effects and dental caries. The methodology used was described in a protocol EFSA developed (and consulted upon) specifically for this assessment in 2018 before the work started.

Our scientists also estimated the intake of dietary sugars from different categories of food using standardised consumption data from dietary surveys in 25 European countries, covering some 135,000 individuals.

Risks for consumers

Despite the huge amount of scientific papers, the available data **did not allow us to set a UL or a safe level of intake** for dietary sugars.

While it was not possible to quantify the risks, our scientists confirmed – to **different degrees of certainty** – links between intake of sugars and health problems (see Table 2)

The link between sugars and risk of **dental caries** is well established, therefore the intake of **total sugars** should be **as low as possible** within the context of a nutritionally adequate diet.

Based on the risk of developing **chronic metabolic diseases** and **dental caries**, the intake of **added and free sugars** should be **as low as possible**.

(N.B. Uncertainty is high regarding intake of added/free sugars and risk of chronic metabolic diseases at levels below the limits currently recommended by some EU Member States, for example, 10% of total energy intake. This is because of the scarcity of data in that range of intake.)

This is why national authorities and the WHO **recommend limiting consumption of added and free sugars** from different categories of food. They can do so by establishing a target for sugars intake based on the highest possible health benefit and in the context of national diets.

Metabolic diseases	Added and free sugars	Fructose	Sugar-sweetened beverages	100% Fruit juice
Obesity				
Liver disease*				
Type 2 diabetes				
High bad cholesterol**				
Hypertension				
Cardiovascular disease				
Gout				

*Non-alcoholic fatty liver disease (NAFLD). ** = Dyslipidaemia.

Pregnancy-related	Added and free sugars	Fructose	Sugar-sweetened beverages	100% Fruit juice
Diabetes in pregnancy				
Small infant				

Degrees of certainty

<15% (very low) | 15-50% (low) | 50-75% (moderate) | 75-100% (high) | no conclusion

Table 2: *Links between sugars and health problems*

Why was it not possible to establish a UL?

▶ All the 'dose-response' relationships (between intake of sugars and risk of adverse health effects) were positive and linear. This means that the risk of adverse health effects (response) increased across the whole range of observed intake levels (doses) in a constant (linear) manner, i.e. the higher the intake, the greater the risk of adverse effects.

▶ When this happens, it is **not possible to determine a 'threshold' value** below which there is negligible risk, or a safe level of intake up to which no adverse health effects have been observed.

Nevertheless, the scientific evidence supports recommendations in Europe to limit the intake of added and free sugars. The draft opinion contains extensive scientific advice on the relationship between the intake of different categories of sugars and their sources and the risk of developing chronic metabolic diseases, pregnancy-related conditions and dental caries.

The draft opinion contains several recommendations for research to inform the possible setting of an UL for dietary **sugars in the future.**

Main sources of sugars in the diet

Total sugars: staple foods such as fresh fruits and vegetables, milk and dairy, and cereal products represent a large proportion of total sugars intake. Non-staple foods such as beverages (sugar-sweetened beverages and fruit juices), fine bakery wares, and 'sugars and confectionery' (i.e. table sugar, honey, syrups, confectionery and water-based sweet desserts) are other significant contributors.

Added and free sugars: the food groups contributing the most to the intake of added and free sugars in European countries were 'sugars and confectionery', followed by 'beverages' and 'fine bakery wares' in most population groups, but there are large differences across countries. The main difference between the intake of added and free sugars was accounted for by fruit juices. In infants, children and adolescents, sweetened milk and dairy products were also major contributors to the intake of added and free sugars.

▶ In the studies included in the safety assessment, it was possible to estimate sugar intakes from sugar-sweetened beverages and 100% fruit juices, but not from a number of food groups **which could be significant contributors** to the intake of dietary sugars. For the following groups we lacked sufficient information (e.g. data on consumption and/or amounts of sugars): 'sweets and cakes', 'sweet beverages including milkshakes, coffee and tea', 'cereal products', 'fruit and vegetable products', and 'dairy products'.

▶ The proportion of consumers of **sugar-sweetened beverages** (SSBs) in Europe varies widely across population groups and countries. Intakes of added and free sugars from all sources were higher in consumers of SSBs than in consumers of any other non-staple food group that significantly contributed to the intake (e.g. fine bakery wares, confectionery, 'sugar and similar', fruit and vegetable juices) in virtually all countries and population groups.

▶ The proportion of consumers of **fruit juices** also varies widely across population groups and countries. In toddlers, intakes of free sugars from all sources were higher in consumers of fruit juices than in consumers of any other non-staple food group in most countries.

HAVE YOUR SAY
What happens now?

EFSA welcomes additional scientific insights from experts, individuals and organisations with an interest in this topic. The **public consultation on the draft scientific opinion** will run from 22 July to 30 September 2021.

EFSA will hold an **online public meeting** on the draft scientific opinion on 21 September 2021.

Once finalised, EFSA's scientific opinion can assist European countries in setting goals for populations and/or recommendations for individuals in their country.

EFSA is the keystone of EU risk assessment regarding food and feed safety. In close collaboration with national authorities a in open consultation with its stakeholders, EFSA provides independent scientific advice and clear communication on existing and emerging risks.

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