

PROJECT REPORT
ON
***FRONT-OF-PACK LABELLING (FOPL) IN HFSS FOOD
PRODUCTS***
SUBMITTED TO



FOOD SAFETY AND STANDARDS
AUTHORITY OF INDIA

Inspiring Trust, Assuring Safe & Nutritious Food
Ministry of Health and Family Welfare, Government of India

UNDER THE GUIDANCE OF

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CERTIFICATE

This is to certify that this project report entitled *Front-of-pack labeling in HFSS food products* submitted by **Ms. Sreya Damani** in partial fulfillment of requirement of internship programme at Food Safety and Standards Authority of India (FSSAI) is original work contribution under my guidance and supervision.

We recommend that the study is fit to be evaluated for the certificate by FSSAI. The project submitted by her is excellent and can be considered by the organization for detailed examination.

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Place:

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GLOSSARY

HFSS	High in Fat, Salt or Sugar
NCDs	Non Communicable Diseases
CVD	Cardiovascular Disease
FOPL	Front of pack labeling
NIP	Nutrition Information Panel
FSSAI	Food Safety and Standards Authority of India
TFA	Trans fat
SAFA	Saturated fat
WHO	World Health Organisation
HFCS	High Fructose Corn Syrup
EC	European Commission
JETRO	Japan External Trade Organization
USFDA	Food and Drug Administration
GMP	Good Manufacturing Practices

SECTION 1

FRONT-OF-PACK LABELING IN HFSS FOOD PRODUCTS

BACKGROUND

Obesity and Non-communicable Diseases (NCDs) are increasing rapidly in India. (1). NCDs continue to be major public health problem in our country, responsible for major proportion of morbidity and mortality (2). According to WHO, Non-communicable diseases (NCDs) kill 41 million people each year, equivalent to 71% of all deaths globally. NCDs contribute to around 5.87 million (60%) of all deaths in India (3)

Processed food products tend to contain high amount of nutrients related to obesity and NCDs- sodium, sugar, saturated fat and trans fat (4). High salt consumption leads to hypertension and cardiovascular diseases. Much salt consumption results from non-discretionary intake of breads, soup mixes, gravies which are all processed foods (6). Intake of trans fat has been associated with Coronary Heart Disease (CHD), sudden death from cardiac causes and diabetes. (8).

There has been surge in market of packaged foods in India recently. According to a forecast of Euromonitor, India will become a third largest market of packaged foods in world in the year 2020. Due to increased urbanization and increase in number of working women, there is less time left with people to prepare their meals and beverages (5). Instead, they prefer pre-packaged food because they are easy to use, easily available and save a lot of time. Sugars which are predominantly added in packaged foods are fructose containing sugars, sucrose and HFCS. Consumption of excess sugar is directly and indirectly associated with CVD and Diabetes Mellitus. (7)

Increase in number of cases of NCDs and Obesity due to consumption of pre-packaged and processed foods has become a concern for governments of many countries. In order to prevent or control further widespread of such diseases, various public health policies are coming up. Front-of-pack labeling (FOPL) is also one of the strategies to control this.

INTRODUCTION

As mentioned in Section 2.2.2 Labeling of Pre-packaged Foods of the Food Safety and Standards (Packaging & Labelling) Regulations, 2011, Nutritional information or nutritional facts per 100 gm or ml or per serving of the product shall be given on the label.

Consumers often do not have the time to read labels when shopping, and many also have difficulty understanding the information provided. In order to make this information simpler and easy to understand for consumers, and make them aware of what they are eating, front-of pack labeling can be of help. FOPL provides nutritional information in interpretative form on front of food products.

- This will help consumers understand product's nutritional information and to enable them to make better informed food choices at the point of purchase.
- Healthy choice of food can help prevent and reduce the burden of childhood obesity, NCDs (e.g., cardiovascular disease, cancer, obesity, and type 2 diabetes) in Indian population.

- It stimulates healthy product development and reformulation by manufacturers.

Many countries like UK, France, Australia, Chile have implemented certain FOPL models. A **draft on FOPL as per FSS (Labelling and Display) Regulations, 2019** has been proposed so that India can also implement a FOPL model. In this draft, two things of major importance are:

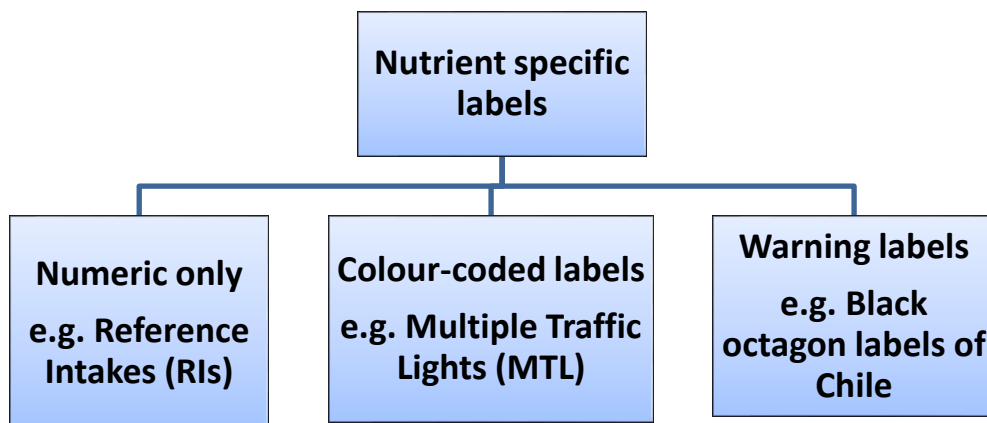
- HFSS Model to be displayed on Principal Display Panel (PDP)
- Nutrient thresholds for food categories. (Schedule 1)

Purpose of this project is to compare these two major components of draft with that of other countries and models in order to have a better and clear picture on what can be the ideal way forward for India.

TYPES OF FOPL SYSTEMS

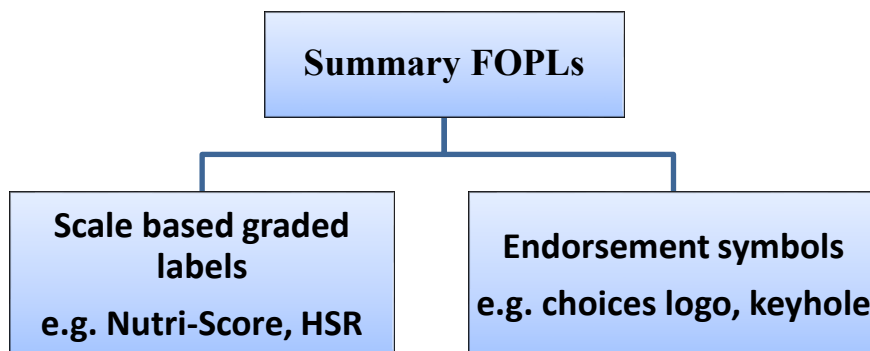
- NUTRIENT-SPECIFIC SYSTEMS

It displays information on the content of a given nutrient.



- SUMMARY INDICATOR SYSTEMS

It provide an assessment of the overall nutritional quality of a given food product.







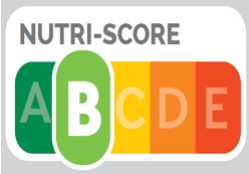
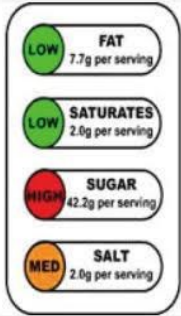


- **FOOD GROUP INFORMATION SYSTEMS**

These include symbols that indicate that a food group (such as vegetables and fruit) or a food ingredient important to the diet (such as whole grains) is present in a food product.

COMPARISON OF ‘HIGH’ NUTRIENT CRITERIA OF HFSS MODEL WITH OTHER MODELS.

Excessive/ nutrient criteria	High	HFSS model	PAHO model	SEAR model
Added sugar		>10% total energy	--	--
Free sugar		--	≥10% total energy	≥10% total energy
Sodium		Threshold values specified for food categories	≥1 mg per kCal	≥1 mg per kCal
Total fat		--	≥30% total energy	≥30% total energy
TFA (Trans Fat)		>1% total energy	≥1% total energy	Exclusion criteria
SAFA (Saturated Fat)		Threshold values specified for food categories	≥10% total energy	≥10% total energy
Other sweeteners		--	Any amount	--

LABELING SYSTEM IN DIFFERENT COUNTRIES

Country	Labelling model	Logo
Australia, New Zealand	Health Star Rating	
Netherland, Czech Republic, Nigeria, Argentina	Choices logo	
Sweden, Norway, Denmark, Iceland	Green keyhole	
Chile	Stop signals (octagonal logo)	
France	NutriScore	
UK	Multiple Traffic Lights	
Singapore	Healthier Choice Symbol	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Old</p> </div> <div style="text-align: center;">  <p>New</p> </div> </div>

A. HEALTH STAR RATING (HSR) SYSTEM



1. Background:

The Australian Government introduced a voluntary Health Star Ratings (HSR) front-of-pack labelling system in June 2014 on a **voluntary basis for five years**. The system rates food products on a 1 to 5 star scale (with ½ star increments) based on four aspects of food associated with increasing risk factors for chronic disease – **energy, saturated fat, sodium, and total sugar** – as well as **positive aspects, namely protein, dietary fiber, fruit, vegetables, nuts and legumes and, for some products, calcium**. The overall rating of the product is determined based on an algorithm that awards stars according to the quantity of these components within the product – i.e. **the more stars, the healthier the food**.

2. Components:

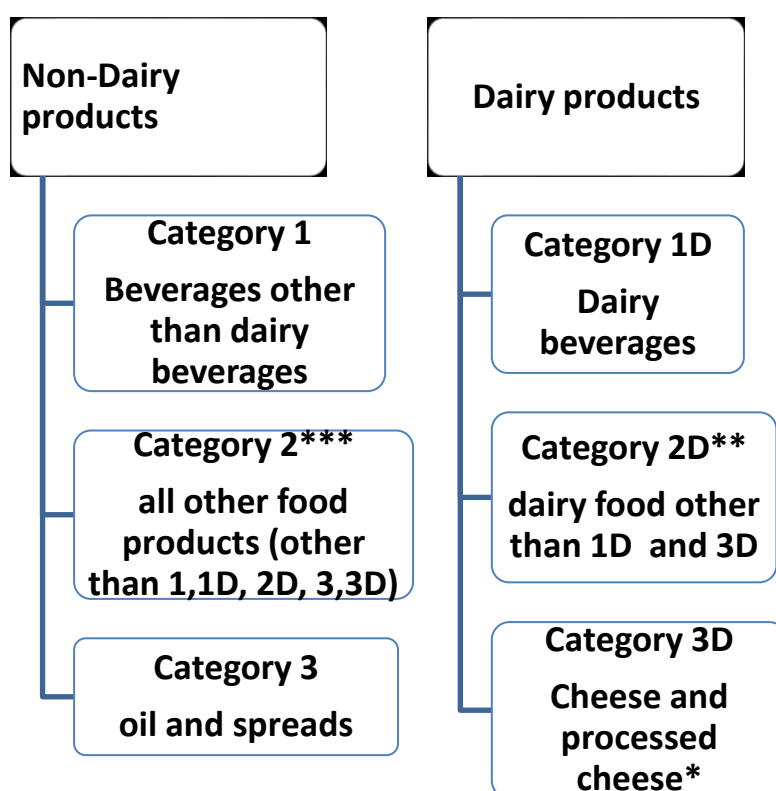
Negative components: Energy, saturated fat, sodium and total sugars.

Positive components: Fruit and vegetable content, dietary fibre and protein content.

3. Reference Unit:

Nutritional composition of 100 g or 100 mL

4. Product classification:



*Category 3D: Cheese with calcium content >320mg/100g

**Category 2D: also contains cheese with calcium content <320mg/100g

***Custards, desserts, cream cheese, ice-cream and cream are not considered in the HSRC as dairy foods but are classified as Category 2 foods.

5. Excluded products:

- Foods with inherently low nutritional contribution, such as herbs, spices, vinegar, salt, pepper, tea, coffee, herbal infusions, gelatin and setting compounds.
- Small packages (less than 100 mm²) are exempt from NIP labelling, and may not have space to carry HSR labelling.
- Certain Special Purpose Foods namely:
 - Infant formula products
 - Food for infants
 - Formulated Supplementary Foods for young children (including toddler milks and formulated supplementary foods intended for young children)
 - Formulated Supplementary Sports Foods and
 - Foods for Special Medical Purposes (i.e. supplementary foods that are general purpose foods [Category 1D or 2D] may use the HSR system).
- Alcoholic beverages (>1.15% alcohol by volume)
- Alcohol kits
- Kava.

