Update of the Nutri-Score algorithm

Yearly report from the Scientific Committee of the Nutri-Score 2021

The 2021 yearly report of the Scientific Committee of the Nutri-Score was voted on January 24, 2022 and approved unanimously by the members of the ScC

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Executive summary

The Scientific Committee of the Nutri-Score (ScC) has been set up as one of the structures of governance of the front-of-pack nutrition label (FOPL) Nutri-Score. It is tasked with the revision of the algorithm underlying the Nutri-Score, to integrate new knowledge in the field of nutrition in an evidence-based approach. This document provides an interim report on the progress of the ScC, stating the areas of potential improvement to the system identified by the group and the methods proposed to provide an update to the Nutri-Score algorithm.

Overall, the ScC considers that the Nutri-Score performs well. As such, while there may be areas of potential improvement highlighted by the ScC, there is a consensus that the current version of the algorithm already provides useful comparisons of the nutritional value of foods. The objective of the ScC is therefore to allow for a better alignment between the classification in the Nutri-Score and national dietary guidelines.

The ScC considers modifications to the algorithm in line with the mandate provided by the Steering Committee (StC). As such, it retains the across-the-board nature of the algorithm and the constraints over the elements that can be included in the algorithm as principles in its proceedings.

The ScC investigates areas of potential improvement using literature reviews focusing on specific food groups and/or dietary components, assessing their association with health outcomes or intermediary biomarkers of nutritional and health status.

Modifications to the algorithm are investigated using pre-defined objectives for target food groups and outcome measures (using the distribution of the final nutritional score (FNS) obtained) in several databases of nutritional composition of foods as sold available in various countries officially engaged in the Nutri-Score (COEN). Multiple scenarios of modification of the algorithm are investigated and evaluated in terms of gains to the final classification of target food groups and limitations in the final classification of non-target groups (considering the across-the-board nature of the algorithm) and/or considering the potential complexity introduced to the system.
Final recommendations are based on scientific consensus and pre-defined voting procedures.

In 2021, the ScC has identified several areas of potential improvement, for which literature reviews were conducted and/or potential modifications to the algorithm are under scrutiny. These pertain to improving the scoring system for plant-based oils with favourable nutritional profiles, fish and seafood; improving discriminating power for whole-grain products and beverages; allowing a better alignment with recommendations for highly sugary or salty products.

1. Background

1.1 Main nutritional issues in the Countries Officially Engaged in the Nutri-Score (COEN)

Background information on the prevalence of nutrition-related diseases & obesity/overweight – co-morbidities including Type 2 Diabetes (T2D)

Among the main dietary-associated non-communicable diseases (NCDs) are, in general, type 2 diabetes (T2D), a number of cardiovascular diseases (CVD) such as coronary heart disease and stroke and some types of cancer such as those of the digestive tract (Schulze et al., 2018). These potentially preventable diseases account for approximatively 50% of deaths worldwide (GBD 2019 Risk Factors Collaborators, 2020). More specifically, leading causes of these NCDs world-wide and among the 10 leading causes of death in general were ischemic heart disease (IHD, no. 2 regarding mortality rank), stroke (ranked no. 3), chronic obstructive pulmonary diseases (COPD,(ranked no. 6), and diabetes (ranked no. 8) (GBD 2019 Risk Factors Collaborators, 2020).

A recent Lancet paper has well summarized also the socio-economic consequences of an unhealthy diet in 195 countries, expressed as DALYs (disability adjusted life-years) (GBD 2017 Diet Collaborators, 2019). The main diet-associated losses occurred via the intake of too much sodium (3 mio. deaths, 70 mio. DALYs lost), insufficient consumption of whole grains (3 mio. deaths, 82 mio. DALYs) and fruits (2 mio. deaths, 65 mio. DALYs), which compares high to e.g. DALYs lost due to ischemic heart disease (180 mio. DALYs). Similarly, a recent study in Canada has estimated that not adhering to the recommended intake of fruits and vegetables alone has resulted in additional health care costs (direct and indirect) of 3.3 billion Canadian dollars (Ekwaru et al., 2017). In line with this, general estimations of WHO suggest that adhering to a sufficient fruit and vegetable intake could prevent 31% of deaths from IHD, 19% of gastro-intestinal cancer deaths and 11% of deaths from stroke (World Health Organization., 2002).

Predominant dietary problems, i.e. the discrepancy between dietary guidelines such as food based dietary guidelines (FBDGs) by the WHO (World Health Organization, 2020) or, for nutrients and non-nutrients such as by the European Food Safety Agency (EFSA, 2017) versus the observed dietary patterns include the following, according to findings from the Lancet paper (GBD 2017 Diet Collaborators, 2019):

- Too high intake of dietary sodium, related to elevated risk of developing hypertension and thus arterial diseases and stroke;
- Too low intake of fruits and vegetables;
- Too low intake of whole-grain products;
- Too low intake in nuts and seeds
- Related to the latter 3 points, a too limited intake of dietary fibre, which contributes to lower blood cholesterol and reduced risk of digestive cancers;
- Too high intake of free/added sugars, such as via sweetened beverages;
- Too high intake of red meat and also processed meat, which has been associated in several meta-analyses to several cardio-metabolic diseases, including T2D;
- Related to the latter aspect, too high intake of saturated fatty acids vs. rather unsaturated fatty acids, especially seafood omega-3 fatty acids, likewise increasing the risk of cardio-metabolic diseases;
- Risk of too high intake of trans-fatty acids;
- Too few milk products (and related low calcium intake).

A major challenge related at least in part to dietary patterns are also the increasing numbers of people with overweight and obesity, as obesity is associated with many co-morbidities, most notably T2D, stroke, CVD and non-alcoholic fatty liver disease, among other (Guh et al., 2009). These still increasing trends are observable in most countries of the EU, including the COEN (Table 1). In parallel, diabetes prevalence (T2D) as a main comorbidity of obesity also remains high (Table 1). Finally, the number of children with obesity remains high (Table 2).

Table 1. Brief summary of prevalence of overweight and obesity in adults living in COEN of the EU (World Obesity, 2022a), as well as prevalence of diabetes among adults (T2D and T1D) (International Diabetes Federation, 2021).

Country (year)	Age category	Prevalence overweight, including obesity (BMI>25 kg/m^2), %	Prevalence obesity (BMI>30 kg/m^2), %	Diabetes prevalence (%)
Belgium (2019)	18+	50.2	16.3	3.6
France (2019)	18+	47.1	15.0	5.3
Germany (2019)	18+	53.5	19.0	6.9
Luxembourg (2019)	18+	48.4	16.5	5.9
The Netherlands (2020)	20+	51.1	14.2	4.5
Spain (2019-20)	15+	53.8*	16.0*	10.3
Switzerland (2014-15)	18-75	43.3	12.6	4.6

*average of males and females taken as global mean was not reported

Table 2. Prevalence of overweight and obesity in children (World Obesity, 2022b) in COEN.

Country (year)	Age category (y)	Prevalence overweight including obesity (%)	Methods
Belgium (2018)	2-17	18.8	WHO
France (2016)	7-9	16.5	IOTF
Germany (2014-7)	3-17	24.0	IOTF
Luxembourg (2017-8)	15	22.0*	WHO
The Netherlands (2020)	4-12	13.2	IOTF
Spain (2019	6-9	40.6	WHO
Switzerland (2017-8)	6-12	15.9	CDC

*average of girls and boys taken as global mean was not reported

General overview of the intakes of various nutrients and main sources that are of main public health concern in the COEN

Various reports have looked at the major food groups and their contribution to nutrient and non-nutrient (dietary fibre and energy) intake. A typical scenario for a European COEN country is shown in figure 1.

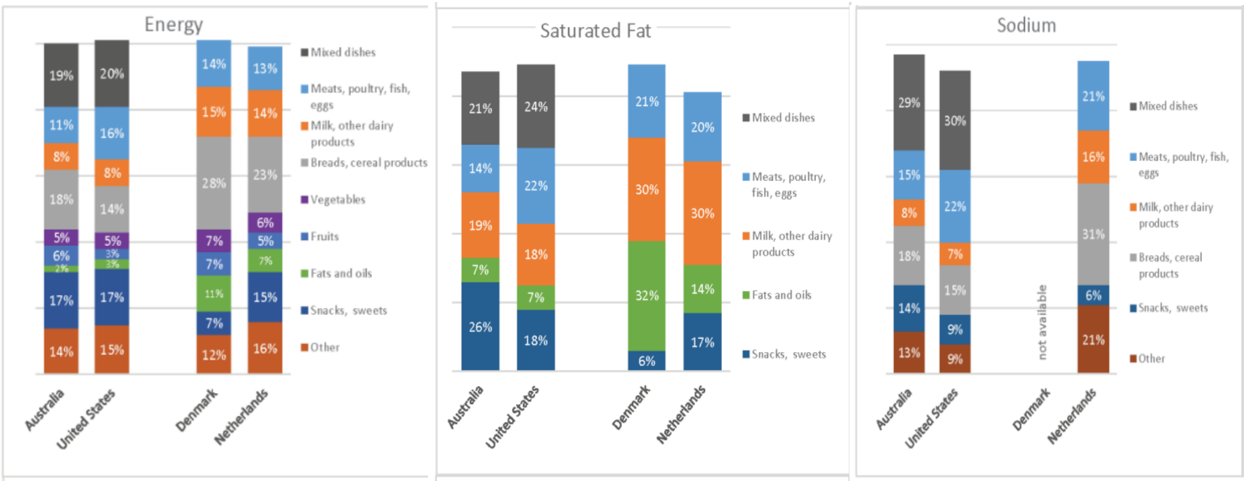

Figure 1 – food group contributors to energy, saturated fat and sodium, for the Netherlands as a COEN –and additional countries, from 2015, taken from (Auestad et al., 2015).

The following presents a brief overview about the contribution of food groups to the intake of energy, saturated fats, total fats, sodium, total sugar and dietary fibre:

Energy: Energy intake is not so much dominated by a specific food group, with major contributing food groups being typically (in Westernized countries) breads and cereals, followed by others, snacks and sweets, milk and dairy products, and meat and eggs (figure 1).

Saturated fat: it is apparent that for countries with a rather dairy-based agriculture, such as the Netherlands, milk and dairy products are significant sources of saturated fats, followed by meat and fats and oils. However, this is similar to other Westernized countries, with a large variable contribution from the group "snacks and sweets" (figure 1).

Sodium: For this mineral, major contributing food groups include breads and cereal products, followed by meat, fish and eggs, as well as other/diverse products (figure 1).

Total fats: According to a study in 15 EU countries (Eilander et al., 2015), major food group contributors to the intake of the most energetic macronutrients were added fats and oils (which contributed 9–46% to total fat intake across countries), meat and meat products (17–26%), and dairy (11– 24%). In the UK, Finland, and the Netherlands, also cereals and cereal products contributed substantially to total fat intake (10–18%).

Total sugar: According to a study from 2017 (Azaïs-Braesco et al., 2017) with data from France, Belgium, and the Netherlands, main food groups contributing to total sugar intake entail sweet products (27-34%), beverages (15-30%), fruits and vegetables (11-25%), as well as dairy products (14-19%).

Dietary fibre: Main sources, according to a publication from 2017 (Stephen et al., 2017) of dietary fibre include, in European countries such as Belgium, France, Spain and the Netherlands typically the food groups grain products and breads (ca. 30-50%), potatoes (6-18%), vegetables including legumes (15-32%) and fruits (11-23%).

Proteins: For proteins, major contributing food sources in Europe were meat and meat products, followed by grains and grain-based products, and milk and dairy products. These three food groups contribute to about 75 % of the protein intake (EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA), 2012)

A good guidance emphasizing the importance of various food groups is given within a recent draft document produced by EFSA, dealing with front-of-pack nutrient profiling, which was under public consultancy until January 9, 2022 (EFSA Panel on Nutrition, Novel Foods and Food Allergens (NDA), 2021). The food groups highlighted in the same document, playing an important though varying role in the diet of European countries include:

- starchy foods (cereals and potatoes),
- fruits and vegetables,
- legumes and pulses,
- milk and dairy products,
- meat and meat products,
- fish and shellfish and products thereof,
- oils and fats,
- nuts and seeds,
- and non- alcoholic beverages, as recognised in FBDGs in Member States.

Various nutrients and non-nutrients and their potential for inclusion in for front-of-pack nutrient profiling are likewise discussed and it is again highlighted that certain food groups and nutrients are either under or over-consumed, including the following:

- whole grains, fruits and vegetables, nuts and seeds, fat-reduced milk and dairy products, fish and water intake is encouraged, whereas food products high in SFAs, sugars and/or sodium owing to food processing are generally discouraged,
- regular consumption of legumes and pulses instead of meat, especially red meat and processed meat, is encouraged,
- the consumption of vegetable oils rich in cis-MUFAs and cis-PUFAs instead of fats high in SFA and trans-fats is advised,
- dietary intakes of SFAs, sodium and added/free sugars are above current dietary recommendations in a majority of European populations; a decrease in intake is advised,
- intakes of dietary fibre and potassium are below current dietary recommendations in a majority of European adult populations, their intake is encouraged.

1.2 Nutri-Score algorithm

The algorithm underpinning the Nutri-Score is an adaptation to front-of-pack nutrition labelling (FOPL) of the 2005 Office of Communication – Food Standards Agency nutrient profile model, developed for the purpose of regulating advertising to children in Great Britain.

The initial development of the algorithm was conducted by an independent research team from Oxford, taking into account the main nutrients of concern in the dietary patterns of the United Kingdom. The initial development of the algorithm considered multiple adjustments and modelling in order to select the most appropriate model (Rayner et al., 2005).

The algorithm strives on one hand to limit the intake of certain nutrients and non-nutrient components from the diet – namely energy, saturated fatty acids, sugars and sodium – and on the other hand to encourage the intake of other nutrient and non-nutrient components from the diet – namely fruits, vegetables, pulses and nuts, fibres and proteins (Rayner et al., 2009). Of note, proteins were integrated in the algorithm at a secondary stage, as the initial nutrient profile model considered instead n-3 fatty acids, iron and calcium. Proteins were integrated as a proxy for calcium and iron, following discussions on the feasibility and burden to stakeholders of including elements that were not part of the nutrient declaration at the time (Rayner et al., 2005).

The FSA-OfCom model has been adapted for the purpose of FOPL in the COEN (as a basis for the Nutri-Score) and in Australia and New-Zealand, for the purpose of regulating health and nutrition claims in Australia, New Zealand and South Africa, and for the purpose of regulating advertising to children in the United Kingdom and Ireland (Labonté et al., 2018).

The adaptation of the original algorithm for the purpose of a FOPL system in the form of the Nutri-Score was conducted by an independent group at the French High Council for Public Health in 2015 (Haut Conseil de la Santé Publique, 2015). The review of the algorithm included specific adaptations pertaining to three food groups: beverages, fats and oils and cheeses. The High Council for Public Health also defined the thresholds for the allocation of the 'colours/letters' to the Nutri-Score. The adaptations from the High Council for Public Health were integrated in the final algorithm in 2015.

Of note, a specific opinion from the French Food Safety Agency in 2019 added to the list of ingredients qualifying for the "fruits, vegetables, pulses and nuts components" certain oils that were considered as favourable in the French dietary guidelines – namely olive, canola and nut oils (ANSES, 2019).

Considering the nutrient and non-nutrient components of concern identified in the recent report by EFSA on nutrient profiling currently under public consultation (until January 9th, 2022), the algorithm of the Nutri-Score is consistent with the main recommendations from the Panel on Nutrition, Novel Foods and Food Allergens (NDA) of EFSA (EFSA Panel on Nutrition, Novel Foods and Food Allergens (NDA), 2021).

Saturated fatty acids, added/free sugars, sodium and energy were all considered by EFSA among the nutrients and non-nutrients for which a limitation of intake is warranted in most European populations. Of note, while the EFSA Panel considered that added/free sugars were the main component of concern, total sugars were considered an adequate proxy, in particular in the case of category-based nutrient profile models.

As to elements considered favourable to health, the EFSA Panel identified fibres as a non-nutrient component of concern with inadequate intakes in most European countries, as well as iron and calcium in sub-groups of the population. Considering that proteins were included in the algorithm as a proxy for both iron and calcium, there appears again to be a consistency between the nutrients identified as of concern and the Nutri-Score algorithm.

Of note, other favourable nutrient and non-nutrient components identified by the EFSA Panel are not included in the Nutri-Score algorithm, such as long-chain n-3 fatty acids (eicosapentaenoic acid – EPA – and docosahexaenoic acid – DHA), potassium, iodine, vitamin D and folates. These components are not included in the mandatory nutrient declaration. Most of them can appear as a voluntary addition by the manufacturer under the EU1169/2011 regulation, but only if they reach a sufficient concentration. As to EPA and DHA, they are not mentioned among the components that can be added in the nutrient declaration, either as mandatory or voluntary elements.

Validation studies conducted for the Nutri-Score have shown that the nutrient profile model underpinning it (termed FSAm-NPS DI for Food Standards Agency modified Nutrient profile model dietary index) was able to characterize the diet quality of individuals (Deschamps et al., 2015; Julia et al., 2014, 2016). As an indicator of the nutritional value of the foods consumed - using the algorithm underpinning the Nutri-Score, this dietary index in general increases with decreasing nutritional quality of the foods consumed. The dietary index was found to be associated in the expected direction (i.e. negatively) regarding the consumption of fruits, vegetables, pulses and fish, and (positively) with the consumption of sugary and salty snacks and soft drinks. Importantly, the dietary index was associated with intakes of vitamins and minerals (other than sodium) at the diet levels, while the algorithm itself does not take those into account directly in the evaluation of the nutritional value of foods.

Finally, the validation of the nutrient profile model showed that a dietary index based on the nutrient profile of the foods consumed was associated with an increased risk of weight gain and nutrition-related non-communicable diseases. Initial results in France (NutriNet-Santé and SU.VI.MAX cohorts) were replicated in multiple countries, in particular in the Spanish ENRICA and SUN cohorts and in the EU-wide EPIC cohort study. The nutrient profile was found to be significantly associated with mortality (overall and specific mortality (Deschasaux et al., 2020)), cancer overall and specific locations of cancer (breast, colo-rectal cancer in particular) (Deschasaux et al., 2017, 2018; Donnenfeld et al., 2015), cardiovascular disease (CVD) (Adriouch et al., 2016, 2017; Donat-Vargas et al., 2021; Gómez-Donoso et al., 2021), metabolic syndrome (Julia, Fézeu, et al., 2015) and weight gain (Egnell et al., 2020; Julia, Ducrot, et al., 2015).

Finally, the use of Nutri-Score was estimated to have the potential to contribute substantially to a reduced burden of nutrition-related non-communicable diseases in France using a simulation model (Egnell et al., 2019).

Overall, these elements suggest that the algorithm underpinning the Nutri-Score includes relevant elements with regards to dietary balance and health and that the overall structure of the algorithm is valid.

1.3 Place of the Nutri-Score within nutritional policies in the COEN

1.3.1 Belgium[1]

In Belgium, policies related to healthy diets are a joint responsibility of the federal as well as regional governments. At federal level, Belgium has developed a Nutrition and Health Plan in 2006.The most recent actions of this Plan, that target, among others, overweight and obesity, are: 1) a Convention for a Balanced Diet (Category-specific commitments by the food industry in Belgium to reduce sodium, sugar, saturated fat and energy in food products within specific food categories) since 2016; 2) Adoption of the Nutri-Score logo since April 2019, 3) a tax on soft drinks (since 2016, the Belgian government applies an excise duty of 7,43 eurocents per liter to all soft drinks, including non-alcoholic drinks and water containing added sugar or other sweeteners or flavours). In addition, already since 1985, the legislation in Belgium establishes a 2% maximum salt content in bread. Flanders (since 2008) and the Federation of Wallonia-Brussels (since 2013) both have voluntary guidelines with food-based standards for foods available in schools, including restrictions on (deep) fried food, sweet treats and soft drinks.

1.3.2 France

The Nutri-Score was developed initially in France in the framework of the French National Nutrition and Health, a national program under the umbrella of the French Ministry of Solidarities and Health initiated in 2001 and supervising all nutrition-related public health policies.

The Nutri-Score acts both at the individual level and at the environmental level though the reformulation of products, which could lead to an overall improvement of the food offer. At the individual level, the Nutri-Score operates as a complementary measure to the dietary guidelines, which were updated in 2017 in France, aiming for the first time at taking into account both nutritional and environmental elements of dietary behaviour.

[1] This paragraph was amended following feedback from the steering committee.

At the environmental level, the Nutri-Score is complementary to other actions such as the prohibition of vending machines in schools (2005) or the taxation of sugar-sweetened and artificially-sweetened beverages (2012, updated in 2018). Targets for reformulations of products are also under development, to ensure an improvement of the food offer.

National policies in the framework of the French Nutrition and Health program are evaluated every five years by the French High Council for Public Health, whose mandate includes setting nutritional objectives at the population level for the subsequent five years and provide an outline of the main axes of nutritional policies to be implemented to achieve these goals in the population. The main orientations are then selected and integrated at ministerial level in a blueprint report.

One of the goals of the new French National Nutrition and Health program (2019-2023) is to extend the Nutri-Score to the products consumed out of home and foods sold in bulk. Experiments and discussions with stakeholders are ongoing to define how to use the Nutri-Score in these particular contexts.

1.3.3 Germany

In Germany, several holistic steps were implemented within the last years:

With the IN FORM initiative, the Federal Ministry of Food and Agriculture promotes healthy living. IN FORM pools together projects on healthy lifestyles from across Germany and provides information on good dietary practices for all spheres of life – from nutrition for children at school and kindergarten, to balanced diets for women during pregnancy, people at work and the elderly.

On behalf of the Federal Ministry of Food and Agriculture, the German Nutrition Society (DGE) developed quality standards and criteria for health-promoting, balanced and sustainable community catering.

The implementation of the National Reduction and Innovation Strategy started at the beginning of 2019. The food sector has committed itself to achieve specific reduction targets by 2025 – with a special focus on products targeted at children and adolescents. The overall aim is that processed foodstuffs contain less energy, sugar, fats and salt, but still have sufficient nutrients such as vitamins and minerals.

Furthermore, a ban on the addition of sugar, honey, fruit juice (concentrate), malt extract or other syrups or thick juices derived from plant-based foods to infant and young child teas was adopted together with the mandatory indication to purchasers and users that sugar and other sweetening ingredients should not be added during preparation or administration.

With the implementation of the FOPL system Nutri-Score in 2020, Germany joined the COEN and enabled food-producers to use this FOPL on their products. Together with the food-based dietary guidelines (FBDGs) of the DGE, the Nutri-Score could support consumers in their informed choice regarding a favourable and health-conscious food choice.

1.3.4 Luxembourg

Luxembourg has summarized its position regarding nutrition and health goals in a statement published by the Ministry of Health (Vers un plan national alimentation saine et activité physique, n.d.). Furthermore, a national activity plan (created by the Ministries of Health, Sports, Education and Family) supporting such recommendations has also been published, namely the « Gesond iessen, méi bewegen Plan Cadre National 2018-2025 (Présentation du Plan cadre national 'Gesond iessen, Méi bewegen' 2018-2025, n.d.).

Two major objectives (regarding diet) have been highlighted, being

a) the creation of an environment stimulating a balanced diet and

b) the improvement of the competences required to adapt a balanced diet.

This entails food-based recommendations for specific population groups, i.e. children, adults, etc. based on the recommendations of the EFSA and WHO (regarding the intake of macronutrients as well as some further general recommendations (key elements), emphasizing that the availability and affordability of healthy food items should be increased). It will also be strived to regularly update these national dietary recommendations (Besoins nutritionnels de chacun, n.d.).

1.3.5 Netherlands[2]

In the Netherlands, relevant policy on food and nutrition is the responsibility of the Ministry of Health, Welfare and Sport (nutrition and food safety) and the Ministry of Agriculture, Nature and Food Quality (sustainability and food security).

An important policy document related to overweight and nutrition is the public private National Prevention Agreement (NPA) (2019–2040) to which over 70 parties committed to a 'healthier Netherlands', including a target to reduce the prevalence of overweight, by 2040, to 1997 levels. With the new government (January 2022), new progress will be made, e.g. the introduction of a soft drinks tax is announced in the coalition agreement.

At the food level, apart from EU regulations national food legislation rules apply (e.g. salt and fibre contents of bread) and public procurement schemes for foods. Introduction of a single food logo is one of the actions of the NPA. The decision on the introduction of Nutri-Score will be made after the evaluation of the algorithm by the scientific committee and Health Council.

Within the Prevention agreement The National Approach to Product Improvement (Nationale Aanpak Productverbetering, NAPV) is set to start in 2022. This approach is intended to speed up the improvements to processed food composition that are already under way due to previously made agreements. Benchmarks (at three levels- low, middle, high) are established for contents of salt, sugar, saturated fat and fibre for major contributing foods. Producers are incentivized to produce foods with lower levels of saturated fat, sugar and salt. The benchmarks will be aligned with the Nutri-Score algorithm as much as possible.

For consumer-oriented action on choosing healthy and sustainable foods current dietary policy is centred around dietary recommendations. The evidence based food-based dietary guidelines (Health Council of the Netherlands, n.d.) are translated into practical recommendations for the lay public by the Netherlands Nutrition Center. The main visual scheme framework used for this translation is the Wheel of Five. The Wheel of Five applies a dichotomous scheme and indicates for specific food groups which foods are recommended to be consumed (i.e. are within the Wheel of Five) and in what amounts and which foods are considered discretionary foods (i.e. are outside the Wheel of Five).

1.3.6 Spain

The Spanish Agency for Food Safety and Nutrition (AESAN) of the Ministry of Consumer Affairs launched in 2005 the NAOS Strategy -Strategy for Nutrition, Physical Activity and Obesity Prevention-, aimed to reverse the trend in the prevalence of obesity through the promotion of a healthy diet and physical exercise. NAOS Strategy was reinforced in 2011 by Law 17/2011, on food security and nutrition. The main strategic lines are: Health protection facilitating access to a varied and balanced diet with a moderate intake of calories, fat, sugar and salt; promoting food reformulation; improving information to consumers such as through FOPL, and reducing the pressure of food marketing to minors; Health promotion about a healthy and varied diet and

[2]This paragraph was amended following feedback from the steering committee.

physical activity: NAOS official website, Informative campaigns, Publications, NAOS Annual Convention and the NAOS Strategy Awards; Multisectoral collaborative activities through coordination and cooperation between national, regional and local administrations; Monitoring and evaluation through the Observatory of Nutrition and for the Obesity Study.