- Food that is intended for further processing, packaging or labelling prior to retail sale
- Food that is delivered to a vulnerable person by a delivered meal organization
- Food, other than food in a package that is provided to a patient in a hospital or a medical institution.

6. **Methodology:**

Step 1: Determine the **category** of the food. (Refer to product classification above).

Step 2: Calculate the **baseline points**.

HSR baseline points are calculated for the average quantity of **energy, saturated fat, total sugars and sodium in 100 g or 100 ml of the food**.

The more the quantity of fat, salt or/and sugar in food, higher will be the baseline points.

Baseline points can be maximum of 30 points.

Step 3: Calculate the **modifying points**.

HSR Modifying Points may be scored for the amount of following nutrients present in food:

- **fruits, nuts, vegetables and legumes (fvnl)**- HSR V points*
- **protein**- HSR P points **
- **fibre**- HSR F points***

**HSR Protein (P) points can be scored if a food scores less than 13 baseline points. A food that scores equal to or more than 13 baseline points can only score protein points if the food scores 5 or more V points.

***Category 1 and 1D foods (dairy and non-dairy beverages) cannot score F points.

*V points can be scored for fruits, vegetables, nuts and legumes (fvnl) including coconut, spices, herbs, fungi, seeds and algae content including –
 (a) fvnl that are fresh, cooked, frozen, canned, pickled or preserved; and
 (b) fvnl that have been peeled, diced or cut (or otherwise reduced in size), puréed or dried.

V points cannot be scored for –

- (a) A constituent, extract or isolate of a food e.g. peanut oil, fruit pectin and de-ionised juice; or
- (b) Cereal grains

V points may be scored for –

- (a) Fruit juice or vegetable juice including concentrated juices and purees;

(b) coconut flesh (which is to be scored as a nut), whether juiced, dried or desiccated, but not processed coconut products such as coconut milk, coconut cream or coconut oil; and

(c) The water in the centre of the coconut.

In the case of canned vegetables and legumes, the percentage of *fvnl* in the product should be calculated based on the product as it would be consumed (i.e. drained) and not the product as sold.

The more the fvnl content of food, higher will be the modifying points.

Step 4: Calculate the final HSR score.

Final HSR Score = baseline points – (V points) – (P points) – (F points)

Step 5: Assignment of a rating to food on basis of final HSR score.

Table: Final scores used to assign Heath Star Ratings

Health star rating	Food category					
	1 non-dairy beverage	1D Dairy beverage	2* non-dairy foods	2D# Dairy foods	3 Oil spreads	3D cheese > 320 mg Ca/100g
5	≤ -6	≤ -2	≤ -11	≤ -2	≤ 13	≤ 22
4 ½	-5	-1	-10 to -7	-1	14 to 16	23 to 24
4	-4	0	-6 to -2	0	17 to 20	27 to 28
3 ½	-3	1	-1 to 2	1	21 to 23	29 to 30
3	-2	2	3 to 6	2	24 to 27	31 to 32
2 ½	-1	3	7 to 11	3	28 to 30	33 to 34
2	0	4	12 to 15	4	31 to 34	35 to 36
1 ½	1	5	16 to 20	5	35 to 37	37 to 38
1	2	6	21 to 24	6	38 to 41	39 to 40
½	≥ 3	≥ 7	≥ 25	≥ 7	≥ 42	≥ 39

*All foods other than dairy not in Category 1 or 3

All dairy foods not in Category 1D or 3D

Lesser the final HSR Score, the product will have a better rating.

B. CHOICES LOGO



1. Background:

Choices has national programmes in The Netherlands, Belgium, Poland and Czech Republic and has established cooperation with other European, Latin American and Asian countries. This criteria has been developed by the Choices International Scientific Committee, an independent panel of international experts in nutrition, food technology and consumer behavior.

2. Components:

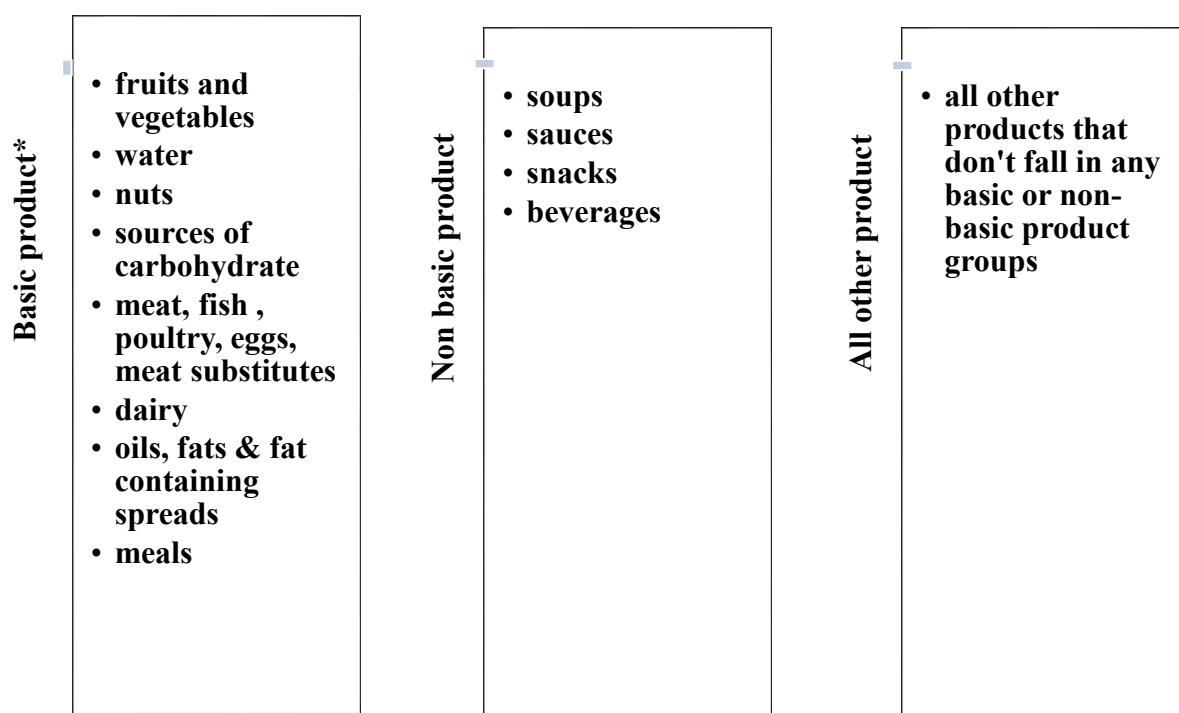
Negative components: Saturated fat, trans fat, sodium, added sugar, energy

Positive components: Fibre

3. Reference Unit:

Nutritional composition of 100 g or 100 mL

4. Product classification:



5. Excluded products:

- products containing >0.5% alcohol
- food supplements
- products for use under medical supervision
- Foods for children under a year old.

6. Methodology:

Criteria had been set for food categories.

Table: criteria for **basic product group**

Product group	Criteria
Fruits and vegetables	
Fresh or fresh frozen fruits, vegetables and legumes	All products that do not contain additions comply. These include dried, fresh frozen and/or sliced fruits and vegetables, without additives.
Processed and dried fruits and vegetables	SAFA: ≤ 1.1 g/100 g TFA: ≤0.1 g/100 g Sodium: ≤ 100 mg/100 g Added sugars: not added Fibre: ≥ 1.0g/100g*
Processed beans and legumes	SAFA: ≤ 1.1 g/100 g TFA: ≤0.1 g/100 g Sodium: ≤ 200 mg/100 g Added sugars: 2.5g/100 g

	Fibre: $\geq 3.5\text{g}/100\text{g}^*$
Water	
Water (plain), tea, coffee	SAFA: not added TFA: not added Sodium: $\leq 200\text{mg}/100\text{ ml}$ Added sugars: not added
Nuts	
Nuts and seeds	SAFA: $\leq 8\text{ g}/100\text{ g}$ TFA: $\leq 0.1\text{ g}/100\text{ g}$ Sodium: : $\leq 100\text{ mg}/100\text{ g}$ Added sugars: not added
Sources of carbohydrates	
Potatoes (unprocessed)	All additions-free products only
Potatoes (processed), pasta &noodles	SAFA: $\leq 1.1\text{ g}/100\text{ g}$ TFA: $\leq 0.1\text{ g}/100\text{ g}$ Sodium: $\leq 100\text{ mg}/100\text{ g}$ Added sugars: not added Fibre: $\geq 2.7\text{ g}/100\text{g}^*$ Potato products: the nutritionally preferred preparation method should be promoted on the package
Rice	SAFA: $\leq 1.1\text{ g}/100\text{ g}$ TFA: $\leq 0.1\text{ g}/100\text{ g}$ Sodium: $\leq 100\text{ mg}/100\text{ g}$ Added sugars: not added Fibre: $\geq 1.8\text{ g}/100\text{g}^*$
Bread	SAFA: $\leq 1.1\text{ g}/100\text{ g}$ TFA: $\leq 0.1\text{ g}/100\text{ g}$ Sodium: $\leq 450\text{ mg}/100\text{ g}$ Added sugars: $\leq 4.0\text{ g}/100\text{ g}$ Fibre: $\geq 4.0\text{ g}/100\text{g}^*$
Grains and cereal products	SAFA: $\leq 1.1\text{ g}/100\text{ g}$ TFA: $\leq 0.1\text{ g}/100\text{ g}$ Sodium: $\leq 100\text{ mg}/100\text{ g}$ Added sugars: $\leq 2.5\text{ g}/100\text{ g}$ Fibre: $\geq 5.0\text{ g}/100\text{g}^*$
Breakfast cereal products	SAFA: $\leq 3.0\text{ g}/100\text{ g}$ TFA: $\leq 0.1\text{ g}/100\text{ g}$ Sodium: $\leq 400\text{ mg}/100\text{ g}$ Added sugars: $\leq 17.5\text{ g}/100\text{ g}$ Fibre: $\geq 6.0\text{ g}/100\text{g}^*$
Meat, fish, poultry, eggs, meat substitutes	
Meat, poultry, eggs (unprocessed)	SAFA: $\leq 3.2\text{ g}/100\text{ g}$ TFA: $\leq 0.1\text{ g}/100\text{ g}$ Sodium: $\leq 100\text{ mg}/100\text{ g}$ Added sugars: not added
Processed meat, meat products and meat substitutes	SAFA: $\leq 5.0\text{ g}/100\text{ g}$ TFA: $\leq 0.1\text{ g}/100\text{ g}^{**}$ Sodium: $\leq 820\text{ mg}/100\text{ g}$ Added sugars: $\leq 2.5\text{ g}/100\text{ g}$

Fresh or fresh frozen fish, shellfish and crustaceans	SAFA: ≤ 4.0 g/100 g TFA: ≤ 0.1 g/100 g Sodium: ≤ 130 mg/100 g Added sugars: not added
Processed fish or fish products	SAFA: ≤ 4.0 g/100 g TFA: ≤ 0.1 g/100 g Sodium: ≤ 450 mg/100 g Added sugars: not added
Dairy	
Milk (products)	SAFA: ≤ 1.4 g/100 g TFA: ≤ 0.1 g/100 g** Sodium: ≤ 830 mg/100 g Added sugars: not added
Cheese (-products)	SAFA: ≤ 15.0 g/100 g TFA: ≤ 0.1 g/100 g** Sodium: ≤ 830 mg/100 g Added sugars: not added
Oils, fats and fat containing spreads	
Oils, fats and fat containing spreads	SAFA: ≤ 28.0 g/100 g TFA: ≤ 1.0 g/100 g Sodium: ≤ 160 mg/100 g Added sugars: not added
Meals	
Main course***	SAFA: ≤ 2.0 g/100 g TFA: ≤ 0.15 g/100 g Sodium: ≤ 240 mg/100 g Added sugars: ≤ 3.0 g/100 g Fibre: ≥ 1.2 g/100g Energy: 400-700 kcal/portion
Sandwiches/ rolls***	SAFA: ≤ 2.2 g/100 g TFA: ≤ 0.15 g/100 g Sodium: ≤ 450 mg/100 g Added sugars: ≤ 8.0 g/100 g Fibre: ≥ 1.4 g/100g Energy: ≤ 350 kcal/portion
Mixed salads	SAFA: ≤ 2.6 g/100 g TFA: ≤ 0.10 g/100 g Sodium: ≤ 170 mg/100 g Added sugars: ≤ 1.25 g/100 g Fibre: ≥ 0.80 g/100g Energy: ≤ 110 kcal/portion
Small meals***	SAFA: ≤ 4.0 g/100 g TFA: ≤ 0.15 g/100 g Sodium: ≤ 450 mg/100 g Fibre: ≥ 1.4g/100g Energy: 350 kcal/portion

* the source of fibre in a product must be naturally occurring in one of the main ingredients of the product group.