In 2021, related to FOPL Nutri-Score AESAN has participated in the international structures for the governance, launched an official registration and information web site and an information campaign. Other ongoing activities are: Draft of a specific regulation to limit food and drink advertising aimed at children; Evaluation of a four-year Plan for the improvement of the composition of food and drink products; A study on the socio-economic dimension of childhood obesity; A programme to monitor the nutritional quality of school menus, vending machines and school canteens; Other actions planned in 2022 are the development of the "Healthy Meal Plate" and the updating of the Spanish Nutritional Pyramid for the dissemination of food-based recommendations and the adoption of nutritional quality and sustainability criteria in public procurements in schools and other centres dependent on public administrations.

1.3.7 Switzerland

The Swiss Nutrition Policy 2017–2024 is intended to make an important contribution to the national policy for preventing non-communicable diseases (NCDs) 2017–2024 (NCD Policy). Its vision is that all people can decide in favor of a balanced and varied diet. They should have a framework that enables them to maintain a healthy lifestyle on their own – regardless of their background, socio-economic status or age. Three goals were defined as part of the Swiss Nutrition Policy 2017-2024:

- Increase nutritional competences: the general public should be familiar with nutritional recommendations. The information about these should be available, easy to understand and simple to implement in everyday life.
- Improve the framework conditions: In order to facilitate the choice of healthy foods, there must be a corresponding offering.
- Integrate the food industry: Ever more producers and suppliers of foodstuffs and meals are making a voluntary contribution to healthy nutrition.

An action plan implements the strategy through various measures in four fields of action: 1. Information and education, 2. Framework conditions, 3. Coordination and cooperation, 4. Monitoring and research.

One priority of the first action field is assistance in choosing food products by promoting the clarity of food labelling. By helping consumers to choose healthy foods, the Nutri-Score represents an important element of the Swiss Nutrition strategy. The Swiss authorities supports its introduction since Sept 2019.

All countries having adopted the Nutri-Score agree on the efficiency of the system and its broad alignment with national nutritional policies. Overall, in all COEN, the Nutri-Score operates as a complementary measure to dietary guidelines or other nutritional policies, and is only one of the multiple strategies put forward to improve the nutritional status of the population. The ScC recognizes therefore the importance of considering the overall framework in which the Nutri-Score operates, which includes multiple avenues to accompany the implementation of the Nutri-Score, in particular in terms of population education to its use and potential limitations.

1.4 Front-of-pack nutrition labelling and Nutri-Score outside of COEN

The Nutri-Score is one of the FOPLs currently implemented in the EU. In the framework of the *farm to fork* strategy (European Commission, 2020), the European Commission is currently making an evaluation of the various FOPLs implemented in the region, with a review of the evidence on their effectiveness by the Joint Research Centre (JRC) in 2020 (European Commission. Joint Research Centre., 2020) and a review of the potential nutrients to be included in a nutrient profiling system that could be used to underpin a harmonized FOPL for European countries by EFSA (EFSA Panel on Nutrition, Novel Foods and Food Allergens (NDA), 2021), under public consultation up to January 9, 2022.

The European Commission is expected to decide upon a harmonized and mandatory FOPL for the EU by the end of 2022, following an impact assessment (Proposal revision Regulation of FIC, n.d.).

The Scientific Committee welcomes the assessment of the EU commission of various types of labels, and recognizes the potential of the Nutri-Score to be among the contenders for a harmonised and mandatory system across the EU. The report from the JRC highlighted the research effort behind Nutri-Score, and the fact that its implementation is supported by substantial evidence of its preference in consumers but also its performance in terms of objective understanding and effects on purchases and purchasing intentions. The EFSA's NDA Panel opinion – though under public consultation at the time of publication of this report – also showed consistency between the nutrients and non-nutrient components identified as of concern in the EU and the elements included in the algorithm underpinning the Nutri-Score.

As such, while currently only COEN have adopted the Nutri-Score, the Scientific Committee understands the necessity of an assessment of the potential modifications to the Nutri-Score beyond its current geographical scope, considering the context in which this assessment is being made. This could include impact assessment in other countries if databases of nutritional composition are available – and if resources are allocated to allow for such an expansion of the scope of the ScC work – and/or the interviews of scientists outside of COEN to understand their concerns over the Nutri-Score algorithm or areas of improvement that they would consider as a priority.

2 Objective of the revision of the Nutri-Score algorithm

Regular evaluation of the Nutri-Score is embedded within its regulatory framework. Evaluation of a public health policy is considered a standard good practice implemented in all fields. Dietary guidelines or nutritional recommendations are revised regularly against scientific developments so as to integrate new knowledge and rely on the highest possible level and quality of evidence.

As such, the revision of the Nutri-Score algorithm is necessary to take into account new knowledge on the relationship between nutrient and non-nutrient components of the diet and health. Considering that the initial nutrient profile model was developed in 2004-2005 and adapted for FOPL in 2015, with first implementation in 2017, it appears also necessary to confront it with the reality on the ground and potential limitations that may have arisen since its implementation in the real world.

The Steering Committee provided to the Scientific Committee a mandate for the revision of the algorithm that included elements pertaining to the perimeter and objectives of the revision of the algorithm.

2.1 Mandate of the Scientific Committee

The ScC accepted the mandate of the Steering Committee and started its work in February 2021.

The elements included in the scope of the mandate are the following: To

- study the whole body of scientific knowledge in the field of nutrition and health, in view of new data that may impact the computation of the algorithm
- study the scientific rationale for any request for a Nutri-Score update transmitted through the Steering committee.

- study the scientific rationale for also any request received from the food industry, consumer associations and other stakeholders, which are transmitted by the Steering committee and deemed relevant by the Scientific committee. The Scientific Committee may, on an ad hoc basis, elect to invite experts from a non-COEN country to meetings dealing with specific issues, when that non-COEN country has expressed interest in the subject of the meeting for the purpose of its better understanding of the Nutri-Score.
- conduct corresponding literature reviews to assess the evidence of said request.
- propose to the Steering committee evidence-based adjustments, if relevant, to the nutrient profiling system of Nutri-Score, taking into account scientific knowledge and public health issues in the nutritional field, in synergy with the food-based dietary guidelines.

Of note, the Steering Committee posed specific boundaries as to the potential modifications that could be undertaken by the ScC, as follows – and presented as examples: To

- elaborate new nutritional recommendations.
- modify the core principles of Nutri-Score algorithm based on the FSA score or other core elements of the Nutri-Score (e.g. the algorithm cannot consider nutrients that are not part of the nutritional declaration such as vitamins or minerals; the calculation will remain per 100 grams or 100 millilitres and not per portion, and should remain transversal to all product categories, except for products like cheeses, beverages and added fat for comparability reasons).
- modify the graphical format.
- carry out communication activities related to the opinions and activities of the ScC except if mandated expressly and in writing by the Steering committee.

The full mandate of the ScC is included as an Annex to this report (Appendix 2).

The ScC committed to investigate modifications to the algorithm within the mandate stated by the Steering Committee.

2.2 Principles guiding the revision of the Nutri-Score algorithm

In line with the mandate set by the Steering Committee, a series of principles were maintained in the revision process of the Nutri-Score algorithm by the ScC.

The ScC agreed to the following principles:

1. Adherence to the scope and mandate of the Steering Committee

The Nutri-Score system is generally performing well in regards to its objective. It is overall aligned with the main recommendations from EFSA and has been found to be useful to guide consumers towards healthier food choices. As such, while a revision of the algorithm underlying the Nutri-Score should aim at improving it, it must be stated that the current version of the label is already overall well aligned with national dietary guidelines of the COEN.

2. Evidence-based approach to the revision of the algorithm

The ScC investigated priority areas of improvement to the algorithm that were identified by its members or highlighted by the Steering Committee (based on stakeholders requests) and justified by the scientific literature. Reviews of the evidence in specific cases were either conducted directly in the group or commissioned to outside parties (see Review of the evidence below).

3. Preference for simple across-the-board scenarios of modification

Areas of improvement to the algorithm were generally identified in specific food groups. This is particularly the case for stakeholder requests that usually cover the specific industry sector where the manufacturer operates. However, in line with the mandate from the Steering Committee, the Nutri-Score algorithm should maintain an across-the-board approach. The ScC therefore considered preferentially modifications to the algorithm that would be across the board rather than specific exception and exemption rules for specific products or groups.

4. Constraints to scenarios for modifications in the algorithm

Modifications to the algorithm considered elements within the nutritional declaration, and in particular the mandatory information available. As requested in the mandate, addition of components was not considered as good practice for the revision of the algorithm, as well as changing drastically the structure of point allocation within the overall scoring system.

Of note, in very specific cases, the ScC explored modifications outside the scope of the mandate. These were undertaken only when the ScC considered that exploring other elements would be useful to have a full view of the possible approaches to the issue.

5. Nutri-Score as one of many policies to address nutrition-related diseases

As stated previously, the Nutri-Score is only one of many policies developed in COEN to address the burden of nutrition-related diseases. Its main purpose is to guide consumers towards healthier choices and industry towards food reformulation within food groups. As such, it cannot be considered as the sole source of dietary advice and is intended to complement dietary guidelines, which provide the overarching structure of the diet, in particular the recommended frequency and amount for the main food groups.

3 Methods of the Scientific Committee

3.1 Identification of main areas of potential improvement

The main areas of potential improvement for the algorithm of the Nutri-Score were identified using a combination of elements:

- Elements highlighted by the Steering Committee of the Nutri-Score as priority areas for the ScC to consider
- Confrontation of the Nutri-Score with national policies and in particular dietary guidelines
- Confrontation of the Nutri-Score classification with the composition of foods in different countries, taking into account both average compositions of specific types of foods and distribution of foods within larger categories of foods
- Literature reviews pertaining to novel elements in the association between nutrition and disease outcomes of markers thereof
- Stakeholder requests

The areas of improvement of the algorithm pertained essentially to large food groups. Hence, the investigation was conducted separately for several food groups as well as for specific nutrients. However, the ScC systematically explored the impact of a modification for a given food group in the more general context of the classification of foods. Indeed, as the algorithm for the Nutri-Score is across-the-board, any modifications for one food group may affect others.

Furthermore, the ScC investigated across-the-board modifications to the algorithm, once a specific scenario was considered appropriate in terms of delivering enough discrimination in food groups specially highlighted in relation to each component.

Of note, the identification of areas of improvement did not necessarily lead to a modification of the algorithm. In particular, only elements that would be based on strong scientific evidence were considered for a modification of the algorithm.

3.2 Review of the evidence

The assessment of the scientific literature on the topics covered by the ScC aimed to elucidate if, for certain food groups, the Nutri-Score results were aligned, in a broad sense, with current scientific evidence on their health effects or with recommendations of intake in FBDGs. Of particular interest was the ascertainment of the health effects of each food relative to the effects of other foods within the same category (e.g., one vegetable oil versus the other vegetable oils, or skimmed versus full fat dairy products).

The ScC has mainly summarised and discussed scientific evidence from previous systematic reviews and meta-analyses (MA), where available, complemented with recently published studies. The ScC particularly focused on systematic reviews and evidence reviews supporting dietary guidelines; these reviews included both observational studies and randomized clinical trials (RCTs), using short-term-biological outcomes (i.e. surrogate markers) as well as long-term disease outcomes.

The reviews conducted by the ScC were not based on a registered review protocol, and did not include a formal systematic assessment of the grade of evidence, as the time frame and the resources available determined these procedures out of the scope of the ScC.

A systematic review and meta-analysis of the health effects of vegetable oils was conducted by an external ad-hoc Spanish scientific group and was presented by the Spanish members of the ScC.

Methods employed for the review of the evidence also included: type of studies and time frame reviewed, delegation to third parties when necessary, safeguards in this case against conflicts of interest etc.

To consider modifications to the algorithm, the criteria judged as necessary in the literature review were in particular the consistency of the evidence and the ability to provide evidence as to the comparison between different types of products (as would be highlighted in the Nutri-Score – for example between whole-grain and refined grain products).

3.3 Interviews

3.3.1 Similar algorithms

The Nutri-Score algorithm is based on the initial work from the Oxford University, underlying the Office of Communication – Food Standards Agency nutrient profiling system (see above). This algorithm, initially developed in 2004-2005, was adopted by the Office of Communication for the regulation of advertising to children in the United Kingdom. Though initially developed for this specific purpose, the algorithm has been since adapted and widely used outside of its initial goal, and in particular for use in nutrition labelling.

The OfCom model is the basis of the Australasian FOPL *Health Star Rating System*, adapted for the purpose of labelling in Australia and New Zealand and implemented in 2014. It has also been used for the regulation of health and nutrition claims in Australia and New Zealand and in South Africa.

While the core elements in the variant models of the OfCom model do not vary – i.e. the nutrients and non-nutrient elements that are included in the algorithm, the specific calculation models do vary, in the number of points attributed, in the food categories that are considered or in the way in which the points are allocated. This can lead to variations in the classification of certain types of foods.

The UK OfCom models and the Australasian Health Star Rating System have both undergone revision processes in the recent past, with updates proposed to their computational models. Considering that the challenges posed by the revision of very similar algorithms are probably consistent, and in order to build on experiences abroad, the ScC interviewed scientists and agencies having participated in the revision process of both algorithms. This allowed to understand the way challenges were able to be resolved – or not – the elements of methodology applied to each revision process and the organisation of the review itself to safeguard it from conflicts of interest.

3.3.2 Scientists from outside COEN

As mentioned above, the Nutri-Score is among the FOPL currently implemented in the EU, creating interest in other countries. Considering the potential for extension of the Nutri-Score outside of COEN, the ScC interviewed scientists from outside countries interested in the development of the Nutri-Score, to understand their potential concerns over the algorithm and its revision process, and the areas of improvement to the algorithm that would be regarded as a priority. Confrontation of viewpoints outside of COEN is indeed important to ensure that the revision of the algorithm may cover a wide range of interests and that key areas of improvement to the algorithm respond to unified views in the scientific community.

3.4 Stakeholders requests

The COEN have invited food business operators, food associations, consumer associations or any other stakeholders using or potentially impacted by the Nutri-Score to provide their views on the algorithm of the Nutri-Score. The objectives were for the Steering Committee to identify main areas potentially requiring modifications and to provide to the ScC a comprehensive perspective of the food industry branch or Non-Governmental Organisations. The comments received up to September 15th, 2021 were first evaluated by the Steering Committee, to be then transferred to the ScC. Of note, not all comments from stakeholders were transmitted, and some were only partially transmitted whenever the Steering Committee considered that the requests went beyond the mandate of the ScC.

In total, more than 70 comments were transferred to the ScC, who classified them by topics. A short description of the stakeholders requests can be found in table of the Appendix 4.

Key themes of the comments were related to:

- The general algorithm (nutrients considered, current thresholds, rules of calculation, food groups considered)
- The scoring of some nutrients, foods and food groups
- The consideration of some food groups as favourable components
- The classification of specific food products
- The discrimination of some foods within given product categories
- The Nutri-Score repartition for some product categories over the scale
- The exemption of some specific food products from the Nutri-Score evaluation
- The consideration of additional dimensions in the general approach (e.g. food processing) that would be outside of the scope of the mandate of the ScC

After their classification, the stakeholders' requests and comments addressing a specific topic were reviewed together. They were integrated in the various reflections of the ScC and tasks pertaining to the specific food groups or nutrients concerned. However, only scientific considerations guided at the end the development, the selection and the evaluation of the algorithm modification proposals.

The ScC will not provide individual feedback on the various requests from stakeholders in this report nor separately at a later time. However, elements of answers may be in part available in the final report presenting the scientific evidence used to support the potential changes of the Nutri-Score system.

3.5 Scientific Committee procedures

In sight of the voting procedures of various scientific panels/organizations such as EFSA, US EPA and FDA (EFSA, 2021; U.S. Department of Health and Human Services, Food and Drug Administration, 2008; US EPA, 2020), the ScC has developed and approved by consensus its voting procedures. Items taken into account are:

1. **Subjects to vote**, mainly intermediate and final reports to determine if there is unanimous acceptance or majority acceptance or not, and, in general, any topic supported by at least 3 members of the Scientific Committee.
2. **Way of voting online** and remote, requiring the presence of at least 2/3 of all members of the ScC. Materials to vote on must have been made available at least 7 days before the voting procedure.
3. **Counting the votes by the** Chair of the ScC and one additional member. The simple majority needed (>50%) of persons to approve a voted topic refers to all members, including absentees. E.g. for 11 members, 8 persons fulfil the quorum, 6 the simple majority.
4. **Consequences of voting procedures for a report/written statement:** A report can be approved a) unanimously, b) by the majority without minority opinions and c) by the majority with minority reports if

one or several members insist on it. Within the report, a field is inserted, highlighting the outcome of the voting. A potential minority opinion will be expressed in written within the report.

5. **Minority opinion and the recommendation to include it** in the report, detailing who is supporting the minority opinion, a brief description of the alternative position, the suggested alternative re-wording of major aspects of the report and its conclusions and references, if applicable. A minority report can be supported by 1 or several members (<50% of members). It is limited to 20% in length of the total opinion.
6. **Prolonged absence of a member of the Nutri-Score ScC,** missing more than 1 monthly meeting, the member states and the Steering Committee may nominate a replacement who has also one vote. Should no replacement be nominated until the second following meeting, the number of eligible votes is reduced by 1.

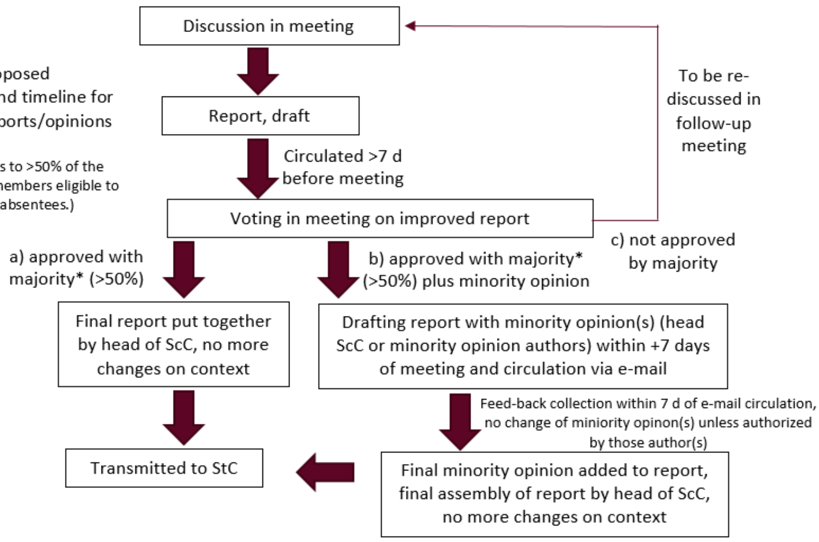

Figure 1. Proposed procedure and timeline for voting on reports/opinions etc.
*Majority refers to >50% of the number of all members eligible to vote, including absentees.)

4 Methods for the update of the algorithm

4.1 Databases for update testing

The Nutri-Score provides valuable information regarding an informed and health-conscious food choice within a food category, in particular for products that contain a mandatory nutrition label according to the EU regulation 1169/2011 on the provision of food information to consumers (EUR-Lex - 32011R1169 - EN - EUR-Lex, n.d.). In order to test potential modifications on the Nutri-Score algorithm and consequently show that these modifications would achieve their above-mentioned main goal and across different European countries, information from branded food databases of the COEN are needed. Therefore, available national or international branded food databases were identified that were able to provide all necessary information to undergo this kind of analyses.

Data analyses will be based on data from Belgium, France, Germany and the Netherlands, since these countries have access to eligible branded food databases to carry out the comprehensive testing of potential modifications.

Options to access international databases of branded food products covering a wider range of countries were investigated by the ScC, but could not be performed in part due to limited resources and time to do so. In a later stage, modifications could be applied more broadly across EU countries when branded food composition data from currently ongoing EU projects become available.

4.1.1 Origin of the data

4.1.1.1 Belgium (BE)

For the Belgian market, data from the Nutritrack branded food database [unpublished data], started in 2018, were used. The data are collected on a yearly basis from the five major retailers (Delhaize, Colruyt, Carrefour, Aldi, Lidl) through pictures of food packages and web scraping. For this report, data obtained from web scraping from 2019 for the three biggest retailers (Delhaize, Colruyt, Carrefour) were used. Food products were classified according to the FoodSwitch categorization system by two dieticians.

4.1.1.2 France (FR)

For the French market, two sources were used to analyse the impact of modifications of the algorithm. First, the 2020 Oqali database was used, which contains pre-packaged food monitored by the Oqali (OQALI - Observatoire de la Qualité de l'Alimentation - Accueil, n.d.). The data are collected from manufacturers from various food sectors regularly as a tool of surveillance of the nutritional quality of the food offer and reformulation efforts by manufacturers. For France, the 2020 Oqali database included initially >30,000 products.

To cover a larger spectrum of the food offer, the 2021 Open Food Facts (OFF) database was used for food groups that were not included or represented a too small sample size in the Oqali database (fish and seafood, cheese, fats...). Briefly, OFF is a free participative initiative from consumers who upload the information on food products that they purchase. For the 2021 OFF database, initial extraction of relevant food groups led to a sample size of around 90,000 food products.

4.1.1.3 Germany (DE)

For the German market, data from the national Product Monitoring database were used (Max Rubner-Institut, 2018, 2020, 2021). This database was first established at the Max Rubner-Institut in 2016 in order to provide data about frequently purchased processed foods. In line with the National Reduction and Innovation Strategy of the Federal Ministry of Food and Agriculture, the database is continuously extended and used for a yearly product monitoring (2019-2025) to determine changes in sugar, fat, salt, and energy contents of selected groups of processed food in Germany over time. It provides information on the product name, producer and brand, the mandatory and, if available, voluntary back-of-pack nutritional labelling according to the EU regulation No 1169/2011 (EUR-Lex - 32011R1169 - EN - EUR-Lex, n.d.), photos of the packaging as well as the ingredient lists for some product categories. In 2021, the Product Monitoring database contained a sample of 19,296 products. Data for food groups that were relevant for the analyses but not part of the Product Monitoring database (such as pasta, rice, oils, etc.) were extracted from the Global New Product Database (Mintel, 2021). This commercial database provides quality-checked detailed product data on new products in the food and drink market. Additionally, a plausibility check of the extracted data was performed by a nutritionist.

4.1.1.4 The Netherlands (NL)

For the Dutch market, data on food products used for the analyses were extracted from the Dutch Branded Food database (Westenbrink et al., 2021). This database contains the back-of-pack nutritional information, including food composition data used in the calculation of the Nutri-Score. The data extraction took place on 19 January 2021 and included products from both private brands and supermarket brands that were on the market in 2020. These products are sold mainly in Dutch supermarkets but also includes imported foods sold in Dutch supermarkets. It is estimated that about 75 percent of foods sold in the Netherlands are represented in the database.

Products were categorized according to the Dutch RIVM Reformulation Monitor 2018 and product criteria for the National Approach to Product Improvement (NAPV). Both classifications focused on processed foods that could be reformulated and for which products were checked on accuracy by research dietitians. Data on pasta and rice were available in the Dutch Branded Food database but were not included in the categorization of the Dutch RIVM Reformulation Monitor 2018.

The food composition data in BE, DE, FR and NL refer to the composition of products ‘as sold’. Of note the Oqali database from FR provides the composition as prepared for products that necessitate a reconstitution (e.g dried potato puree), in line with the terms of use of Nutri-Score.

4.1.2 Limitations

4.1.2.1 Handling of missing values

Since some of the information, that are necessary to calculate the Nutri-Score, are not part of the mandatory back-of-pack information (e.g. dietary fibre), missing values for a number of products within the available databases occur. Subsequently and for all countries equally, products with missing values for one or more of the components used in the Nutri-Score algorithm (except for the “Fruits, vegetables, pulses, nuts and selected oils” (FVPNO) component) were not included in the subsequent analyses.

4.1.2.2 Estimation of the FVPNO component

For BE and NL, an estimation of the FVPNO component per food group was computed by research dietitians as it was not available from the back-of-pack nutritional information. For the majority of food groups included in the analyses, it is estimated/assumed that the FVPNO component is ≤ 40%, which is equivalent to 0 points for the FVPNO component.

For France, in the OQALI database, food groups for which the FVPNO component could be above 40% (prepared meals, jams, breakfast cereals, etc.), lists of ingredients were scrutinized to compute the amount of FVPNO in each individual food. For food groups for which reasonably no product could reach 40% FVPNO, the amount was considered <40% FVPNO. In the Open Food Facts database, the amount of FVPNO was estimated using the list of ingredients with automated processes or declaration made upon registration by contributors.

For Germany, a more accurate estimate of the FVPNO component was computed for some food groups. It was assumed that fruit and vegetables present in bars, breakfast cereals and biscuits were 100% dried. Researchers went through the ingredient list and estimated the content of nuts, vegetables, oil and pulses for each product individually for the food groups breakfast cereals, bars, fats and oils, pizza, ready to eat meals, nuts. For any other food group, the FVPNO component was estimated/assumed to be ≤ 40%, equivalent to 0 points.

4.2 Methods for testing scenarios

4.2.1 Identification and definition of indicator foods

For each identified area of improvement, indicator foods/food groups will be defined primarily based on the main dietary sources in the COEN for the nutrient/component that is being investigated for a potential modification of the algorithm (e.g. pasta, rice and bread in the case of the fibre component). Furthermore, food groups that are likely to be affected by such a modification are identified and investigated. This is done in order to investigate so-called "side effects" driven by the across-the-board approach of the algorithm, where changes of a single component are likely to affect all foods equally and are generally not restricted to specific food categories.

For the final step, a combination of modifications from all components will be performed. This analysis will be evaluated based on all available food groups and not on a selection of indicator food groups.

4.2.2 Development of scenarios for Nutri-Score algorithm update

Each component of the Nutri-Score algorithm will be first evaluated independently from other components. Here, different aspects are considered.

In the current algorithm, dietary reference values and a common methodology for point allocation are used for nearly all components except for the FVPNO component: Point allocation starts at 3.75% of the given reference value and increases in linear steps up to five points for favourable components or ten points for unfavourable components (Rayner et al., 2005, 2009).

Building on this principle, scenarios could include modified reference values. As far as possible, already established reference values will be taken into account that are suitable to a European perspective. These may include reference intakes, acceptable daily intakes or upper consumption limits from the WHO, EFSA, EU regulations, etc.