** naturally occurring trans fatty acids from meat or milk are excluded.

*** if all the components of the product comply with the criteria of their respective product group , and if the product is in line with the energy and fibre criterion for its product group, then the product also complies with the criteria.

Table: criteria for non-basic product group

Product group	Criteria
soups	SAFA: ≤ 1.1 g/100 g TFA: ≤ 0.1 g/100 g Sodium: ≤ 300 mg/100 g Added sugars: ≤ 2.5 g/100 g Energy: ≤100 kcal/100 g
Meal sauces	SAFA: ≤ 1.1 g/100 g TFA: ≤ 0.1g/100 g Sodium: ≤ 450 mg/100 g Added sugars: ≤ 2.5 g/100 g Energy: ≤100 kcal/100 g
Other sauces (water-based)	SAFA: ≤ 1.1 g/100 g TFA: ≤ 0.1g/100 g Sodium: ≤ 750 mg/100 g Energy: ≤110 kcal/100 g
Other sauces (emulsions)	SAFA: ≤ 4.0 g/100 g TFA: ≤ 0.35g/100 g Sodium: ≤ 750 mg/100 g Added sugars: ≤ 11 g/100 g Energy: ≤350 kcal/100 g
Snacks (including pastry, ice cream, sweet snacks and savoury snacks)	SAFA: ≤ 6.0 g/100 g TFA: ≤ 0.4g/100 g Sodium: ≤ 400 mg/100 g Added sugars: ≤ 20 g/100 g Energy: ≤110 kcal/serving
beverages	SAFA: ≤ 1.1 g/100 g TFA: ≤ 0.1g/100 g Sodium: ≤ 20 mg/100 g Energy: ≤20 kcal/100 ml*
fruits	SAFA: ≤ 1.1 g/100 g TFA: ≤ 0.1 g/100 g Sodium: ≤ 100 mg/100 g Added sugars: not added Fibre: ≥0.30 g/100g Energy: ≤48 kcal/100 ml
Bread toppings incl. hummus-type products	SAFA: ≤ 4.0 g/100 g TFA: ≤ 0.3g/100 g Sodium: ≤ 400 mg/100 g Added sugars: ≤ 30 g/100 g Energy: 350 kcal/100 g
All other products	SAFA: ≤ 1.1 g/100 g or ≤ 10 en % TFA: ≤ 0.1 g/100 g or ≤ 1.0 en%

	Sodium: ≤ 100 mg/100 g Added sugars: ≤ 2.5 g/100 g or ≤ 10 en%
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* in Europe the criteria will develop stepwise towards this criterion.

C. GREEN KEYHOLE



1. Background:

Norway, Sweden and Denmark have worked together since 2007 to develop and implement a joint Nordic nutrition label- the keyhole.

The label certifies that the product has met certain requirements for salt, sugar, fat and fibre content.

A Keyhole product meets one or more of the following criteria:

- Less and healthier fat
- Less sugar
- Less salt
- More dietary fibres and wholegrain, i.e., food labeled with the green keyhole symbol have a healthier fat composition, contains less sugars and salt, more dietary fibre and wholegrain and more fruit and vegetables than other foods of the same type.

Use of keyhole label:

- Pre-packaged foods
- Non pre-packaged foods:
 - 1) Vegetables etc. which are unprocessed
 - 2) Fruit and berries
 - 3) Breads
 - 4) Crispbread
 - 5) Cheese other than fresh cheese
 - 6) Vegetable alternatives to cheese
 - 7) Fishery products
 - 8) Meat
- Menu labeling in restaurant with keyhole.

2. Components:

Negative components: fat, saturated fat, salt and sugar

Positive components: fibre

3. Reference unit:

Nutritional composition per 100 g.

4. Product classification:

Following food groups are covered:

Food group 1-3: Vegetables, fruits, berries and nuts.

Food group 4-6: Flour, groats and rice.

Food group 7-10: Porridge, bread and pasta etc.

Food Group 11-15: Milk, acidified milk products and vegetable alternatives.

Food group 16-18: Cheese and vegetable alternatives.

Food Group 19-20: Food fat and oils

Food group 21-22: Fish products and products of fishery products.

Food Group 23-24: Meat and meat products.

Food group 25: Vegetable products.

Food Group 26-31: Ready meals etc.

Food Group 32-33: Dressings and sauces.

5. Excluded products:

- foods specifically made for infants and young children under 3 years of age
- the product / food group can be included in a healthy and varied diet, but for special reasons it is desired to limit or keep intake of the product / food group in question (eg mushrooms, sunflower kernels, seeds),
- the product is targeted to special groups of the population, while the same products are advised against other groups of the population (eg plant stanols in margarine),
- the product / food group can contribute to promoting less healthy eating - habits by, for example, accustoming children and others to sweet taste (eg sweeteners),
- The product / food group is referred to as "sweets" or "snack" or will be perceived as this among consumers.
- Foods that are added to sweeteners (additives).
- Foods that are added to approved new foods and food ingredients with sweetening properties.
- Foods that are added to plant sterols, plant steroids, plant stanols or plant stanol esters.
- Cakes.

- Snacks like salted peanuts etc.
- Chocolate, bolcher (hard boiled candy)
- Brunost.
- Jam.
- Juices and smoothies.
- Soft drinks and mineral water.
- Water, bottled water.
- Coffee and tea drinks.
- Alcoholic beverages.
- Dry milk.
- Mayonnaise.
- Quinoa.
- Amaranth.
- Eggs.
- Seeds.

6. Methodology:

The criteria for individual food groups are described:

Food group	Criteria
Food group 1-3: Vegetables, fruits, berries and nuts.	
1. Vegetables, legumes (except peanuts), potatoes and other root vegetables. The products can be processed. Unprocessed herbs are also included.	- added fat not more than 3 g / 100 g - added fat can contain no more than 20% saturated fatty acids - added sugars no more than 1 g / 100 g - salt not more than 0.5 g / 100 g
2. Fruit and berries that are unprocessed. However, the products can be heat treated.	neither salt, sugar nor fat must be added.
3. Unprocessed nuts and peanuts. However, the products can be heat treated.	- saturated fatty acids not more than 10 g / 100 g
Food group 4-6: Flour, groats and rice.	
4. Flour, flakes, groats and broken cereal grains containing at least 100% wholegrain calculated on the dry matter of the product, and bran and germ of cereals.	- dietary fiber at least 6 g / 100 g
5. Rice containing 100% wholegrain calculated on the dry matter content of the product.	- dietary fiber at least 3 g / 100 g
6. Breakfast cereals and muesli containing at least 55% whole grains calculated on the dry matter content of the product. Gluten-free breakfast cereals and muesli, however, at least 20% whole grains calculated on the dry matter content of the product.	- fat not more than 8 g / 100 g - sugars not exceeding 13 g / 100 g - added sugars not exceeding 9 g / 100 g - dietary fiber at least 6 g / 100 g - salt not more than 1.0 g / 100 g

Food group 7-10: Porridge, bread and pasta etc.	
7. Porridge and porridge powder (prepared according to the manufacturer's instructions) containing at least 55% whole grain based on the dry matter content of the product.	- fat not more than 4 g / 100 g - sugars not exceeding 5 g / 100 g - dietary fiber at least 1 g / 100 g - salt not more than 0.3 g / 100 g The criteria apply to the ready-to-eat product.
8 a). Bread and bread mix, where only liquid and possibly yeast is added and which contains at least 30% whole grain calculated on the dry matter content of the product. Products as defined in group 8 b) are not covered. Gluten-free bread and bread mix, however, at least 10% whole grain calculated on the dry matter content of the product.	- fat not more than 7 g / 100 g - sugars not exceeding 5 g / 100 g - dietary fiber at least 5 g / 100 g - salt not more than 1.0 g / 100 g The criteria apply to the ready-to-eat product.
8 b) Rye bread and other rye-based products and bread mix, where only liquid and possibly yeast must be added, and which contains at least 35% whole grains calculated on the dry matter content of the product. In the products, at least 30% of the cereals must be rye.	- fat not more than 7 g / 100 g - sugars not exceeding 5 g / 100 g - dietary fiber at least 6 g / 100 g - salt not more than 1.2 g / 100 g The criteria apply to the ready-to-eat product.
9. Crispbread and crusts containing at least 50% whole grains calculated on the dry matter content of the product. Gluten-free crispbread and crusts, however, at least 15% whole grains calculated on the dry matter content of the product.	- fat not more than 7 g / 100 g - sugars not exceeding 5 g / 100 g - dietary fiber at least 6 g / 100 g - salt not more than 1.3 g / 100 g
10. Paste (not filled) containing at least 50% wholegrain calculated on the dry matter content of the product. For gluten-free pasta (not filled) there are no requirements for whole grain content.	- dietary fiber at least 6 g / 100 g - salt not more than 0.1 g / 100 g The criteria apply in relation to the dry matter content of the product.
Food Group 11-15: Milk, acidified milk products and vegetable alternatives.	
11 a). Milk and soured milk products intended for drinking, without added flavor. Similarly lactose-free products and lactose-free milk drinks are also included.	- fat not more than 0.7 g / 100 g
11 b). Vegetable products with the same scope as products in food group 11 a), without added flavor.	- fat not more than 1,5 g / 100 g - saturated fatty acids up to 33% of the total fat content of the product - sugars not exceeding 5 g / 100 g - salt not more than 0.1 g / 100 g
12 a). Dried milk products not intended for	- fat not more than 1,5 g / 100 g

drinking, without added flavor. Similarly, lactose-free products are also included.	
12 b). Vegetable products with the same scope as products in food group 12 a), without added flavor.	- fat not more than 1,5 g / 100 g - saturated fatty acids up to 33% of the total fat content of the product - sugars not exceeding 5 g / 100 g - salt not more than 0.1 g / 100 g
13 a). Dried milk products that are not intended to drink, with added flavor. Similarly, lactose-free products are also included.	- fat not more than 1,5 g / 100 g - added sugars no more than 4 g / 100 g
13 b). Vegetable products with the same scope as products in food group 13 a), with added flavor.	- fat not more than 1,5 g / 100 g - saturated fatty acids up to 33% of the total fat content of the product - sugars not exceeding 8 g / 100 g - salt not more than 0.1 g / 100 g
14 a). Products consisting of a mixture of milk and cream with the same application area as cream and similar acidified products without added flavor.	- fat not more than 5 g / 100 g
14 b). Wholly or partly vegetable products with the same scope as products in food group 14 a) without added flavor.	- fat not more than 5 g / 100 g - saturated fatty acids up to 33% of the total fat content of the product - sugars not exceeding 5 g / 100 g - salt not more than 0.3 g / 100 g
15 A). Products consisting of a mixture of milk and cream with the same application area as cream and similar acidified products with added taste. Similarly, lactose-free products are also included.	- fat not more than 5 g / 100 g - sugars not exceeding 5 g / 100 g - salt not more than 0.8 g / 100 g
15 B). Wholly or partly vegetable products with the same scope as products in food group 15 a) with added flavor.	- fat not more than 5 g / 100 g - saturated fatty acids up to 33% of the total fat content of the product - sugars not exceeding 5 g / 100 g - salt not more than 0.8 g / 100 g
Food group 16-18: Cheese and vegetable alternatives.	
16. Cheese, except fresh cheese (food group 18). The products may have added flavor.	- fat not more than 17 g / 100 g - salt not more than 1.6 g / 100 g
17. Wholly or partly vegetable products with the same scope as the products in food group 16.	- fat not more than 17 g / 100 g - saturated fatty acids not more than 20% of the total fat content of the product