Alternatively to the 3.75% starting threshold for the point allocation, modified starting thresholds may be considered for some scenarios. These could include for example cut-offs that are used to define nutrition claims in the EU regulation on nutrition and health claims (e.g. source of a nutrient, per 100ml or 100g).

Furthermore, scenarios using alternative point allocations or thresholds may be developed. This will be done in specific cases and considering the average and range of the nutritional contents of specific relevant indicator food groups. This could be target-oriented to achieve an adequate discrimination or the creation of potential incentives for product reformulation in specific food groups or to ensure the "status" of the indicator foods in the dietary guidelines (e.g. recommended foods/foods which consumption should be limited).

Following the principle of simplicity, point allocation should increase in linear steps whenever possible. Nonetheless, in particular in those nutrients/components where reformulation targets are viewed as priority areas in nutritional policies in the COEN, non-linear scenarios could also be tested.

All potential scenarios have to be aligned with the existing EU regulation in particular with regards the use of decimal points for nutrient contents.

As a basic principle, scenarios will be developed for those components that are already part of the algorithm. Modifications or scenarios that consider additions to the current system can only be investigated to achieve a more comprehensive view of possible modifications. However, those modifications are not covered by the mandate of the ScC.

4.2.3 Definition of outcome variable

Depending on the rationale of the developed scenarios for each nutrient/component of the algorithm in general, the desired outcome could vary. Basically, the primary outcome measure to be evaluated after the calculation of the scenarios is the final nutritional score (FNS) and the range of FNS within the indicator food groups.

Second, the resulting distribution of foods across the Nutri-Score in the indicator food groups and the alignment of this classification with dietary recommendations across the COEN will be explored. Herein it is possible to investigate whether the modifications result in an improved discrimination between certain food groups/sub groups (e.g. between whole-grain and refined grain alternatives).

Furthermore, as a secondary objective, it will be evaluated if the modifications may have, as far as possible, any beneficial effects and incentives for reformulation for the indicator food groups.

Of note: It is not possible to define an absolute or relative effect magnitude for a successful modification beforehand (e.g. change by X% or X points), since the market situation, and thus the basis for such a number, is not completely comparable for all COEN. Furthermore, dietary recommendations may vary across countries with possible discrepancies with respect to specific foods/food groups. In this case, the main driver is consensus among the members of the ScC as to the alignment with recommendations. In addition, the ScC has to point out that dietary recommendations in the form of food-based dietary guidelines and a FOPL like the Nutri-Score are complementary to each other and operate with a different set of criteria.

4.2.4 Criteria for retaining a scenario for further testing

Given the limited resources (e.g. limited testing ability) of the ScC, only one scenario for each component will initially be tested in combination with the others. Therefore, after several nutrient-specific scenarios are calculated, the results will be evaluated regarding the defined outcomes and compared to the current algorithm. The scenario that maximizes the achievement of afore defined main goals will be retained as the most appropriate one for further analyses. This means the scenario that performs best in terms of the final nutritional score, improved discrimination for foods in the indicator food groups accompanied with an improved distribution of ratings for the indicator foods and the alignment with the dietary guidelines.

Elements of secondary importance, in particular unintended consequences or “side effects” of a scenario will be weighted before proceeding to retain a scenario. The criteria here are to minimize unintended consequences on groups that were not the main target for the modifications.

4.2.5 Combination of scenarios

A combination of scenarios will then be tested consisting of the retained nutrient-specific scenarios from the previous steps. As introduced in 4.2.1, this combined scenario will be tested in all food groups and is not restricted to a specific set of indicator food groups. This approach ensures the consistency between the rationales of the different modifications and the obtained results.

The combined scenario should as best as possible maximize or at least retain the benefits of the nutrient-specific scenarios and minimize the unintended consequences/side effects that may appear in nutrient-specific scenarios alone.

4.2.6 Final Nutri-Score thresholds – attribution of colours

Once a combination of scenarios will be evaluated as appropriate, the thresholds for the different Nutri-Score ratings will be determined. This step aims for an equitable overall distribution across categories and a maximized distribution of the various food groups for their most appropriate Nutri-Score ratings (colours). This ensures that the distribution of food groups overall and the discrimination between key foods is maximized and that specific indicator foods could be placed in their "intended" category according to the outcome definition at the beginning (e.g. compared to the FBDGs). Furthermore, this step aims to minimize or avoid so-called 'outlier' distributions (e.g. with <5% of a given group in one colour).

4.2.7 Comparison elements

4.2.7.1 WHO EURO model for marketing restriction for children

Comparisons of the classification in the Nutri-Score with the WHO EURO model for marketing restrictions (WHO Europe, 2015) will be used to investigate the overall consistency between the models or to verify changes in Nutri-Score allocation due to algorithm revisions for products considered "permitted" (considered "healthier" products) or "not permitted" (considered "less healthy" products) to be marketed to children. Considering the fact that the WHO EURO model was developed for the purposes specifically of restricting marketing to children, it is not considered as a gold standard to which compare the Nutri-Score, but rather a comparison point, knowing that it is generally strict. Also, the WHO EURO model is by nature dichotomous, while the Nutri-Score provides a graded assessment of the nutritional quality of foods.

These differences in the nature and computation methods in the models will be accounted for in the interpretation of the results.

4.2.7.2 Correlation between nutrient composition and final score

The algorithm of the Nutri-Score includes seven components in its computation (energy, sugars, saturated fats, sodium, proteins, fibres, percentage of fruit, vegetables, legumes, nuts and some vegetable oils (canola, nuts and olive)).

Some of its components have been included as proxy for other elements within the composition of the food (e.g. proteins as a proxy for calcium and iron content). Considering that the Nutri-Score algorithm aims at reflecting the overall nutritional value of foods and beverages, correlations between the final algorithm score and nutrient and non-nutrient component composition of foods would allow for a better assessment of it achieving this goal. Generic databases of food composition, including a wide range of nutrient and non-nutrient components, including calcium, iron, vitamins and minerals could help in ascertaining that the updated model for the Nutri-Score has improved correlations with these components that are not directly taken into account in the algorithm.

4.3 Publication of results – recommendations

For each food group or task identified, the report highlights separate elements of their specific background, approach and methods of the ScC specifically for this particular food group.

The final impact assessment of the modifications in the algorithm will consist in the progressive combination of the various scenarios and the modification to the overall thresholds of the algorithm.

The ScC recommendations will be transmitted to the Steering Committee. Though the Steering Committee retains the final decision of accepting or rejecting recommendations from the ScC, the ScC insists on the fact that all recommendations from the group are a reflection of scientific collective expertise and as such should be transposed directly in the final update of the algorithm. Of note, the ScC considers balance between gains and potential limitations in its decision-making process.

Task 1. Fats and oils

This task was the topic of a report voted on June 30, 2021 with a majority opinion (8 members) and a minority opinion (2 members) transmitted to the Steering Committee. The elements below summarize the main components within this report with additional elements of progress from the ScC.

Background

The classification of the various oils in the Nutri-Score has led to considerable debate as to the optimal classification of the various types of fats and oils according to the algorithm. Currently, when applying the Nutri-Score, vegetable oils are classified into three categories, from C (for olive, nut and canola oils) to E (for palm and coconut oils).

Concerns were raised in Spain as to a lack of understanding of such a classification, in particular in sight of the perception of olive oil as a healthy component of the Mediterranean diet. Olive oil is among the preferred vegetable oils in the dietary guidelines of most European countries, along with canola, nut oils, and other oils with high poly-unsaturated fatty acid content. Considering the place of the various vegetable oils in the dietary guidelines in France, with canola, olive and nut oils being preferred over other vegetable oils, the French Food Safety Agency (ANSES) recommended in 2019 that those be included in the 'Fruit, vegetables, legumes and nut' component of the algorithm (ANSES, 2019).

The Scientific Committee considered that any modification to the algorithm should investigate not only the evidence concerning olive oil, but more generally all vegetable oils, and more specifically the comparison of various types of oils, i.e. the question being whether a better ranking of olive oil alone or certain vegetable oils including olive oil is justifiable. This consideration was based on the fact that the Nutri-Score is meant to be used to compare foods within food categories and as such, the investigation of olive oil was meaningful in the context of the overall group of vegetable oils.

Indeed, the Nutri-Score is a tool for food guidance, with particular utility to choose food products within the same group, providing comparisons of the nutritional composition between different types of foods, considering their contribution to a healthy diet. As such, the Nutri-Score operates differently from dietary guidelines, and this difference in rationale needs to be considered in any modification to the algorithm. Nevertheless, the Nutri-Score should be sufficiently in line with dietary guidelines to be an effective tool to reach healthier diets.

The ScC considered that any modifications should be based on scientific evidence and the nutritional composition of different foods and food groups.

Related stakeholders requests

Representatives of the StC from Spain presented a rationale and a proposal to the ScC to modify the algorithm in order to improve the classification of olive oil, in order for virgin an extra-virgin olive oil to reach a classification in the B category of the Nutri-Score. This proposal included dividing the 'fruit, vegetables, nuts, legumes and olive, canola and nut oils' (henceforth referred to as the 'F&V' component for simplicity) into 'fruit, vegetables, nuts and legumes' on the one hand, and 'olive, canola and nut oils' on the other hand. In this configuration, virgin and extra-virgin olive oils would load points both as 100% 'fruit, vegetables, nuts and legumes' and as 100% 'olive, canola and nut' oils. Hence, their classification would be modified to the B category in the general algorithm.

Some stakeholders have requested modifications to the algorithm for fats and oils, through the inclusion of unsaturated fats (polyunsaturated fats and/or n-3 fatty acids) as a new component or the consideration of camelina, linseed, soybean or mustard oil among the oils considered in the FVPNO component.

Association with diet-related chronic diseases

The ScC commissioned a literature review, which was conducted by a group of scientists from Spain (Vanessa Bullón-Vela, Carmen Sayón-Orea, Maira Bes-Rastrollo, Miguel A. Martínez-González – conflicts of interest statements were provided by all members of the group). The objective of the review was to assess the association between the intake of various types of oils and health outcomes in humans, with the explicit aim of comparing these associations between various types of oils, when possible. The group of scientists from Spain provided the original papers identified during the process of systematic review and performed meta-analyses when a sufficient number of studies were identified. The document provided to the ScC is not published as of today and therefore has not yet undergone peer review.

The systematic review included all published cohort studies or controlled trials conducted in the last 10 years pertaining to the association between various types of oils and health outcomes including: all-cause mortality, CVD, cancer or T2D.

In order to complement this systematic review, systematic reviews and meta-analyses of randomized trials (<10 years of publication) pertaining to the comparison of the effects of the intake of various types of oils on intermediate biomarkers of cardiovascular risk (e.g. blood lipids in particular) were also extracted from the literature and considered by the ScC. Though these intermediate biomarkers are considered as less strong of an evidence, they are regularly employed to support hard outcomes such as mortality or morbidity. Such complementary evidence is useful, since the association of vegetables oils with hard outcomes are primarily studied in prospective cohort studies, which are limited by confounding factors and as such provide lower level evidence than randomized controlled trials (RCTs). The effects on biomarkers were studied in RCTs and could thus support associations from cohorts.

Finally, the ScC reviewed the reports of the updates of the British OfCom (Public Health England, 2018) and the Australasian Health Star Rating system (mpconsulting, 2019), which operate under the same – or very similar - nutrient profiling system concerning potential modifications to the algorithm for fats and oils.

Results of the literature review

Forty studies were considered eligible in the systematic review on the association between various types of oils and health outcomes, provided by the group of external scientists. The large majority of studies included investigated the association between olive oil consumption and health outcomes, including cohort studies (N=23 publications), controlled trials (N=6 publications) and systematic reviews and meta-analyses (N=11 publications). Of note, some included studies did not directly investigate olive oil consumption specifically but rather the Mediterranean diet in general. Most studies performed on olive oil were conducted in Mediterranean countries (8 out of 12 observational studies for the investigation of the association between olive oil and CVD for example). For other types of oils, the number of studies identified were very limited, with only one cohort study in China investigating canola oil.

No study directly compared the associations between different types of oils and health outcomes. Only two studies provided an estimation of the effect of an isocaloric substitution of one type of fat with another on cardiovascular events (one in the USA (Guasch-Ferré et al., 2020) and one in China (Zhuang et al., 2020), the latter not providing a detailed assessment of various types of fats).

Overall, studies showed a consistent and beneficial effect of the consumption of olive oil (vs. no or low consumption) on health outcomes, specifically on CVD (12 observational studies included, 6 of which finding significant inverse associations), diabetes (3 observational studies, 2 of which finding significant inverse associations) and all-cause mortality (6 observational studies, 2 of which finding significant inverse associations). Of note, results on the association between olive oil consumption and cancer rather showed nonsignificant associations (5 studies, no significant inverse associations). Results from the PREDIMED trial found significant inverse associations in the group assigned to the Mediterranean diet + extra-virgin olive oil on CVD (composite primary endpoint), and T2D compared to the control group assigned to a low-fat diet.

By contrast, this type of evidence was lacking for the other types of oils due to an absence of specific studies (1 observational study on canola oil showing significant inverse associations).