The products may have added flavor.	- salt not exceeding 1.5 g / 100 g
18. Fresh cheese and similar products. The products may have added flavor.	- fat not more than 5 g / 100 g - added sugars no more than 1 g / 100 g - salt not more than 0.9 g / 100 g
Food Group 19-20: Food fat and oils.	
19. Cooking fat and cooking fat blends. The products may have added flavor.	- fat not more than 80 g / 100 g - saturated fatty acids up to 33% of the total fat content of the product - salt not more than 1.1 g / 100 g
20. Cooking oils, liquid cooking fats and liquid cooking fats. The products may have added flavor.	- saturated fatty acids not more than 20% of the total fat content of the product - salt not more than 1.0 g / 100 g
Food group 21-22: Fish products and products of fishery products.	
21. Fish products and live bivalve molluscs. The products can be prepared.	the products can be cleaned, cut, cut, filleted and chopped but they cannot be processed.
22. Products made from at least 50% of processed fishery products. The products must contain sauce or make. The percentage and criteria apply to the portion of the product intended for eating. The products must be breaded, but the preparation as stated on the product must not add fat to the product.	
22 a). Products of fishery products not covered by group 22 bd.	- fat other than fish fat not exceeding 10 g / 100 g - sugars not exceeding 5 g / 100 g - salt not exceeding 1.5 g / 100 g
22 b). Add-on products, slice.	- fat other than fish fat not exceeding 10 g / 100 g - sugars not exceeding 5 g / 100 g - salt not more than 2.5 g / 100 g
22 c). Smoked or engraved fish.	- fat other than fish fat not exceeding 10 g / 100 g - sugars not exceeding 5 g / 100 g - salt not more than 3.0 g / 100 g
22D). Caviar and other half-preserved fish.	- fat other than fish fat not exceeding 10 g / 100 g - sugars not exceeding 5 g / 100 g - salt not more than 3.0 g / 100 g
Food Group 23-24: Meat and meat products.	
23. Meat that is unprocessed.	- fat not more than 10 g / 100 g

<p>24. Products made from at least 50% meat. Liver pate (food group 24 b), but at least 35% meat. For products where at least 10% of the meat is replaced by a vegetable raw material with protein, the requirement for meat content is 40%. The products must contain sauce or make. The percentage and criteria apply to the portion of the product intended for eating. The products may be breaded, but the preparation as stated on the product must not add fat to the product.</p>	
<p>24 a). Raw products of whole or cut pieces of meat which are surface marinated or seasoned. - For salted products.</p>	<ul style="list-style-type: none"> - fat not more than 10 g / 100 g - sugars not exceeding 3 g / 100 g - salt not more than 1.0 g / 100 g - salt not more than 0.5 g / 100 g
<p>24 b). Raw or ready-to-eat products, where the main ingredient is minced meat. - For sausages though - For cold cuts though - For minced meat only water and salt added</p>	<ul style="list-style-type: none"> - fat not more than 10 g / 100 g - sugars not exceeding 3 g / 100 g - salt not more than 1.7 g / 100 g - salt not more than 2.0 g / 100 g - salt not more than 2.2 g / 100 g - salt not more than 1.0 g / 100 g
<p>24 c). Ready-to-eat or smoked products, where the main ingredient is whole pieces of meat or cut meat and not covered by food group 24 b). -For toppings however</p>	<ul style="list-style-type: none"> - fat not more than 10 g / 100 g - sugars not exceeding 3 g / 100 g - salt not more than 2.0 g / 100 g - salt not more than 2.5 g / 100 g
Food group 25: Vegetable products.	
<p>25. Products consisting of at least 60% vegetable raw materials. The products must not contain meat or fishery products. The products can contain sauce or make. The percentage and criteria apply to the portion of the product intended for eating. The products must be breaded, but the preparation as stated on the product must not add fat to the product.</p>	<ul style="list-style-type: none"> - fat not more than 10 g / 100 g - saturated fatty acids up to 33% of the total fat content of the product - sugars not exceeding 3 g / 100 g - salt not more than 1.0 g / 100 g
Food Group 26-31: Ready meals etc.	
<p>26. Prepared foods intended to constitute a main meal of protein, carbohydrates, vegetables, fruit or berries and not included in the food groups 27, 28, 29, 30 or 31. The court must contain - 400-750 kcal (1670-3140 kJ) per serving, and - at least 28 g of vegetables (excluding potatoes), legumes (other than peanuts), root</p>	<ul style="list-style-type: none"> - A maximum of 33% of the energy value must come from fat. - in dishes containing fish with more than 10 % fat, however, the energy content of fat may not exceed 40%. - A maximum of 10% of the energy content must come from saturated fatty acids. - added sugars no more than 3 g / 100 g - salt not more than 0.8 g / 100 g

<p>vegetables or fruit and berries, 100 g. If the dish contains cereals, the cereal portion must satisfy the requirement for whole grains indicated in the relevant food group. If gluten-free pasta is included in the dish, it must comply with the requirement for fiber in food group 10.</p>	<p>- but not more than 3.5 g of salt in total per. portion.</p>
<p>27. Pirogues, pizzas and other pies other than dessert pies and containing - at least 250 kcal (1050 kJ) per serving, and - at least 28 vegetables (except potatoes), legumes (except peanuts), root vegetables or fruit and berries per year; 100 g. The cereal part of the product must contain at least 30% wholegrain calculated on the dry matter content of the cereal part. For gluten-free cereals, however, the requirement for whole grains is 10% based on the dry matter content of the product.</p>	<p>- A maximum of 33% of the energy value must come from fat. - in products that contain fish and more than 10% fat, the energy content of fat must be however, not more than 40% of the total energy content of the product. - A maximum of 10% of the energy content must come from saturated fatty acids. - added sugars no more than 3 g / 100 g - salt not more than 1.0 g / 100 g</p>
<p>28. Sandwiches, sandwiches, wraps and similar cereal-based products containing - at least 150 kcal (630 kJ) per serving, and - at least 25 g of vegetables (excluding potatoes), legumes (other than peanuts), root vegetables or fruit and berries, 100 g. The cereal part of the product must contain at least 30% wholegrain calculated on the dry matter content of the cereal part. For gluten-free cereals, however, the requirement for whole grains is 10% based on the dry matter content of the product.</p>	<p>- A maximum of 33% of the energy value must come from fat. - in products that contain fish and more than 10% fat, the energy content of fat must be however, not more than 40%. - A maximum of 10% of the energy content must come from saturated fatty acids. - added sugars no more than 3 g / 100 g. - salt not more than 0.9 g / 100 g.</p>
<p>29. Fish or meat soups (finished products and products after cooking, following the manufacturer's instructions) and containing - at least 100 kcal (420 kJ) per serving, and - at least 28 g of vegetables (excluding potatoes), legumes (other than peanuts), root vegetables or fruit and berries, 100 g. If the dish contains cereals, the cereal portion must satisfy the requirement for whole grains indicated in the relevant food group. If gluten-free pasta is included in the dish, it must comply with the requirement for fiber in food group 10.</p>	<p>- A maximum of 33% of the energy value must come from fat. - in products that contain fish and more than 10% fat, the energy content of fat must be however, not more than 40% of the total product energy. - added sugars no more than 3 g / 100 g - salt not more than 0.8 g / 100 g - but not more than 2.5 g total salt per. portion.</p>
<p>30. Soups without fish or meat (finished products and products after cooking,</p>	<p>- A maximum of 33% of the energy value must come from fat.</p>

<p>following the manufacturer's instructions) and containing</p> <ul style="list-style-type: none"> - at least 100 kcal (420 kJ) per serving, and - at least 50 g of vegetables (excluding potatoes), legumes (other than peanuts), root vegetables or fruit and berries, 100 g. <p>If the dish contains cereals, the cereal portion must satisfy the requirement for whole grains indicated in the relevant food group. If gluten-free pasta is included in the dish, it must comply with the requirement for fiber in food group 10.</p>	<ul style="list-style-type: none"> - added sugars no more than 3 g / 100 g - salt not more than 0.8 g / 100 g - but not more than 2.5 g total salt per. portion.
<p>31. Ready meals not intended to constitute a main meal and not covered by food group 26, 27, 28 or 29.</p> <p>The court must include:</p> <ul style="list-style-type: none"> - at least 100 kcal (420 kJ) per serving, and - at least 50 g of vegetables (excluding potatoes), legumes (other than peanuts), root vegetables or fruit and berries, 100 g. <p>If the dish contains cereals, the cereal portion must satisfy the requirement for whole grains indicated in the relevant food group. If gluten-free pasta is included in the dish, it must comply with the requirement for fiber in food group 10.</p>	<ul style="list-style-type: none"> - A maximum of 33% of the energy value must come from fat. - in dishes containing fish with more than 10 % fat, however, the energy content of fat may not more than 40%. - A maximum of 10% of the energy content must come from saturated fatty acids. - added sugars no more than 3 g / 100 g - salt not more than 0.8 g / 100 g - but not more than 2.5 g total salt per. portion.
Food Group 32-33: Dressings and sauces.	
<p>32. Dressings of oil and vinegar. The products may have added flavor.</p>	<ul style="list-style-type: none"> - saturated fatty acids not more than 20% of the fat content - sugars not exceeding 5 g / 100 g - salt not more than 0.8 g / 100 g
<p>33. Sauces for dinner dishes (finished products and products prepared according to the manufacturer's instructions).</p>	<ul style="list-style-type: none"> - fat not more than 5 g / 100 g - saturated fatty acids not more than 33% of the fat content - sugars not exceeding 5 g / 100 g - salt not more than 0.8 g / 100 g <p>The criteria apply to the ready-to-eat product.</p>

D. WARNING LABEL OF CHILE



1. Background:

On December 11, 2017, Chilean Ministry of Health (MOH) published in the Official Gazette, Decree N°1, which outlines the implementing regulation for labeling and advertising of packaged foods and beverages that carry one or more black octagonal stop sign labels. Chile notified the proposed implementing regulation to the World Trade Organization Technical Barriers to Trade Committee (WTO/TBT) on November 15, 2016.

On June 7, 2012, Chile's MOH published Law 20.606 commonly known as "Super 8 Law" or Law of Food Labeling and Advertising. According to Article 6 of Law 20.606, all food advertising must contain a message, determined by MOH, which promotes habits of a healthy life. Decree N°1 is the implementing regulation that sets the characteristics and the disposition of the graphic norm to use for the message.

2. Components:

Negative components: Energy, sodium, total sugars, saturated fats.

3. Reference unit:

Nutritional composition per 100g .

4. Product classification:

- Solid foods
- Liquid foods

5. Excluded products:--

- A. Foods or mixes of them, which have no added sugar, honey, syrup, sodium or saturated fats.
- B. Foods marketed in bulk, or in portions, or divided and those prepared upon request, even if they are packaged at the very moment of sale.
- C. "Foods for Special Diets:"
 - c.1. Baby Formulas
 - c.2. Commercially Prepared Baby Foods (purées and solid foods), except for those with added sugar.
 - c.3. Food for infant use made out of cereals, except for those with added sugar.
 - c.4. Foods for medical or therapeutic purposes.

- c.5. Foods for Weight Control Diets.
- D. The following foods under "Supplementary Foods and Foods for Athletes:"
- d.1. Food Supplements.
- d.2. foods for athletes
- E. Zero-calorie, free-sugar tabletop sweeteners.

6. Methodology:

If the nutritional composition of food contains energy, sodium, sugar or saturated fat in amounts excess of those detailed herein under Table N°1 and Table N°2, warning label should be displayed in the Front of pack of food according to the Section II: Labeling regulations of Chilean Food Law.

TABLE NO. 1: For solid foods:

Nutrient or energy	Date of entry into force (June 27, 2016)	24 months following entry into force	36 months following entry into force
Energy (kcal/100g)	350	300	275
Sodium (mg/100g)	800	500	400
Total sugars (g/100g)	22.5	15	10
Saturated fats (g/100g)	6	5	4

Gradual decrease in content of nutrient and energy



TABLE NO. 2: For liquid foods:

Nutrient or energy	Date of entry into force (June 26, 2016)	24 months following entry into force	36 months following entry into force
Energy (kcal/100g)	100	80	70
Sodium (mg/100g)	100	100	100
Total sugars (g/100g)	6	5	5
Saturated fats (g/100g)	3	3	3

E. NUTRISCORE



1. Background:

In 2017, the **voluntary** Nutriscore FOP labelling scheme was initiated in France, and it was recently also approved to be used in Belgium, Spain and Portugal by their respective Ministries of Health

The Nutri-Score, also called **5-color system** is a system of nutrition labeling based on a logo with five values ranging from A to E and from green to red, established according to the nutritional value of a food product.

2. Components:

Negative components (N components): calorie density, SFA, simple sugars, sodium.

Positive components (P components): fruits, vegetables and nuts, fibres and proteins.

3. Reference unit:

Nutrition composition per 100g or ml.

4. Product classification:

There is no product classification as such. All processed food products will be given a NutriScore label. Score ranges are different for general case and drinks.

5. Excluded products:

Infant foods for children 0 to 3 years.

6. Methodology:

1. **Calculate N-points** (on the basis of attributed to each of the N-components or negative components). It corresponds to the sum of the points it accumulates based on the nutritional composition of food products. This can range from 0 to 40 points.

Table: points attributed to each of the elements of the negative N component.

Points	Energy density (KJ/100g)	Saturated fats (g/100 g)	Simple sugars (g/100 g)	Sodium*
0	≤335	≤1	≤4.5	≤90
1	>335	>1	>4.5	>90
2	>670	>2	>9	>180
3	>1005	>3	>13.5	>270
4	>1340	>4	>18	>360

5	>1675	>5	>22.5	>450
6	>2010	>6	>27	>540
7	>2345	>7	>31	>630
8	>2680	>8	>36	>720
9	>3015	>9	>40	>810
10	>3350	>10	>45	>900

* the sodium content corresponds to the salt content mentioned in the mandatory statement divided by 2.5

2. **Calculate P-points** on the basis of amount of fruits, vegetables, legumes and nuts. This can range from 0 to 15 points.

Table: points attributed to each of the nutrients of the positive P component.

Points	Fruits, vegetables and nuts (g/100 g)	Fibres (g/100 g) AOAC method**	Proteins (g/100 g)
0	≤40	≤0.9	≤1.6
1	>40	>0.9	>1.6
2	>60	>1.9	>3.2
3	-	>2.8	>4.8
4	-	>3.7	>6.4
5	80	>4.7	>8.0

**content obtained using the AOAC method.

3. **Calculation of the nutritional score.**

Nutritional score= total N points- total P points.

This can range from -15(the best according to this nutritional plan) to +40 (the worst according to this nutritional plan)

Specific rules: The calculation is performed the same for all food products except cheeses, vegetable and animal fats, and drinks.

- For drinks, criterias used to calculate score are: calorie, total sugar, fruits and vegetable (%)
 - If total N points < 11, then
Nutritional score = total P points – total N points.
 - If the total points for “fruits and vegetables” is equal to 5, then
Nutritional score = total P points – total N points.
 - If the total points for “fruits and vegetables” is below 5, then the nutritional score is equal to the total N component points subtracted from the sum of the points for “fibres” and “fruits and vegetables”. In this case, the protein content is therefore not taken into account in the calculation of the nutritional score.
 - *Cheeses:* The score is calculated by taking the protein content into account whether or not the total N points are ≥ 11
Nutritional score = total N points - total P points
 - *Added fats:* The points table for fatty acids is calculated based on **the total saturated fatty acid/lipid component with the table for attributing points starting at 10% and increasing by steps of 6%**
4. **Class/colour is decided** on the basis of nutritional score.

For general case,

Class	Score ranges	Colour
A	Min to -1	Dark green
B	0-2	Light green
C	3-10	Light orange
D	11-18	Orange
E	19- max	Dark orange

For drinks,

Class	Score ranges	Colour
A	Mineral water	Dark green
B	Min- 1	Light green
C	2-5	Light orange
D	6-9	Orange
E	10- max	Dark orange

CONCLUSION

Positive labeling/logos like Choices logo	Negative logo like warning symbol of Chile	Nutriscore	Health Star Rating System
<p>Pros: 1.Choices logo is for all food products. Even, sauces, snacks, beverages which helps consumers make better choice across every food product category.</p> <p>Cons: 1. May lead to Excessive consumption of the food product by consumers in the impression that its healthy. 2. In the Indian scenario, few or no processed food will be able to qualify for positive logos as they are so loaded with salt/sugar/fat for taste. Thus, it will lead to disagreement by food industries.</p>	<p>Pros: 1. More effective in helping consumers identify unhealthy products. It can discourage consumers from buying products with warning labels 2. there is a provision for gradual decrease in amount of negative components in time span of 36 months.</p> <p>Cons: 1. Chances of disagreement from food industries seem to be high as it may affect their market share. Negative logos will discourage the consumers from buying such products.</p>	<p>Pros: 1.Colours on the label will draw attention towards the label. 2. It is neither positive nor negative. Since it's not negative, industries should not have objection, rather they can make their product healthier and have better grade for their product. 3. this system takes into account many nutritional component, both positive and negative, like energy, fruit and vegetable content, dietary fibre, nuts.</p> <p>Cons: 1.Meaning of amber color not fully understood. This gives mixed message. It can be confusing.</p>	<p>Pros: 1. Indian consumers are familiar with star rating system in appliances, etc. 2. This gave enough time to manufacturers to reformulate their products as it was voluntary to adopt for 5 years. 3. this system takes into account many nutritional component, both positive and negative, like energy, fruit and vegetable content, dietary fibre, protein.</p> <p>Cons: 1.It doesn't clearly demarcates the product . for example 3 star and 3 ½ star seems not to make much difference in the choice of consumer.</p>

1. According to a study, nutriscore performed the best in ability to correctly rank products (healthy and not healthy) followed by MTL, HSR, warning symbols and RI.

Objective Understanding of Front-of-Package Nutrition Labels: An International Comparative Experimental Study across 12 Countries Manon Egnell et. al. 2018

AIM: to assess consumer's ability to understand 5 FOPLs- HSR, MTL, NutriScore, RIs, Warning symbol.

In 2018, approximately 1000 participants per country were recruited and asked to rank three sets of label-free products (one set of three pizzas, one set of three cakes, and one set of three breakfast cereals) according to their nutritional quality, via an online survey. Participants were subsequently randomised to one of five FoPL conditions and were again asked to rank the same sets of products, this time with a FoPL displayed on pack. Changes in a participants' ability to correctly rank products across the two tasks were assessed by FoPL using ordinal logistic regression. In all 12 countries and for all three food categories, the Nutri-Score performed best, followed by the MTL, HSR, Warning symbol, and RIs.

2. Another study says that nutriscore is the easiest label to identify as it required lowest amount of effort and time to understand.

Effectiveness of Front-Of-Pack Nutrition Labels in French Adults: Results from the NutriNet-Santé Cohort Study

Pauline et. Al. 2015.

Aim: to compare the effectiveness of label format currently in use: Guideline Daily Amounts (GDA), Multiple Traffic Lights (MTL), 5-Color Nutrition Label (5-CNL), Green Tick (Tick), and a "no label" condition.

The FOP label effectiveness was assessed by measuring the label acceptability and understanding among 13,578 participants of the NutriNet-Santé cohort study, representative of the French adult population. Participants were exposed to five conditions, including four FOP labels: Guideline Daily Amounts (GDA), Multiple Traffic Lights (MTL), 5-Color Nutrition Label (5-CNL), Green Tick (Tick), and a "no label" condition. Acceptability was evaluated by several indicators: attractiveness, liking and perceived cognitive workload. Objective understanding was assessed by the percentage of correct answers when ranking three products according to their nutritional quality. Five different product categories were tested: prepared fish dishes, pizzas, dairy products, breakfast cereals, and appetizers

RECOMMENDATIONS

Industries are not willing to accept any negative labeling because it may hamper their market share and it's very difficult to implement any form of positive label in India because it will be too difficult for industries to meet the criteria for positive label at once. NutriScore or Health Star Rating (HSR) can be a way out as they are neither positive nor negative. These are balanced forms of labeling that will indicate the nutritional quality in terms of grade or star. Even though star rating is more or less familiar to Indian consumers on appliances, it doesn't clearly demarcates the nutritional quality of product, for example 3 star and 3 ½ star doesn't seems to make much difference in the choice of consumer. On the other hand, NutriScore may act as stimuli for manufacturers to improve nutritional quality of their product and shift to a better or greener side of grade scale.

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SECTION II

ADDITION OF VITAMINS AND MINERALS IN FOOD PRODUCTS

BACKGROUND

Provisions available under FSSR regarding addition of vitamins and minerals in food product are collated as below:

A. Provisions under Section 22 of Food Safety and Standards Act, 2006:

Section 22 of the FSS Act has a provision for addition of minerals or vitamins or proteins or metals or their compounds or amino acids (in amounts not exceeding the Recommended Daily Allowance for Indians) for “foods for special dietary uses or functional foods or nutraceuticals or health supplements”.

B. Provisions under FSS (Food Product Standards and Food Additives) Regulation, 2011:

I. The definition of ‘Proprietary foods’ under section 2.12 (2) is as follows:

“...Provided that a proprietary food may also contain vitamins and minerals in quantities not exceeding one Recommended Dietary Allowance of the respective micronutrients.”

II. Further vitamins and minerals are allowed in various product standards as mentioned below, where no limits/levels of micronutrients are specified as such:

- a. Infant milk foods (Section- 2.1.9 (1))-Vitamins and Minerals (sources and limits specified);
- b. Infant formula (Section- 2.1.9 (2))-Vitamins and Minerals (sources and limits specified);
- c. Milk-cereal based complementary food (Section- 2.1.9 (3))- Vitamins and Minerals (sources and limits specified);
- d. Processed cereal based complementary food (Section- 2.1.9 (4))-Vitamins and Minerals (sources and limits specified);
- e. Follow-Up Formula-Complementary Food (Section- 2.1.9 (5))-Vitamins and Minerals (sources and limits specified);
- f. Fruit Based Beverage Mix/Powdered Fruit Based Beverage (Section-2.3.40)- vitamins and minerals;
- g. Vegetable protein product (Section- 2.3.59)- Vitamins and Minerals
- h. Pasta Products (Section-2.4.10 (1))- Vitamins and minerals;
- i. Malted Milk Food (Section- 2.4.11 (1))- Vitamins and minerals;

- j. Malt Based Foods (Malt Food) (Section- 2.4.11 (2))- Sodium or potassium bicarbonate minerals, aminoacids and vitamins;
- k. Formulated supplements for children (Section 2.4.22 (4))- Vitamins and Minerals (Source and limit specified)
- l. Bakery products- Biscuits (Section- 2.4.15 (1))- Vitamins;
- m. Bakery products- Bread (Section- 2.4.15 (2))- Vitamins;
- n. Soy Protein products (Section- 2.4.20)- Vitamins and Minerals;
- o. Wheat Protein Products including Wheat Gluten(Section- 2.4.22)-Vitamins and Minerals;
- p. Sugar Boiled Confectionery (Section- 2.7.1)- Vitamins and minerals;
- q. Lozenges (Section- 2.7.2)- Vitamins and minerals;
- r. Chewing gum and bubble gum (Section- 2.7.3)- Nutrients like Vitamins, minerals, proteins;
- s. Chocolate (Section 2.7.4)- Vitamins and minerals;
- t. Carbonated water (Section- 2.10.6 (1))- Vitamins;

C. Provisions under FSS (Health Supplements, Nutraceuticals, Food for Special Dietary Use, Food for Special Medical Purpose, Functional Food and Novel Food) Regulations, 2016:

Schedule I of this regulation specifies list of vitamins and minerals and their sources permitted to be used under the category ‘Health supplements, Nutraceuticals, FSDU and FSMP’. Additionally, Table C of Schedule I also have provision for nutrients (vitamins/minerals) to be added in overage for the purpose of maintaining at least the claimed amount of the ingredient(s) for the normal shelf life of the product to compensate for the expected manufacturing / storage loss and to allow for variation in assay performance.

Furthermore, under each category for addition of vitamins/minerals the following provisions are mentioned:

I. Clause (6) (1) (ii) of Health supplement:

“The health supplements shall contain concentrated source of one or more nutrients, namely, amino acids, enzymes, minerals, proteins, vitamins, other dietary substances, plants or botanicals, prebiotics, probiotics and substances from animal origin or other similar substances with known and established nutritional or beneficial physiological effect, which are presented as such and are offered alone or in combination, but are not drugs as defined in the clause (b) of section 3 of the Drugs and Cosmetics Act, 1940 (23 of 1940) and the rules made thereunder.”

II. Clause (6) (2) (iii) of Health supplement and 7 (2) (iii) of Nutraceuticals:

“The quantity of nutrients added where applicable, shall not exceed the recommended daily allowance as specified by the Indian Council of Medical Research and in case such standards are not specified, the standard laid down by international food standards body, namely Codex Alimentarius Commission shall apply;”

III. Clause 8 (2) of Food for special dietary use other than infants, and those products intended to be taken under medical advice:

“(iv) A food business operator may add the quantity of the nutrients at a level higher than the recommended daily allowance, but not exceeding the limits of vitamins and minerals specified in

Schedule III.”

“(vii) A formula food represented as a replacement for all meals per day, shall not have less than a hundred per cent of the recommended daily allowance of vitamins and minerals in the daily intake.”

IV. Clause 9 (2) (v) of Food for special medical purpose:

“In food for special medical purpose, nutrients may be added at levels higher than the recommended daily allowance, but not exceeding the limits of vitamins and minerals as specified in Schedule III.”