The only study proposing a simulation of the isocaloric replacement of different types of fats in a high-income country (Guasch-Ferré et al., 2020), i.e. the USA, showed that olive oil had a significant beneficial effect on cardiovascular events compared to dairy fats, margarine and mayonnaise, but not compared to other plant-based oils (e.g., corn, safflower, soybean, canola, without giving further details on the various types of oils).

Results of meta-analyses on intermediate biomarkers have mainly been performed for effects on blood lipids, with more limited evidence on other cardiovascular risk factors such as blood pressure, blood glucose or body weight. These meta-analyses (N=4 publications, including between 27 and 54 randomized controlled trials) provided more direct comparisons between different types of oils and showed that canola oil was associated with significantly better blood lipid profiles (including LDL-cholesterol, total-cholesterol, triglycerides) than other oils, including olive oil. By contrast, olive oil showed beneficial effects only when compared to butter or lard.

Finally, an update of the British nutrient profile did not specifically consider modifications to be necessary as to fats and oils. In the review of the Australasian Health Star Rating, similar concerns as those raised in the group were discussed over the optimal classification of oils – including olive oils – but no modifications were considered appropriate or necessary in the final version of the algorithm.

Conclusion

Overall, the analysis of the literature showed that there was substantial evidence of the beneficial effect of olive oil on the risk of T2D, CVD and all-cause mortality, with a significant number of studies being performed. The lack of studies on the effect of other vegetable oils with favourable nutrient profiles (i.e. low in saturated and high in poly-unsaturated fatty acids) on chronic diseases and mortality precluded a direct comparison of the effects of the various types of oils on health outcomes. More direct comparisons between the various types of oils were only available for some intermediate biomarkers of cardiovascular risk as surrogate endpoints and did not show any further benefits on health for olive oil in comparison to other vegetable oils.

A majority of the members of the ScC considered that the evidence available supported the contention that vegetable oils with favourable nutrient profiles as a group could have a better classification in the algorithm but that the evidence did not reach a sufficient high level to warrant a specific modification in the algorithm so that olive oil would have a higher rating than other oils with comparably favourable nutrient profiles. The two Spanish members of the ScC considered that the scientific evidence of the association between olive oil consumption and beneficial health effects was enough to be taken into account, even when there is no comparative evidence between different vegetable oils, as there is a lack of evidence for health benefits of canola and nut oils.

Given the evidence that vegetable oils, in particular olive oil, have beneficial effects on health, modifications to the algorithm could be performed to improve the scoring of olive and other vegetable oils with comparable favourable nutrient profiles in the system and support dietary guidelines that advocate the moderate use of vegetable oils. Such across-the-board modifications to the algorithm may also improve classification of some food groups high in favourable fatty acids that are currently ranked as being of lower nutritional value, given their overall energy density content (namely fatty fish). Scenarios of modifications are currently being investigated by the ScC on this topic.

Task 2. Fish and seafood

Background

Fish, and in particular fatty fish, are recognized sources of beneficial components to the diet, in particular long chain n-3 fatty acids. Such components have been considered as elements of concern for which the consumption may be insufficient in some populations in Europe, in particular for low consumers of fish (EFSA Panel on Nutrition, 2021).

Related stakeholder requests

Some stakeholders from the sector of fish production and manufacturing have expressed concerns over the fact that the Nutri-Score algorithm does not take sufficiently into account the beneficial components of fish, including long chain n-3 fatty acids. Also, they expressed concerns over the overall classification of fish, considered to be unsatisfactory considering the health benefits of fish consumption – in particular fatty fish. Of note, stakeholders' requests included requests to improve the classification of all types of fish – including canned or smoked fish which may contain higher levels of salt depending on the process.

Fish contribution in the diet

Fish and seafood are the main sources of dietary EPA and DHA in most European countries, contributing up to 95% depending on the population and country (Sioen et al., 2017). However, the consumption of fish is highly variable in the population, with risks of inadequate intakes in a number of sub-groups of the population.

Association with diet-related chronic diseases

Multiple studies have shown a protective effect of the consumption of fish with CVD and mortality. Several meta-analyses of prospective cohort studies have shown that consumption of fish once per week is associated with a 15% reduced risk of cardiovascular mortality (17 studies ; (Zheng et al., 2012)), a 20% reduced risk of non-fatal coronary heart disease (5 studies (He et al., 2004)) and 10% reduced risk of stroke (21 studies (Chowdhury et al., 2012)).

These associations have led to the inclusion of fish as products to be promoted in dietary guidelines. Both lean and fatty fish are recommended, with intakes up to several times a week. In France, two servings of fish are recommended per week, one of fatty and one of lean fish.

Of note, due to concerns over the potential contamination of commercial species of fish (Copat et al., 2012, 2013; EFSA Panel on Contaminants in the Food Chain (CONTAM), 2018) – and in particular highly consumed species that are bio-accumulators of heavy metals – some dietary guidelines have integrated specific advice concerning the types or frequencies of consumption, in particular for vulnerable groups such as children, pregnant or childbearing age women.

The Nutri-Score operates as a complementary measure to dietary guidelines, and though unprocessed fish (both lean and fatty) consumption should be encouraged, the Nutri-Score should also allow consumers to compare the nutritional composition of various forms of fish (unprocessed, with addition of salt, addition of wine etc.).

Conclusion

Overall, the ScC recognizes the importance of fish in the diet, as important sources of essential dietary components and due to their beneficial association with health. The ScC considers fish as an area in which improvements to the Nutri-Score could be devised, in order to allow consumers to identify fish and seafood as healthy components of their diets and compare the nutritional quality between different forms of fish.

Task 3. Whole grain products

Background

Whole grain foods are food groups whose consumption is encouraged in most dietary guidelines in the world, including in COEN. Whole grain foods are generally higher in fibre content than similar refined grain foods. Fibre content is part of the Nutri-Score algorithm as a favourable component as higher fibre consumption has been shown to have various health benefits.

Considering both their status as favoured food groups in dietary guidelines and their higher fibre content, concomitantly with a higher content of minerals and vitamins, it is expected that whole grain products would be allocated in more favourable classes of the Nutri-Score than the refined alternatives, with a clear distinction based on their fibre content. However, the current classification of foods – and in particular cereal products – in the Nutri-Score does not appear to fully discriminate between similar fibre-rich(er) and low(er)-fibre foods.

Related stakeholder requests

To improve the intake of whole grains in European countries, some stakeholders have requested to evaluate more favourably whole grain foods within the Nutri-Score algorithm. The rationale is that this would encourage manufacturers to include more whole grains in their products. In addition, some stakeholders forwarded a global definition for a whole grain product to contain at least 50% whole grain ingredients based on dry weight, as well as a definition for whole grain ingredients to be whole grains consisting of the intact, ground, cracked, flaked or otherwise processed kernel after the removal of inedible parts such as the hull and husk, and of which all anatomical components, including the endosperm, germ, and bran must be present in the same relative proportions as in the intact kernel. Stakeholders also forwarded scientific publications evaluating the impact of including an additional component of whole-grains in the Nutri-Score algorithm.

Fibre rich grain products and contribution of different food groups to fibre intake

Whole grain foods (including whole grain flour) are defined differently across countries and there is no European endorsed definition of whole grain products that would be harmonized across countries.

Depending on the fibre content of products, European Food Safety Authority (EFSA) nutrition and health claims such as “source of fibre” or “high in fibre”(EFSA Panel on Dietetic Products, Nutrition and Allergies, 2010a) are allowed to be used on product packaging in the EU.

The main food groups contributing to fibre intake at the dietary level are “vegetables, fruits, and legumes” and “grain products” in most countries. Vegetables, fruits and legumes are covered by FVPNO component of the Nutri-Score algorithm. For grain products, fibre is an important component in the algorithm.

Associations with diet-related chronic diseases

The consensus to increase the discrimination between similar whole grain and refined grain products was based on scientific evidence embedded in FBDGs. Dietary guidelines of Belgium, France, Germany, the Netherlands, Spain and Switzerland were evaluated considering their recommendations of whole grain versus refined grain products. All guidelines show consistency in advocating the consumption of whole grain over refined foods, although some variation in quantities and specific advises exists. These recommendations are based on a large body of literature on relations between whole grain consumption and the risk of chronic diseases and effects of whole grain consumption on established biomarkers of chronic diseases. In most cohort studies, higher levels of whole grain intakes were compared with lower levels, e.g. by using quintiles of consumption. Strong evidence is available for the following outcomes:

- 30-60 g of whole grains lowers LDL-cholesterol by 0.2 mmol/l, compared with low whole grain or refined grain control conditions – 10 RCTs (Charlton et al., 2012; Kelly et al., 2007; Kristensen and Bügel, 2011)
- 90 g of whole grains per day are associated with a 25% reduced risk of coronary heart disease, compared with low whole grain consumption – 7 cohort studies (Anderson et al., 2000; Jensen et al., 2004; Liu et al., 2003; Steffen et al., 2003)
- 60 g of whole grains per day are associated with 25% reduced risk of T2D – 15 cohorts (Aune et al., 2013; Ye et al., 2012)
- No association between refined grain intake and risk of T2D – 6 cohorts (Aune et al., 2013)
- 160 g of white (refined) rice are associated with a 10% increased risk of T2D – 7 cohorts (Aune et al., 2013)
- 90 g of whole grains are associated with a 10% reduced risk of colon cancer – 9 cohorts (Aune et al., 2013; Kyrø et al., 2013)

In FBDGs, a shift from refined grain products towards whole grain products is advised. For example, in Belgium the recommendation is to consume at least 125 g of whole grain products every day (Superior Health Council, 2019) and in the Netherlands, it is recommended to consume at least 90 g of mixed grain bread (whole grain with refined grain), whole grain bread or other types of whole grain products. It is also recommended to replace refined products by whole grain products (Brink et al., 2019). In Spain it is recommended to consume whole grain products preferably (Agencia Española de Seguridad Alimentaria y Nutrición, 2008). In France, Germany and in Switzerland, it is recommended to consume preferably whole-grain or low-refined grain cereal products over refined grains.

EFSA, however, has concluded that on the basis of the data presented and due to a lack of a definition of whole grain foods, a cause and effect relationship cannot be established between the consumption of whole grains and the claimed effects considered (EFSA Panel on Dietetic Products, Nutrition and Allergies, 2010b). For fibre, on the other hand, EFSA considers dietary fibre intakes of 25 g/day to be adequate for normal laxation in adults (EFSA Panel on Dietetic Products, Nutrition and Allergies, 2010). EFSA further noted evidence of benefits to health associated with the consumption of diets rich in fibre-containing foods in adults at dietary fibre intakes greater than 25g per day, e.g reduced risk of coronary heart disease and T2D and improved weight maintenance (EFSA Panel on Dietetic Products, Nutrition and Allergies, 2010). A fibre intake of 2 g/MJ is considered adequate for normal laxation in children from the age of one year. In addition, for other countries like the UK, it is recommended that the average population intake of dietary fibre for children aged 2 to 5 years should approximate 15 g/day, for children aged 5 to 11 years 20 g/day, for children aged 11 to 16 years 25 g/day and for adolescents aged 16 to 18 years about 30 g/day (TSO, 2015). The reference value for fibres intakes is set at 30g/day in most COEN.

Conclusion

Considering the suboptimal classification of whole grain foods in the current system, the ScC has reached a general consensus as to the fact that the Nutri-Score algorithm could be modified to increase the discrimination between whole grain and refined grain products, with the aim of discriminating as much as possible between similar foods that differ in their fibre content, provided the modifications do not have unintended consequences.

To improve the Nutri-Score's scoring method, scenarios of the Nutri-Score algorithm were designed and are currently being tested against the current method for the ability to better discriminate among similar foods with varying fibre contents.

Task 4. Salt

Background

High sodium intake is associated with higher systolic blood pressure and via this with increased risk of CVD. Sodium is the active component and is derived from sodium chloride, also known as salt.

Daily salt intake is recommended to be below 5g/day (WHO, EFSA, Spain, Switzerland) or 6 g/day (Germany, Netherlands) depending on the country. Ways to reduce salt intake include a different food choice from the consumer (e.g. an apple instead of crisps as snack) as well as food reformulation, from the producer side, towards lower salt content of foods (e.g. of crisps). In the latter situation foods are consumed in similar quantities, but associated with less salt intakes.

A point allocation for salt within Nutri-Score following food composition of high salt foods as well as foods that are major contributors to salt intake could provide incentives for food reformulation. Salt content (g/100 g) of major foods are either at the lower end, e.g. bread (around 1.1 g/100 g) or at the higher end of the salt content distribution (2 g), e.g. cheese and cured meat. The current pointing scale of Nutri-Score does not cover salt contents above 2 g.

Salt, as such, does not deliver energy like for sugar and saturated fat. Fat and sugar count in the energy density component of the Nutri-Score, as well as within the nutrient specific point allocation. On the contrary, salt points do not count in the energy density component of the Nutri-Score. In the current algorithm, therefore salty products cannot reach the same level as fatty or sugary foods. This leaves room for modifications of the algorithm so that foods with higher salt contents would receive more unfavourable points and therefore be classified along with products with highest sugar and/or saturated fat content.

Regulatory issues

Within the Nutri-Score, the current component is formulated as sodium, with points attributed for each 90 mg of sodium per 100 g or 100 ml of foods. However, this formulation is not fully aligned with EU regulations (EUR-Lex - 32011R1169 - EN - EUR-Lex, n.d.) regarding two points :

- While both sodium and salt declarations are possible under current requirements, the EU regulation promotes the use of salt for the nutritional declaration rather than sodium.
- decimal points allowed in the nutritional declaration are regulated: up to 2 decimal points when the content is below 1g and only up to one decimal point above 1 g. However, the conversion from sodium to salt leads to some thresholds to be defined with two decimal points above 1g.