D. Provisions under FSS (Fortification of Foods) Regulation, 2018:

I. As per the standards of fortified staples such as Milk, oil, Atta, Maida and Rice under Schedule-I of the said regulation, the micronutrients levels are revised such that the ‘Fortified Staples’ shall provide 30-50% of RDA, when consumption of the staples is 400g for cereals (atta/maida/rice), 700 ml for milk, 30 g for oil per day.

II. Further, in the draft FSS (Fortification of Foods) Amendment Regulation, 2019 w.r.t ‘Fortified Processed Foods’, the micronutrients levels are defined such that the ‘Fortified Processed Foods’ shall provide 15-30% of the Indian adult RDA of micronutrient based on an average calorie intake of 600 kcal from processed foods (~1/3 of energy of 2000 kcal);

E. Provisions under FSS (Advertising and claims) Regulations, 2018:

Under Schedule-I: Nutrition claims to claim as ‘Source’ of Vitamin (s) or Mineral(s), the food shall provide at least 15% of RDA of the vitamin/mineral per 100g for solids or 7.5% of RDA of the vitamin/mineral per 100 ml for liquids.

Further to claim as ‘High’ in Vitamin (s) or Mineral (s), the food shall provide at least 30% of RDA per 100 g for solids or 15% of RDA per 100 ml for liquids.

INTRODUCTION

There are number of dietary sources available for vitamins and minerals. We have easy accessibility to nutrient/health supplements, fortified foods, food also provides us with certain amount of vitamins and minerals, naturally. Moreover, food industries claim their food products to be a “source of” or “high in” certain vitamins and minerals in order to flourish in the market.

So, we have a number of sources of vitamins and minerals which increases the chances of excessive consumption and thus lead to toxicity and adverse effects on our body. Signs and symptoms of vitamin toxicity in humans is mentioned in Annexure I. This is raising concerns regarding toxicity. Hence, need to define the requirement of addition of vitamins and minerals in food products is felt.

There are countries like Australia and Canada which have defined the limits for addition of certain vitamins and minerals.

PERMITTED FORMS OF VITAMINS AND MINERALS IN AUSTRALIA (as mentioned in Schedule 17 of Australia New Zealand Food Standards Code)

S 17-2 Vitamin Permitted form

Vitamin A Retinol forms	Vitamin A (retinol)
	Vitamin A acetate (retinyl acetate)
	Vitamin A palmitate (retinyl palmitate)
	Vitamin A propionate (retinyl propionate)
	beta-apo-8'-carotenal
Provitamin A forms	beta-carotene-synthetic
	carotenes-natural
	beta-apo-8'-carotenoic acid ethyl ester
	Thiamin hydrochloride
Thiamin (Vitamin B1)	Thiamin mononitrate
	Thiamin monophosphate
	Riboflavin
Riboflavin (Vitamin B2)	Riboflavin-5'-phosphate sodium
	Niacin Niacinamide (nicotinamide)
	Nicotinic acid
	Folic acid
Folate	L-methyltetrahydrofolate, calcium
	Pyridoxine hydrochloride
Vitamin B6	Cyanocobalamin
Vitamin B12	Hydroxocobalamin
	Calcium pantothenate
Pantothenic acid	Dexpanthenol
	L-ascorbic acid
Vitamin C	Ascorbyl palmitate
	Calcium ascorbate
	Potassium ascorbate
	Sodium ascorbate

	Vitamin D2 (ergocalciferol)
Vitamin D	Vitamin D3 (cholecalciferol)
	dl-alpha-tocopherol
Vitamin E	d-alpha-tocopherol concentrate
	Tocopherols concentrate, mixed
	d-alpha-tocopheryl acetate
	dl-alpha-tocopheryl acetate
	d-alpha-tocopheryl acetate concentrate
	d-alpha-tocopheryl acid succinate
	d-alpha-tocopheryl acid succinate
S17—3 Permitted forms of minerals	
The permitted forms of minerals are:	
Calcium	Calcium carbonate
	Calcium chloride
	Calcium chloride, anhydrous
	Calcium chloride solution
	Calcium citrate
	Calcium gluconate
	Calcium glycerophosphate
	Calcium lactate
	Calcium oxide
	Calcium phosphate, dibasic
	Calcium phosphate, monobasic
	Calcium phosphate, tribasic
	Calcium sodium lactate
	Calcium sulphate
Iron	Ferric ammonium citrate, brown or green
	Ferric ammonium phosphate
	Ferric citrate
	Ferric hydroxide
	Ferric phosphate
	Ferric pyrophosphate
	Ferric sodium edetate (other than for breakfast cereals as purchased or formulated supplementary food for young children)
	Ferric sulphate (iron III sulphate)
	Ferrous carbonate
	Ferrous citrate
	Ferrous fumarate
	Ferrous gluconate
	Ferrous lactate
	Ferrous succinate
Iron	Ferrous sulphate (iron II sulphate)
	Ferrous sulphate, dried
	Iron, reduced (ferrum reductum)

Iodine	Potassium iodate
	Potassium iodide
	Sodium iodate
	Sodium iodide
Magnesium	Magnesium carbonate
	Magnesium chloride
	Magnesium gluconate
	Magnesium oxide
	Magnesium phosphate, dibasic
	Magnesium phosphate, tribasic
	Magnesium sulphate
Phosphorus	Calcium phosphate, dibasic
	Calcium phosphate, monobasic
	Calcium phosphate, tribasic
	Bone phosphate
	Magnesium phosphate, dibasic
	Magnesium phosphate, tribasic
	Calcium glycerophosphate
	Potassium glycerophosphate
	Phosphoric acid
	Potassium phosphate, dibasic
	Potassium phosphate, monobasic
	Sodium phosphate, dibasic
	Selenium
Sodium selenate	
Sodium selenite	
Zinc	Zinc acetate
	Zinc chloride
	Zinc gluconate
	Zinc lactate
	Zinc oxide
	Zinc sulphate

S17—4 PERMITTED USES OF VITAMINS AND MINERALS

For sections 1.3.2—3 and 1.3.2—4, the foods are listed in the table:

Vitamin or mineral	Maximum claim per reference quantity (maximum percentage RDI claim)	Maximum permitted amount per reference quantity
Cereals and cereal products		
<i>Biscuits containing not more than 200 g/kg fat and not more than 50 g/kg sugars</i> Reference quantity—35 g		
Thiamin	0.55 mg (50%)	
Riboflavin	0.43 mg (25%)	

Niacin	2.5 mg (25%)	
Vitamin B6	0.4 mg (25%)	
Vitamin E	2.5 mg (25%)	
Folate	100 µg (50%)	
Calcium	200 mg (25%)	
Iron	3.0 mg (25%)	
Magnesium	80 mg (25%)	
zinc	1.8 mg (15%)	
Bread		
<i>Reference quantity- 50g</i>		
Thiamin	0.55 mg (50%)	
Riboflavin	0.43 mg (25%)	
Niacin	2.5 mg (25%)	
Vitamin B6	0.4 mg (25%)	
Vitamin E	2.5 mg (25%)	
Iron	3.0 mg (25%)	
Magnesium	80 mg (25%)	
zinc	1.8 mg (15%)	
Folate	(a) bread that contains no wheat flour— 100 µg (50%)	
	(b) other foods—0	
Breakfast cereals, as purchased		
<i>Reference quantity—a normal serving</i>		
Provitamin A forms of Vitamin A	200 µg (25%)	
Thiamin	0.55 mg (50%)	
Riboflavin	0.43 mg (25%)	
Niacin	2.5 mg (25%)	
Vitamin B6	0.4 mg (25%)	
Vitamin C	10 mg (25%)	
Vitamin D	2.5 µg (25%)	
Vitamin E	2.5 mg (25%)	
Folate	100 µg (50%)	
Calcium	200 mg (25%)	
Iron-except ferric sodium edetate	3.0 mg (25%)	
Magnesium	80 mg (25%)	
Zinc	1.8 mg (15%)	
Cereal flours		
<i>Reference quantity—35 g</i>		
Thiamin	0.55 mg (50%)	
Riboflavin	0.43 mg (25%)	
Niacin	2.5 mg (25%)	
Vitamin B6	0.4 mg (25%)	
Vitamin E	2.5 mg (25%)	
Folate	100 µg (50%)	

Iron	3.0 mg (25%)	
Magnesium	80 mg (25%)	
Zinc	1.8 mg (15%)	
Pasta		
<i>Reference quantity—the amount that is equivalent to 35 g of uncooked dried pasta</i>		
Thiamin	0.55 mg (50%)	
Riboflavin	0.43 mg (25%)	
Niacin	2.5 mg (25%)	
Vitamin B6	0.4 mg (25%)	
Vitamin E	2.5 mg (25%)	
Folate	100 µg (50%)	
Iron	3.0 mg (25%)	
Magnesium	80 mg (25%)	
Zinc	1.8 mg (15%)	
Dairy products		
Dried milks		
<i>Reference quantity—200 mL</i>		
Vitamin A	110 µg (15%)	125 µg
Riboflavin	0.4 mg (25%)	
Vitamin D	2.5 µg (25%)	3.0 µg
Calcium	400 mg (50%)	
Modified milks and skim milk		
<i>Reference quantity—200 mL</i>		
Vitamin A	110 µg (15%)	125 µg
Vitamin D	1.0 µg (10%)	1.6 µg
Calcium	400 mg (50%)	
Cheese and cheese products		
<i>Reference quantity—25 g</i>		
Vitamin A	110 µg (15%)	125 µg
Calcium	200 mg (25%)	
Phosphorous	150 mg (15%)	
Vitamin D	1.0 µg (10%)	1.6 µg
Yoghurts (with or without other foods)		
<i>Reference quantity—150 g</i>		
Vitamin A	110µg (15%)	125 µg
Vitamin D	1.0 µg (10%)	1.6 µg
Calcium	320 mg (40%)	
Dairy desserts containing no less than 3.1% m/m milk protein		
<i>Reference quantity—150 g</i>		
Vitamin A	110µg (15%)	125 µg
Vitamin D	1.0 µg (10%)	1.6 µg

Calcium	320 mg (40%)	
Ice cream and ice confections containing no less than 3.1% m/m milk protein		
<i>Reference quantity—75 g</i>		
calcium	200 mg (25%)	
Cream and cream products containing no more than 40% m/m milkfat		
<i>Reference quantity—30 mL</i>		
Vitamin A	110 µg (15%)	125 µg
Butter		
<i>Reference quantity—10 g</i>		
Vitamin A	110 µg (15%)	125 µg
Vitamin D	1.0 µg (10%)	1.6 µg
Edible oils and spreads		
<i>Edible oil spreads and margarine</i>		
<i>Reference quantity—10 g</i>		
Vitamin A	110 µg (15%)	125 µg
Vitamin D	1.0 µg (10%)	1.6 µg
Vitamin E	a) edible oil spreads and margarine containing no more than 28% total *saturated fatty acids and trans fatty acids—3.5 mg (35%) b) other foods—0	
Edible oils		
<i>Reference quantity—10 g.</i>		
Vitamin E	(a) sunflower oil and safflower oil—7.0 mg (70%); (b) other edible oils containing no more than 28% total *saturated fatty acids and trans fatty acids—3.0 mg (30%)	
Extracts		
<i>Extracts of meat, vegetables or yeast (including modified yeast) and foods containing no less than 800 g/kg of extracts of meat, vegetables or yeast (including modified yeast)</i>		
<i>Reference quantity—5 g</i>		
Thiamin	0.55 mg (50%)	
Riboflavin	0.43 mg (25%)	
Niacin	2.5 mg (25%)	
Vitamin B6	0.4 mg (25%)	
Vitamin B12	0.5 µg (25%)	
Folate	100 µg (50%)	

Iron	1.8 mg (15%)	
Fruit juice, vegetable juice, fruit drink and fruit cordial		
<i>All fruit juice and concentrated fruit juice (including tomato juice)</i>		
<i>Reference quantity—200 mL</i>		
Calcium	200 mg (25%)	
Folate	100 µg (50%)	
Vitamin C	(a) blackcurrant juice—500 mg (12.5 times)	
	(b) guava juice—400 mg (10 times)	
	(c) other juice—120 mg (3 times)	
Provitamin forms of vitamin A	(a) mango juice—800 µg (1.1 times)	
	(b) pawpaw juice—300 µg (40%)	
	(c) other juice—200 µg (25%)	
<i>Vegetable juice (including tomato juice)</i>		
<i>Reference quantity—200 mL</i>		
Vitamin C		
Folate Calcium		
Vitamin C	60 mg (1.5 times)	
Provitamin forms of vitamin A	200 µg (25%)	
Folate	100 µg (50%)	
Calcium	200 mg (25%)	
Analogues derived from legumes		
<i>Beverages containing no less than 3% m/m protein derived from legumes</i>		
<i>Reference quantity—200 mL</i>		
Vitamin A	110 µg (15%)	125 µg
Thiamin	no claim permitted	0.10 mg
Riboflavin	0.43 mg (25%)	
Vitamin B6	no claim permitted	0.12 mg
Vitamin B12	0.8 µg (40%)	
Vitamin D	1.0 µg (10%)	1.6 µg
Folate	no claim permitted	12 µg
Calcium	240 mg (30%)	
Magnesium	no claim permitted	22 mg
phosphorous	200 mg (20%)	