The EU conversion between sodium and salt shows that a number of point allocation thresholds are not aligned with the recommended decimal point rules for the nutritional declaration of salt. This could lead to some discrepancies between the information present on the back of the pack and the obtained calculation of the Nutri-Score if it is based on more detailed data. The risk of maintaining diverging systems is to observe divergences between the back-of-pack declaration and the Nutri-Score obtained, hindering the possibility for consumers of verifying the adequacy of the allocation and limiting transparency.

Conclusion

It appears therefore necessary to adapt the sodium component into a salt component, following the rules for decimal points of the EU regulation and to investigate further the Nutri-Score algorithm with regards to the classification of salty products to design appropriate scenarios and to test them. Also for the salt component, scenarios of the Nutri-Score algorithm were designed and are being tested against the current method.

Task 5. Sugars

Background

Sugars are included in the Nutri-Score algorithm as a 'positive' component which adds points to the score, along with saturated fats, sodium and energy. However, considering that the energy density of sugars is lower than that of fats, by construction highly sugary products do not reach an equivalent classification in the Nutri-Score as highly saturated fat products. Moreover, a scientific consensus is emerging on the deleterious effect of specific forms of sugars – free sugars rather than sugars *per se*, as fruits have consistently showed a beneficial effect in relation with health. This consensus led WHO to set a maximal level of daily energy intake from free sugars <10%, with an additional recommendation to limit intakes of free sugars <5% of total energy intakes (World Health Organization, 2015). These recommendations have been integrated in most countries in diet-related recommendations. In France, the recommendation does not pertain to added or free sugars, but rather on sugars except lactose and galactose, with an upper limit at 100g/day (ANSES, 2016).

A draft opinion (released under consultation in 2021 – as the consultation is over, the draft opinion cannot be retrieved in Jan 2022)[3] from the NDA Panel of EFSA did not allow for the definition of a tolerable upper intake of total or free sugars, considering that the risk associated with intakes is linear. However, the Panel supported the recommendation to limit the intakes of free and added sugars, which should be as low as possible.

The more recent recommendations on sugars pertain to either free, added, or specific sub-types of sugars. However, the nutritional declaration at the back of the pack on which the Nutri-Score is based reports total sugars only. Therefore, any inclusion of specific forms of sugars would necessitate either elements outside of the nutritional declaration (relying therefore on industry data) or computational elements.

Related stakeholders requests

Some stakeholders have expressed concerns over the potential leniency of the Nutri-Score pertaining to sugars, as the reference value for sugars in the algorithm appears high in comparison with current recommendations in particular concerning free sugars. Requests from stakeholders included the investigation of the potential inclusion of free or added sugars rather than total sugars in the algorithm and/or the revision of the sugar component to align with international recommendations pertaining to the reduction of sugars in the diet.

Sugar consumption and main sources of sugars in the population

Total sugars consumption was estimated between 15 and 21% of total energy intakes in a study from 11 representative samples in Europe (Azaïs-Braesco et al., 2017). Added sugars contribution to total energy intakes ranged from 7.3% ±5.4 in Norway to 11.2% ±6.6 in the Netherlands (Azaïs-Braesco et al., 2017). Sugary products (cakes, biscuits and sugar-sweetened beverages) were major contributors to total and added sugar intakes.

With regards to free sugars intakes, the IDEFICS study in children in Europe reported an average of 23% ±10 of energy from total sugars and 18% ± 10 of total energy intake from free sugars. Less than 20% of children had intakes below the recommended 10% free sugars intakes and only 4.1% reached the recommended WHO guideline of <5% of total energy intakes from free sugars. Fruit juices and soft drinks were the first contributors

[3] At the publication of the report in March 2022 the final report has been release under: EFSA Panel on Nutrition, Novel Foods and Food Allergens (NDA) (2022). Tolerable Upper Intake Level for Dietary Sugars ». *EFSA Journal* 20 (2): 7074. https://doi.org/10.2903/j.efsa.2022.7074. Available at https://www.efsa.europa.eu/en/efsajournal/pub/7074

to free sugars intakes (around 10% of free sugars intakes for each) followed by dairy (around 10% intakes) and sweets and candies (around 6%) (Graffe et al., 2020).

Association with diet-related chronic diseases

There is strong evidence to the fact that consumption of sugar-sweetened beverages is associated with weight gain, hypertension and CVD.

As to the various forms of sugars, evidence is inconsistent with regards to total sugars, except for dental caries. This inconsistency relates to the nature of sources and/or types of sugars when considering total sugars as a whole. However, the EFSA NDA Panel considered that there was moderate evidence as to the association between free and/or added sugars with obesity and elevated LDL cholesterol, as well as low evidence of an association between consumption of added/free sugars with non-alcoholic fatty liver disease (NAFLD) and T2D.

Conclusion

Overall, it appears noteworthy to investigate further the Nutri-Score algorithm with regards to the classification of sugary products and/or the definition of the sugar component, to design appropriate scenarios and to test them. Of note, the constraints imposed in particular concerning the information available and usable for the Nutri-Score may not allow including free, added or specific sugars in the algorithm.

Task 6. Beverages

Background

The relative ranking of the various types of sweetened beverages is currently being investigated in the ScC. In the current Nutri-Score algorithm, very low amounts of sugars (> 0 g/100 ml) in beverages automatically result in ranking them into the C (or higher) categories of the Nutri-Score, as only beverages with 0 g of sugars can be ranked in the B category (i.e. scoring up to one point in energy and 0 points in sugars, with up to a final score of 1 equivalent to the B category). Considering this, the use of artificial sweeteners is the only alternative to obtain a ranking of sweetened beverages into the B category. In addition, the Food information for Consumers' (FIC) regulation (EUR-Lex - 32011R1169 - EN - EUR-Lex, n.d.) recommends in case of sugars content below 0.5 g per 100 g/mL to either display « 0 g » or « <0.5 g » on the nutritional declaration. With a threshold at 0 g of sugars for the first point in Nutri-Score, the FNS may depend on the way the information is displayed, so it would not strictly be based on the nutritional content.

Consequently, the current algorithm provides limited incentives for the reformulation of sweetened beverages with low or very low contents in added sugars, and somewhat incentivizes the use of artificial sweeteners to improve ranking.

Another aspect under investigation by the ScC is related to the specific status of dairy (and plant-based) drinks, and their actual categorisation into the solid food category. Currently, dairy drinks (containing more than 80% milk) are excluded from the beverage category. The ScC investigates modifications of the algorithm that would classify milk and dairy drinks as beverages, as this may lead to a better discrimination between dairy beverages and in particular sugar-sweetened dairy beverages.

Related stakeholder requests

Several stakeholders from the beverage and soft drink industry have expressed concerns over the imbalance in the distribution of soft drinks across the Nutri-Score scale. With the actual version of the Nutri-Score, most soft drinks are ranked D or E. Requests were also addressed regarding the fact that very low, residual sugar content of fruit or herbal teas ranks them into the C category. Similarly, when diluting fruit juices with pure water, the ranking declines, typically to D, despite pure water ranking A, due to the losses of negative points in the fruit category. The question is if after all only pure water should be ranked A, or whether flavoured water, even without sweeteners or containing any calories, should not be ranked A as well.

Requests have also been forwarded by stakeholders, related to the classification of fruit juices in the beverage category. These stakeholders request for 100% fruit or vegetable juices to be classified in the 'solid foods' category. Stakeholders have also criticized the somewhat arbitrary threshold of 80 % dairy content in dairy drinks above which they count as food, as this threshold is not mirrored by other guidelines.

Associations with diet-related chronic diseases

A potential other issue considered by the ScC concerns non-nutritive (i.e. non-caloric), (sometimes also referred to as artificial) sweeteners. These are added to various foods and beverages in order to limit energy intake, in particular sugar intake, with an expected benefit on the management of excess weight and blood glucose, in addition to a limitation of the risk of dental caries. However, several studies have reported that the consumption of non-nutritive sweeteners, notably via artificially sweetened beverages, is associated with several metabolic disorders such as diabetes and CVD, as well as weight gain. To establish whether a modification of the algorithm is warranted, the ScC is conducting a literature review to assess the potential benefits and risks associated with the consumption of non-nutritive sweeteners. The assessment is focused on all age and gender categories, including adults and children.

Of note, in Mexico, the intake of non-nutritive sweeteners by children is being discouraged, since the Mexican Ministry of Health has acknowledged that artificial sweeteners can be harmful to children. As a result, a front-of-pack nutritional warning label indicating the presence of artificial sweeteners (translating into “not recommended in children”) is mandatory (NOM-051) since 2020.

Conclusion

The ScC is currently investigating whether potential modifications of the current algorithm could improve the discrimination power of sweetened beverages, with the intention of facilitating incentives to reformulate to lower sugar content. These potential modifications also concern the specific status of dairy drinks (beverage category instead of the actual solid one above 80% dairy content).

These elements are currently under investigation to design the scenarios needed and test them by the ScC, and results of this evaluation could be implemented into the final algorithm modification.

Task 7. Dairy products

Background

Dairy as a food group includes milk and milk products made of milk, such as cheese and yogurt. Dairy types vary considerably regarding:

1. structure: fluids, semi-solids and solid products
2. fat content: low-fat, semi-skimmed, high-fat; fat content differs both between and within dairy types
3. added sugars content: sweetened drinks, yogurts and desserts (up to 20-25g/100g);
4. salt content: cheese (up to 4g/100g) versus other dairy
5. fermentation: fermented (cheese, yogurt, sour milk) versus non-fermented products

Considering this very high variability, while dairy products as a whole are considered in most dietary guidelines, some dairy types are excluded from this category. Butter is technically a dairy product but its nutritional composition warrants its inclusion in dietary guidelines with (preparation) fats and oils. Sour cream is also considered among fats and oils in some dietary guidelines. Similarly, dairy desserts and ice cream are typically dairy products, but their composition warrants their inclusion in most dietary guidelines among sugary products.

The dietary guidelines of the COEN all include dairy foods in moderate amounts (2-4 portions per day) as part of a balanced diet as dairy foods contribute to the intake of high-quality protein, calcium, vitamins and minerals. However, dairy also contains energy, saturated fat, salt (cheese), and sugar (sweetened dairy).

Dairy guidelines are generally derived from dietary reference values for protein, calcium, vitamins and/or fat. For several countries the guidelines are (also) based on chronic disease endpoints (Netherlands, France, Belgium). Dairy is an important contributor to the intake of saturated fatty acids. COEN generally have guidelines aiming at lowering saturated fatty acids by choosing fats or oils from vegetable sources, replacing hard fats with soft fats and oils, or limiting overall saturated fatty acid intake or hidden fat intake (in processed products). Some guidelines also include some elements specifically based on the composition of the dairy food category (e.g. French recommendation to choose cheese with lower fat content and higher calcium content). The sugars and salt content of dairy is generally not mentioned within the dietary guidelines. However, in the dietary guidelines of the Netherlands it is recommended to limit sugar-sweetened drinks, including dairy drinks.

Dairy and the Nutri-Score

Regarding the Nutri-Score, dairy products score 'positive' points for energy, saturated fat, sugar, and salt and 'negative' points for protein.

The following 3 aspects of dairy are relevant:

1. Dairy drinks are not considered beverages
2. Although the Nutri-Score algorithm differs for beverages, dairy drinks (defined as containing more than 80% milk) have been excluded from this beverages category. Calculation of the score and attributing a Nutri-Score for milk products is based on the calculation for solid products, so that the nutritional value of these products can be better taken into account (Santé Publique France, 2021).The cut-off values for energy, sugar and saturated fatty acids are more strict for beverages. The cut-off value included to separate milk and milk-based products from other beverages is intended to prevent to classify beverages with limited amounts of milk and potentially a high content in of sugar or saturated fatty acids to classify as dairy with corresponding less strict cut-offs for energy, sugar and saturated fatty acids.
3. Some dairy products can be classified as added fats (e.g. sour cream)

A modified algorithm for cheeses

The Nutri-Score manual provides specific information about the calculation of the score for cheeses (Santé Publique France, 2021).

There is a strong correlation between the protein and calcium content of dairy products (Rayner et coll. 2005). Calcium is not one of the nutrients subject to mandatory declaration. That is why the score modification consists solely of ensuring that the amount of protein in cheeses is always counted (which would otherwise be precluded by their salt, calorie and saturated fat content, as these result in more than 11 unfavourable points). This ensures that their relative calcium content is always accounted for. Thus, the protein content is counted, whether the unfavourable points is <11 or not, and the thresholds for the other food categories remain the same.

Overall, considering its complementarity with FBDGs, the Nutri-Score should help consumers differentiate between: 1) dairy products with varying fat content, 2) sweetened and non-sweetened dairy, 3) dairy products with varying salt content.

Some areas of improvement to the classification of dairy can be highlighted. As the Nutri-Score allows for more differentiation *between* groups of dairy products (e.g. hard cheeses vs. milk) than *within* groups of dairy products (e.g. types of milk, types of cheese), there may be a limited discrimination between low-fat dairy (specifically low-fat milk and low-fat yoghurt) as opposed to high-fat milk and high-fat yogurt in the Nutri-Score. Another potential concern pertains to the fact that sweetened dairy drinks are classified as milk in the 'solid foods' category, with therefore limited discrimination regarding their added sugar content.

Related stakeholder requests

Several stakeholder requests have been submitted regarding dairy. Some have questioned the rationale for the 80% cut-off for the definition of dairy as beverages versus solid foods. Also, a number of stakeholders from the cheese industry have requested an improvement of the classification of cheese in the algorithm, considering that the current classification - albeit including a specific provision for cheese - is not adequate.

Associations with diet-related chronic diseases

For an evaluation of the associations of dairy consumption with chronic disease endpoints, the scientific evidence informing the Dutch Dietary Guidelines 2015 (DDG2015) was used as a starting point. The DDG2015 used systematic reviews (SRs) or meta-analyses (MAs) of prospective cohort studies (including nested case-control studies and case-cohort studies) and RCTs of 30 food groups and nutrients, including a SR on dairy products, on chronic disease endpoints (Kromhout et al., 2016). The disease endpoints were selected based on the top-10 of chronic disease burden. In addition, SRs and MAs of RCTs on LDL-cholesterol, blood pressure, and body weight were added. The evidence from prospective cohort studies and RCTs was used as complementary evidence.

Strong evidence for associations (MA of cohort studies) were found for the following associations (Kromhout et al., 2016):

- Consumption of 400 g of <u>total dairy</u> per day is associated with a 15% lower colorectal cancer risk (Aune et al., 2012)
- Consumption of 200 g of <u>milk</u> per day is associated with a 10% lower colorectal cancer risk (Aune et al., 2012; Ralston et al., 2014)
- Consumption of 60 g or more of <u>yogurt</u> per day is associated with a 15% lower T2D risk (Chen et al., 2014; O'Connor et al., 2014)

The ScC performed a literature review to update the scientific evidence from of 2014 onwards. A literature search in PubMed has been performed for SRs and MAs of prospective studies on the association between dairy and CVD or T2D. Regarding cancer, the reports of the World Cancer Research Fund have been used in addition to a search in PubMed.

Findings of observational studies on dairy intake and chronic diseases

Regarding colorectal cancer, the inverse association has been confirmed in updated meta-analyses of cohorts (WCRF and EPIC). There is limited information on the association between fat content from dairy and NCDs. However, an analysis in the EPIC cohort provided no indications for differential associations according to fat content.

Based on the WCRF reports there is limited suggestive evidence for an inverse association of dairy intake and pre-menopausal breast cancer, and limited suggestive evidence for a direct association with prostate cancer.

The inverse association for yogurt intake in relation to reduced T2D risk has been confirmed in recent MAs. However, there was considerable heterogeneity between studies.

In the DDG2015, no strong evidence was found for dairy in relation to coronary heart disease (CHD) or stroke. In a recent SR of prospective observational studies of Jakobsen et al (Jakobsen et al., 2021) cheese consumption was associated with a statistically significant lower risk of CHD (based on 7 studies) and high-fat milk was associated with a higher risk of CHD (based on 6 studies). There was, however, considerable heterogeneity between studies, which limits a clear interpretation of the results. Regarding stroke, a recent analysis based on the EPIC study showed inverse associations of milk, yogurt and cheese consumption with stroke risk (Tong et al., 2020).

Findings on saturated fatty acids (SFA) from dairy vs. SFA from other sources; results on CVD from observational data and cardiovascular risk factors from trial data Results based on observational studies on SFA from dairy or total dairy fat are generally in line with observational analyses of dairy products in relation to CVD risk (Chen et al., 2016; de Oliveira Otto et al., 2012; Praagman et al., 2016; Steur et al., 2021). Chen et al (Chen et al., 2016) specifically modelled substitution of dairy fat with other fatty acids and concluded: "…compared with carbohydrates in the diet, dairy fat is not associated with risk of CVD. However, the substitution of dairy fat with vegetable or polyunsaturated fats is associated with lower risk of CVD, whereas the replacement of dairy fat with other animal fat is associated with slightly higher CVD risk. Of note, in observational studies, the findings on nutrients from specific food sources are difficult to disentangle from the findings based on the foods.

Based on data from trials on cardiovascular risk factors, cheese and butter differentially affected LDL-cholesterol (with butter showing an increase on LDL-cholesterol compared to hard cheese) (Brassard et al., 2017; de Goede et al., 2015). However, cheese consumption (as well as butter consumption) had an LDL-raising effect compared to MUFA and PUFA (Brassard et al., 2017). The results on HDL-cholesterol are less clear. The results on non-lipids are limited, or showed no difference between cheese and butter. Of note, both of these studies were funded by the dairy industry.

Conclusion

In summary, the results of the literature review on dairy foods in relation to chronic disease outcomes support a role for dairy (in limited amounts) as a whole as part of a healthy diet. Regarding the evidence on health, the literature review showed evidence of beneficial effects of total dairy products consumption. Some evidence shows a beneficial effect of milk and yogurt specifically on CVD and colorectal cancer. No conclusive evidence was found as to a differential effect depending on the level of saturated fatty acids in specific dairy products.

Perspectives for 2022

The present report only highlights the main areas of potential improvement that the ScC unanimously considered to be worthy of further research as priority tasks. The methodology for modification of the algorithm for the various components of the Nutri-Score as well as the testing methods and the databases in which these may be applied have been described in the “Methods for the update of the algorithm” section.

The next phase for the ScC is to proceed with the definition of the various scenarios of modification to the components of the algorithm and their testing in databases of nutritional composition, both alone and in combination.

Once the various scenarios for modifications of individual components and their combination will be set, the ScC will proceed with the exploration of modifications to the final algorithm and final thresholds of attribution of the Nutri-Score colours. Finally, the ScC considers that the review of the ingredients that are included in the FVPNO component of the algorithm may be necessary, in particular with regards to the industrial processes that may be deemed acceptable or not. This specific task may require specific expertise and may be separated from the overall revision of the algorithm as an independent task.

The ScC aims at providing a fully revised version of the Nutri-Score algorithm in mid-2022. Depending on its progress, the ScC may release the revised version of the algorithm in separate documents for solid foods on the one hand (including cheese and fats and oils) and beverages on the other hand.

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NUTRI-SCORE

Appendices

Appendix 1. Members of the Scientific Committee of the Nutri-Score

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Pr Joline WJ BEULENS
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Pr Torsten BOHN
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Marie-Noëlle FALQUET
Lecturer in food science in Bern University of applied Sciences, Department of Agricultural, Forest and Food Sciences, Switzerland

Dr Marta GARCÍA SOLANO
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Pr Chantal JULIA
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Dr Benedikt MERZ
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Pr Fernando RODRÍGUEZ ARTALEJO
Professor of Preventive Medicine and Public Health. Universidad Autónoma de Madrid Head of the Cardiovascular and Nutritional Epidemiology Group at CIBER of Epidemiology and Public Health, Spain

Dr Elisabeth HM TEMME
Senior scientist Nutrition and Health in the National Institute for Public Health and the Environment, the Netherlands

Dr Stefanie VANDEVIJVERE
Senior Scientist Nutrition & Health, Department of Epidemiology and Public Health, Sciensano, Belgium

Appendix 2. Mandate of the Scientific Committee of the Nutri-Score

The mandate of the Scientific Committe of the Nutri-Score was set by the Steering committee, as follows :

A Scientific committee is established by the COEN in 2021, whose mandate is to provide independent advice on potential update of the current algorithm of Nutri-Score and the scientific evidence underpinning the public health impact of Nutri-Score.

a. Composition of the Scientific committee and decision making process

The Scientific committee is composed of independent scientists, with a maximum of two per COEN, proposed by each of the national authorities responsible for the implementation of Nutri-Score in these countries, sitting at the Steering committee. The designated scientists do not represent their country of origin or specific interests of sectors in their respective country of origin, but represent science and public health in an international scope. Their membership status is approved after analysis by the Steering committee of their scientific and public health knowledge and experience and absence of conflicts of interest with the private sector. In case of non-approval, the country will be asked to propose a new candidate. The final composition of the Scientific committee will be publicly available, including the curriculum vitae and conflict of interest declarations of each of its members, subject to the prior approval of the members to accord with the General Data Protection Regulation.

The expertise requested from the Scientific committee members is on nutrition, public health, food composition, nutrition information including nutrition labeling, nutrient profile and epidemiological studies. If there is a need to address a specific issue such as social sciences, consumer behaviour, food technology, the Scientific committee could request an external expertise after approval by the Steering committee. These external experts will also have to complete a declaration of interests.

Members from the Scientific committee are appointed for a period of 3 years. Their mandate may be renewed twice. The Committee is chaired by an independent scientist chosen by the Steering committee among the members of the Scientific committee. The chair has authority in the field of nutrition and profiling of foods, and is capable to connect the views of committee members. The chair will be chosen for a period of 3 years and may be renewed twice.

The Scientific committee has the free choice of its operating mode (physical meetings by teleconference/videoconference, e-mail).

The Scientific committee will work on consensus mode to produce its scientific recommendations, or exceptionally by vote if consensus cannot be reached. In case of vote, decisions shall be taken by a majority of two-third of the vote cast. Divergent opinions may be expressed in the final document provided to the Steering committee, along with the subsequent recommendations. Final decisions on the proposals of the Scientific committee are taken by the Steering committee. A feedback to the Scientific committee is given, in case a proposal of the Scientific committee is not retained by the Steering committee

b. Scope of work

The mandate of the Scientific committee is approved by the Steering committee. The scope of work of the Scientific committee is to:

- study the whole body of scientific knowledge in the field of nutrition and health, in view of new data that may impact the computation of the algorithm
- study the scientific rationale for any request for Nutri-Score update transmitted through the Steering committee.
- study the scientific rationale for also any request received from the food industry, consumers associations and other stakeholders, which are transmitted by the Steering committee and deemed relevant by the Scientific committee. The Scientific Committee may, on an ad hoc basis, elect to invite experts from a non-COEN country to meetings dealing with specific issues, when that non-COEN country has expressed interest in the subject of the meeting for the purpose of its better understanding of Nutri-Score.
- conduct corresponding literature review to assess the evidence of said request. - propose to the Steering committee evidence-based adjustments, if relevant, to the nutrient profiling system of Nutri-Score, taking into account scientific knowledge and public health issues in the nutritional field, in synergy with the food-based dietary guidelines.

For clarification purposes and as way of example, but not limited to, the Scientific committee may work on the thresholds fixed for the elements taken into account for the calculation of the score: the allocation of points, the thresholds fixed per category, or the jumps defined for fixing positive or negative points. For clarification purposes, the Scientific committee shall not:

- elaborate new nutritional recommendation.
- modify the core principles of Nutri-Score algorithm based on the FSA score or other core elements of Nutri-Score (e.g. the algorithm cannot consider nutrients that are not part of the nutritional declaration such as vitamins or minerals; the calculation will remain per 100 grams or 100 millilitres and not per portion, and should remain transversal to all product categories, except for products like cheese, beverages and added fat for comparability reasons).
- modify the graphical format.
- carry out communication activities related to the opinions and activities of the Scientific committee except if mandated expressly and in writing by the Steering committee.

Appendix 3. Dates of meetings of the ScC

The ScC convened at the following dates in 2021

February 12 – Kick-off meeting
March 5
March 31
May 7
May 28
June 30
September 7
October 8
November 3
November 22-23
December 10

Appendix 4. Stakeholders requests transmitted to the ScC

Up to December 2021, the Scientific Committee of the Nutri-Score received 75 stakeholders' requests from the Steering Committee after their evaluation. For some of the requests, parts were considered outside the scope of the mandate of the ScC by the Steering Committee. In this case, only the requests within the mandate of the ScC were considered.

Most of the stakeholders' requests (36 requests) pertained to general and/or multiple requests for the modification of overall nutrient profile model.

Other specific requests related to the beverages category (11 requests); dairy products (6 requests) and cheese (3 requests); meat (5 requests) and processed meat (1 request); fats and oils (4 requests); seafood products (4 requests); whole-grain products and bread and bakery products (3 requests); seeds, nuts and legumes (2 requests).

The vast majority of requests were from the agro-industry sector: representative bodies of agricultural producers or manufacturers; individual producers or manufacturers (mainly large transnational corporations). The requests came from all COEN.

A limited number of requests were from consumer groups, NGOs or nutrition-related professional groups.

Appendix 5. List of abbreviations

AESAN	Spanish Agency for Food Safety and Nutrition
ANSES	French Agency for Food, Environmental and Occupational Health & Safety
COEN	countries officially engaged in the Nutri-Score
CVD	Cardiovascular Disease
EFSA	European Food Safety Agency
FBDG	Food-based Dietary Guidelines
FNS	Final Nutritional Score
FOPL	Front-of-pack Nutrition Label
FVPNO	Fruits, vegetables, pulses, nuts and selected oils component of the Nutri-Score
MA	Meta-analysis
NAOS	Strategy for Nutrition, Physical Activity and Obesity Prevention
NCD	Non-Communicable Disease
NPA	National Prevention Agreement
PNNS	French National Nutrition and Health Program
RCT	Randomized Controlled Trial
ScC	Scientific Committee of the Nutri-Score
StC	Steering Committee of the Nutri-Score
T2D	Type 2 Diabetes
WHO	World Health Organization