Zinc	no claim permitted	0.8 mg
Iodine	15 µg (10%)	
Analogues of meat, where no less than 12% of the energy value of the food is derived from protein, and the food contains 5 g protein per serve of the food Reference quantity— 100g		
Thiamin	0.16 mg (15%)	
Riboflavin	0.26 mg (15%)	
Niacin	5.0 mg (50%)	
Vitamin B6	0.5 mg (30%)	
Vitamin B12	2.0 µg (100%)	
folate	No claim permitted	10µg
Iron	3.5 mg (30%)	
Magnesium	No claim permitted	26 mg
Zinc	4.4 mg (35%)	
Analogues of yoghurt and dairy desserts containing no less than 3.1% m/m protein derived from legumes Reference quantity—150 g		
Vitamin A	110 µg (15%)	125 µg
Thiamin	no claim permitted	0.08 mg
Riboflavin	0.43 mg (25%)	
Vitamin B6	no claim permitted	0.11 mg
Vitamin B12	0.3 µg (15%)	
Vitamin D	1.0 µg (10%)	1.6 µg
Folate	20 µg (10%)	
Calcium	320 mg (40%)	
Magnesium	no claim permitted	22 mg
Phosphorous	200 mg (20%)	
Zinc	no claim permitted	0.7 mg
Iodine	15 µg (10%)	
Analogues of ice cream containing no less than 3.1% m/m protein derived from legumes Reference quantity—75 g Vitamin A Riboflavin Vitamin B12 Calcium 200 mg (25%) Phosphorus no claim permitted 80 mg		
Vitamin A	110 µg (15%)	125 µg
Riboflavin	0.26 mg (15%)	
Vitamin B12	0.2 µg (10%)	
Calcium	200 mg (25%)	
Phosphorous	No claim permitted	80 mg
Analogues of cheese containing no less than 15% m/m protein derived from legumes Reference quantity—25 g		

Vitamin A	110 µg (15%)	125 µg
Riboflavin	0.17 mg (10%)	
Vitamin B12	0.3 µg (15%)	
Vitamin D	1.0 µg (10%)	1.6 µg
Calcium	200 mg (25%)	
Phosphorous	150 mg (15%)	
Zinc	no claim permitted	1.0 mg
Iodine	no claim permitted	10 µg
Composite products		
<i>Soups, prepared for consumption in accordance with directions</i>		
<i>Reference quantity—200 mL</i>		
Calcium	200 mg (25%)	
Analogues derived from cereals, nuts, seeds, or a combination of those ingredients		
<i>Beverages containing no less than 0.3% m/m protein derived from cereals, nuts, seeds, or a combination of those ingredients</i>		
<i>Reference quantity—200 ml</i>		
Vitamin A	110 µg (15%)	125 µg
Thiamin	no claim permitted	0.10 mg
Riboflavin	0.43 mg (25%)	
Vitamin B6	no claim permitted	0.12 mg
Vitamin B12	0.8 µg (40%)	
Vitamin D	1.0 µg (10%)	1.6 µg
Folate	no claim permitted	12 µg
Calcium	240 mg (30%)	
Magnesium	no claim permitted	22 mg
Phosphorous	200 mg (20%)	
Zinc	no claim permitted	0.8 mg
Iodine	15 µg (10%)	
Formulated beverages		
<i>Formulated beverages</i>		
<i>Reference quantity—600 mL</i>		
Folate	50 µg (25%)	
Vitamin C	40 mg (100%)	
Provitamin A forms of Vitamin A	200 µg (25%)	
Niacin	2.5 mg (25%)	
Thiamin	0.28 mg (25%)	
Riboflavin	0.43 mg (25%)	
Calcium	200 mg (25%)	
Iron	3.0 mg (25%)	
Magnesium	80 mg (25%)	
Vitamin B6	0.4 mg (25%)	
Vitamin B12	0.5 µg (25%)	
Vitamin D	2.5 mg (25%)	
Vitamin E	2.5 mg (25%)	
Iodine	38 µg (25%)	
Pantothenic acid	1.3 mg (25%)	
Selenium	17.5 µg (25%)	

CANADA

As mentioned in *Food and Drug Regulations*

PART D Vitamins, Minerals and Amino Acids

Section D.01.011

No person shall sell a food to which any of the following vitamins have been added if a reasonable daily intake of that food by a person would result in the daily intake by such person of more than,

- (a) in the case of **vitamin A**, 2,500 International Units;
- (b) in the case of **thiamine**, two milligrams;
- (c) in the case of **riboflavin**, three milligrams;
- (d) in the case of **niacin or niacinamide**, 20 milligrams;
- (e) in the case of **pyridoxine**, 1.5 milligrams;
- (f) in the case of **ascorbic acid**, 60 milligrams;
- (g) in the case of **vitamin D**, 400 International Units; and
- (h) in the case of **vitamin E**, 15 International Units.

RECOMMENDATIONS

Safety issues with the consumption of excess amount of vitamins and minerals need to be addressed and a maximum limit of addition of vitamins and minerals in food products need to be set so that food manufacturers and industries don't incorporate random amount of vitamins and minerals in their food products. Industries should have specifications for addition of vitamins and minerals so that toxicity of vitamins and minerals can be prevented. Amount in which vitamins and minerals are added in food, need to be checked. On comparison of the Tolerable Upper Limits (TULs) with the nutrient intake of the population, we can find out the maximum limit of vitamins and minerals to be added. Unfortunately, we lack data on the nutrient intake of Indian population which makes it difficult to define the maximum limit of vitamins and minerals.

Guidance document as that of EU can be made for Indian FBOs as well.

ANNEXURE I

Signs and Symptoms of Vitamin Toxicities in Humans

Vitamin	Children	Adults
Vitamin A	Acute: Anorexia, bulging fontanelles, lethargy, high intracranial fluid pressure, irritability, nausea, vomiting	Acute: Abdominal pain, anorexia, blurred vision, lethargy, headache, hypercalcemia, irritability, muscular weakness, nausea, vomiting, peripheral neuritis, skin desquamation
	Chronic: Alopecia, anorexia, bone pain, bulging fontanelles, chelitis, cranio tabes, hepatomegaly, hyperostosis, photophobia, premature epiphyseal closure, putitus, skin desquamation, erythema	Chronic: Alopecia, anorexia, ataxia, bone pain, chelitis, conjunctivitis, diarrhea, diplopia, dry mucous membranes, dysuria, edema, high CSF pressure, fever, headache, hepatomegaly, insomnia, irritability, lethargy, menstrual abnormalities, muscular pain and weakness, nausea, vomiting, polydypsia, pruritus, skin desquamation, erythema, splenomegaly, weight loss
Vitamin D	Anorexia, diarrhea, Muscular Weakness, Polyuria, poludypsia, Nervousness, Hypercalcemia, Irritability, lassitude neurological abnormalities, pain, poor weight gain, renal impairment	Bone demineralization, constipation, hypercalcemia, Muscular Weakness and pain, nausea, vomiting, Polyuria, renal calculi
Vitamin E	No adverse affects reported	Mild gastrointestinal distress, some nausea, coagulopathies in patients receiving anticonvulsants
Vitamin K	Phylloquinones and menaquinones are thought to have negligible toxicity. Menadione can be toxic. At high doses, it can produce hemolytic anemia, hyperbilirubinemia, and severe jaundice	
Vitamin C	No adverse affects reported	Gastrointestinal disturbances, diarrhea, oxaluria
Thiamin	No adverse affects reported	Headache, muscular weakness, paralysis, cardiac arrhythmia, convulsions, allergic reactions
Riboflavin	No adverse affects reported	No adverse affects reported

Niacin	No adverse affects reported	Vessel dilation, itching, headache, anorexia, liver damage, jaundice, cardiac arrhythmia
Vitamin B6	No adverse affects reported	Neuropathy, skin lesions
Biotin	No adverse affects reported	No adverse affects affected
Pantothenic acid	Negligible	Diarrhea
Vitamin B12	No appreciable toxicity	Allergic reactions

RANGES OF SAFE INTAKES OF VITAMINS

The vitamins fall into four categories of relative toxicity at levels of exposure above typical allowances:

Greatest toxic potential	Vitamin A, Vitamin D
Moderate toxic potential	Niacin
Low toxic potential	Vitamin E, vitamin C, thiamin, riboflavin, vitamin B6
Negligible toxic potential	Vitamin K, Pantothenic acid, biotin, folate, Vitamin B12

REFERENCES

1. The Vitamins. Fourth Edition.
Gerald F. Combs, Jr. Academic Press
2. This Standard is *Australia New Zealand Food Standards Code* – Standard 1.3.2 –Vitamins and minerals
3. *Food and Drug Regulations* **PART D** Vitamins, Minerals and Amino Acids **Section D.01.001**

SECTION III

REVIEW OF FOOD SAFETY AND STANDARDS REGULATIONS (FSSR) ON FOOD COLORS

1. LIST OF FOOD COLORS PERMITTED IN FSSR

The food colors permitted in FSSR under Food Safety and Standards (Food Product Standards and Food Additives) Regulations were listed in increasing order of ADI (Average Daily Intake). A total of 26 food colors are permitted in these regulations. This list is given in Annexure II.

Acceptable Daily Intake (ADI) means the amount of a food expressed on a body weight basis that can be ingested daily over a lifetime without appreciable health risk and an additive, meeting this criterion shall be used within the bounds of Good Manufacturing Practice (GMP).

2. IDENTIFICATION OF FOOD COLORS HAVING POTENTIAL RISK

The lesser the ADI, more will be the risk associated with the amount of consumption of that particular food color. Two food colors with the lowest ADI were identified from the list (Annexure II). Canthaxanthin and Erythrosine have the lowest ADI and thus, may have safety concerns associated with it if it exceeds its ADI. Canthaxanthin has ADI of 0-0.03 mg/kg and Erythrosine has ADI of 0-0.1 mg/kg.

3. PERMISSIBILITY OF ERYTHROSINE AND CANTHAXANTHIN IN FOODS

AS PER FSSR

A review was undertaken to list down the food categories in which these two food colors Erythrosine and Canthaxanthin are permitted in FSSR and their maximum permissible limits in these food categories (Annexure III). This information can help in Theoretical Exposure Assessment of Canthaxanthin and Erythrosine for its risk analysis. Exposure assessment is the process of estimating or measuring the magnitude, frequency and duration of exposure to an agent, along with the number and characteristics of the population exposed. Ideally, it describes the sources, pathways, routes, and the uncertainties in the assessment.

4. REVIEW OF SPECIFICATIONS (VERTICAL STANDARDS) OF FOOD COLORS

Review of the Specifications of the permitted food colors under Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011 was carried out. It was found that in the FSSR, there are specifications only for 15 food colours. However, the remaining colours have no standard at present. Globally available information of different

regulatory bodies like USFDA, JECFA and BIS on specifications of food colours was collected in comparison with that of FSSAI's specifications of existing food colours (Annexure IV). This database may be used to review the existing specifications of food colours with a view of harmonize the standards with other national and international regulatory bodies. In addition, for food colors without specifications in FSS Regulation, database was collated from globally accepted regulatory bodies like BIS, JECFA and USFDA. This information may be of help in developing specifications for these colours.

ANNEXURE II

LIST OF FOOD COLOURS PERMITTED IN FSSR (IN INCREASING ORDER OF ADI)

Food Colour	INS No.	ADI(JECFA)
Canthaxanthin	161g	0-0.03 mg/kg
Erythrosine (Red)	127	0-0.1mg/kg
IRON OXIDES	172 Iron oxides 172(ii) Iron oxide, red 172(iii) Iron oxide, yellow	172(i) Iron oxide, black IRON OXIDE BLACK (0-0.5 mg/kg bw) IRON OXIDE RED (0-0.5 mg/kg bw) <u>IRON OXIDE YELLOW</u> (0-0.5 mg/kg bw)
RIBOFLAVINS	101 101(ii)Riboflavin 5'-phosphate, sodium	101(i) Riboflavin RIBOFLAVIN (0-0.5 mg/kg bw) <u>RIBOFLAVIN 5'-PHOSPHATE SODIUM</u> (0-0.5 mg/kg bw)
Annatto Extract, norbixin-based	160 b	0-0.6 mg/kg
Paprika extract	160c(ii)	0-1.5 mg/kg bw
Grape skin extract	163(ii)	0-2.5mg/kg
Curcumin	100	0-3mg/kg
Ponceau 4R (Red)	124	0-4 mg/kg
Carmoisine (Red)Azorubin	122	0-4 mg/kg
Sunset Yellow (Yellow) FCF	110	0-4 mg/kg
Beta-apo-8'-carotenal	160e	0-5mg/kg
Methyl ester of beta apo- 8-carotenal	160f	0-5 mg/kg bw
Ethylester of Beta-apo-8'-carotenoic acid	160f	0-5mg/kg
Indigo Carmine(Indigotine)(Blue)	132	0-5mg/kg
B-Carotene	160 (i) Carotenes, beta-(Synthetic) 160(ii) Carotenes, beta-(vegetable) 160 (iii)Carotenes, beta-(Blakeslea trispora) 160(iv)Carotenes, beta-(algae)	Group ADI of 0-5 mg/kg bw for beta carotene, synthetic and from Blakeslea trispora
Brilliant Blue FCF(Blue)	133	0-6 mg/kg
Allura red AC	129	0-7mg/kg
Tartrazine (Yellow)	102	0-10 mg/kg

Annatto Extracts, Bixin based	160b	0-12 mg/kg
CHLOROPHYLLS AND CHLOROPHYLLINS, COPPER COMPLEXES	140 Chlorophyll Copper complex 140 (i) Chlorophyll copper complex 141(ii) Chlorophyll sodium and potassium Salts	<u>CHLOROPHYLLINS, COPPER COMPLEXES, SODIUM AND POTASSIUM SALTS</u> (0-15 mg/kg bw) CHLOROPHYLLS (NOT LIMITED) <u>CHLOROPHYLLS, COPPER COMPLEXES</u> (0-15 mg/kg bw)
Caramel	150a Caramel I - Plain 150b Caramel II - Caustic Sulphite Process 150c Caramel III - Ammonia Process 150d Caramel IV - Sulphite Ammonia Process	Class I Not specified Class II 0-160 mg/kg Class III 0-200 mg/kg Class IV 0-200 mg/kg
CAROTENOIDS	—	CAROTENOIDS, MIXED (NO ADI ALLOCATED)
Fast Green FCF	143	0-25mg/kg
Titanium dioxide	171	Not limited
Paprika oleoresin	161C(i)	No safety concern at current levels of intake when used as a flavouring agent
Silver	174	1977: Decision Postponed. 2018: Not re-evaluated by JECFA, but the provisions for silver was withdrawn at CCFA50
Gold	175	1977: No ADI allocated 2018: Not re-evaluated by JECFA, but the provisions for gold was withdrawn at CCFA50

ANNEXURE III

Canthaxanthin

Food Category System	Food Category name	INS No.	Recommended Maximum Level	Note
1.1.2	Dairy-based drinks - flavoured milk and/or fermented	161g	15 mg/kg	52, 170
1.2.1.2	Fermented milks (plain) heat treated after fermentation	161g	100 mg/kg	
1.6.1	Unripened cheese	161g	15 mg/kg	201
1.6.2	Ripened cheese, (Cheddar, Danbo, Edam, Gouda, Havarti, Tilisiter, Camembert, Brie, St Paulin, Samsoe, Emmentaler, Provolone, extra hard grating /sliced/cut/shredded cheese)	161g	15 mg/kg	201
1.6.2.1	Ripened cheese includes rind	161g	15 mg/kg	
1.6.2.2	Rind of ripened cheese	161g	15 mg/kg	
1.6.2.3	Cheese powder	161g	15 mg/kg	201
1.6.4.2	Flavoured processed cheese, including containing fruit, vegetables, meat etc.	161g	15 mg/kg	
1.6.5	Cheese analogues	161g	15 mg/kg	
2.2.2	Fat spreads, dairy fat spreads and blended spreads (margarine, bakery shortenings and fat spreads)	161g	15 mg/kg	214, 215
2.3	Fat emulsions mainly of type oil-in-water, including mixed and/or flavoured products based on fat emulsions	161g	15 mg/kg	
2.4	Fat-based desserts excluding dairy-based dessert 3+ +products of food category 1.7 (frozen desserts/frozen confections)	161g	100 mg/kg	
3.0	Edible ices, including sorbet (ice candy)	161g	100mg/kg	
4.1.2.4	Canned or bottled (pasteurized) fruit	161g	200 mg/kg	
4.1.2.5	Jams, jellies, marmalades	161g	200 mg/kg	
4.1.2.6	Fruit-based spreads (e.g. chutney) excluding products of food category 4.1.2.5	161g	15 mg/kg	
4.1.2.7	Candied / glazed / crystallised fruit including murrabba*	161g	200 mg/kg	
4.1.2.9	Fruit-based desserts including fruit-flavoured water-based desserts	161g	15 mg/kg	
4.1.2.11	Fruit fillings for pastries	161g	15 mg/kg	
4.2.2.2	Dried vegetables (including mushrooms and fungi, roots and tubers, pulses and legumes,	161g	10 mg/kg	

Erythrosine

Food Category System	Food Category Name	INS No.	Recommended Maximum Level	Note
1.1.2	Dairy-based drinks - flavoured milk and/or fermented	127	50 mg/kg	
1.2.1.2	Fermented milks (plain) heat treated after fermentation	127	50 mg/kg	
1.7	Dairy based desserts	127	50 mg/kg	
3.0	Edible ices, including sorbet (ice candy)	127	50mg/kg	
4.1.2.4	Canned or bottled (pasteurized) fruit	127	100 mg/kg	
4.1.2.5	Jams, jellies, marmalades	127	100 mg/kg	
4.1.2.7	Candied / glazed / crystallised fruit including murrabba*	127	100 mg/kg	
4.2.2.7	Fermented vegetables(including mushrooms and fungi, roots and tubers, pulses and legumes, and aloe vera) and seaweed products, excluding fermented soybean products of food categories 6.8.6, 6.8.7, 12.9.1, 12.9.2.1 and 12.9.2.3	127	30 mg/kg	
5.1.3	Cocoa and chocolate products	127	50 mg/kg	
5.2	Confectionery including hard and soft candy, nougats etc. other than food categories 5.1, 5.3, and 5.4	127	50 mg/kg	

ANNEXURE IV

REVIEW OF SPECIFICATIONS OF FOOD COLORS

Comparative database on specifications of food colours in different regulatory bodies

Food Colours	Parameters	FSS	JECFA	BIS	USFDA
Allura Red AC	Assay	No	Not less than 85% total colouring matters	No	Total color, not less than 85.0 percent
	Loss on drying (Vol. 4) - Volatile matter - Salts		Not more than 15% at 135 °C together with chloride and sulfate calculated as sodium salts		Sum of volatile matter (at 135 °C) and chlorides and sulfates (calculated as sodium salts), not more than 14.0 percent

	Water-insoluble matter (Vol. 4)		Not more than 0.2%		Not more than 0.2%
	Subsidiary colouring matters (Vol. 4)		Not more than 3.0%		<ul style="list-style-type: none"> - Lower sulfonated subsidiary colours (as sodium salts), not more than 1.0% - Higher sulfonated subsidiary colours (as sodium salts), not more than 1.0% -6-Hydroxy-5-[(2-methoxy-5-methyl-4-sulfophenyl)azo] -8-(2-methoxy-5-methyl-4-sulfophenoxy)-2-naphthalenesulfonic acid, disodium salt (SCNTR), not more than 1.0% (may actually be an isomer)

	<p>Organic compounds other than colouring matters (Vol.4)</p> <p>- 6-Hydroxy-2-naphthalene sulfonic acid, sodium salt (Shaeffer's salt)</p> <p>-4-Amino-5-methoxy-2-methylbenzene sulfonic acid (cresidine sulfonic acid)</p> <p>-6,6-Oxybis(2-naphthalene sulfonic acid) disodium salt</p>		<p>Not more than 0.3%</p> <p>Not more than 0.2%</p> <p>Not more than 1.0%</p>		<p>Not more than 0.3%</p> <p>Not more than 0.2%</p> <p>Not more than 1.0%</p> <p>-4,4'-(Diazoamino)bis[5-methoxy-2-methylbenzenesulfonic acid], disodium salt (DMMA), not more than 0.1% (GMP specification)</p>

	Unsubstituted primary aromatic amines (Vol. 4)		Not more than 0.01% calculated as aniline		--
	Ether extractable matter (Vol.4)		Not more than 0.2%		--
	Heavy metals (Vol. 4) - Lead - Arsenic - Mercury - Cadmium - Heavy metals (as Pb)	Not more than 2 mg/kg -- -- -- --			Not more than 10 ppm Pb Not more than 3 ppm As Not more than 1 ppm Hg (GMP specification)

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Food Colour	parameters	FSS	JECFA	BIS	USFDA
Annatto	Carotenoid (a) Annatto extract in oil, expressed as bixin, per cent by mass, Min. (b) Water-soluble annatto, expressed as norbixin, per cent by mass, Min.			0.24 0.24	
	Arsenic, mg/kg, Max.	3	Not more than 3 mg/kg Determine using an ICP-AES/AAS-Hydride technique. Alternatively, determine arsenic using Method II of the Arsenic Limit Test. The selection of sample size and method of sample preparation may be based on the principles of the methods described in Volume 4.	3	Not more than 3 parts per million.
	Lead, mg/kg, Max.	10	Not more than 2 mg/kg	10	Not more than 10 parts per million

			Determine using an AAS ICP-AES technique appropriate to the specified level. The selection of the sample size and method of sample preparation may be based on the principles of the method described in Volume 4.		
	Copper, mg/kg, Max.	30		30	
	Heavy Metal, mg/kg, Max	40		40	
	Mercury		Not more than 1 mg/kg Determine using cold vapour atomic absorption technique. Select sample size appropriate to the specified level.		
	Solubility (Vol.4)	Water soluble annatto contains norbixin, the hydrolysis product of bixin, in the form of sodium or potassium salt, as the	Soluble in alkaline water, slightly soluble in ethanol		

		major colouring principle. Both cis and trans forms may be present			
	UV/VIS absorption (Vol. 4)		The sample in 0.5% potassium hydroxide solution shows absorbance maxima at about 453 nm and 482 nm.		

Food Colour	parameters	FSS	JECFA	BIS	USFDA
Beta-apo-8'-carotenal	Purity as C ₃₀ H ₄₀ O per cent. by weight, Min	96		96	
	Sulphated ash, per cent. by weight, Max	0.1	Not more than 0.1% Test 2 g of the sample (Method I)	0.1	
	Melting range, °C	136-140			136 deg. C.-140 deg. C.
	Arsenic , mg/kg, Max	3.0		3	not more than 1 part per million
	Lead, mg/kg, Max	2.0	Not more than 2 mg/kg Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and	10	not more than 10 parts per million

			method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental Methods."		
	Subsidiary colouring matter		Not more than 3% of total colouring matters See description under TESTS		
	Solubility		Insoluble in water, slightly soluble in ethanol, sparingly soluble in vegetable oils, soluble in chloroform.		
	Loss of weight on drying				not more than 0.2 percent
	Residue on ignition				not more than 0.2 percent

Food Colours	Parameter	FSS	JECFA	BIS	USFDA
Brilliant Blue	Total dye content, corrected for	85		85	No

Food Colours	Parameter	FSS	JECFA	BIS	USFDA
FCF	Sample dried at 105±10C for 2 hours, percent by Mass, Minimum				
	Loss on drying at 135oC, and Chlorides and Sulphates expressed as sodium salt, per cent by Mass, Maximum	15	Not more than 15% as total amount Determine chloride as sodium chloride, sulfate as sodium sulfate, and water content (loss on drying at 135°) as described in Volume 4 (under “Specific Methods, Food Colours”).	15	
	Water insoluble matter, percent by Mass, Maximum	0.2	Not more than 0.2%	0.2	
	Combined ether extracts, percent by Mass. Maximum	0.2		0.2	
	Ether extractable matter		Not more than 0.2%		
	Subsidiary dyes, percent by Mass, Maximum	3	Not more than 6% See description under TESTS	3	
	Dye intermediates, percent by Mass, Max. (a) O, sulpho-benzaldehyde, Maximum (b) N-N' ethyl-benzyl-aniline-3-sulphonic acid, Maximum	1.5		1.5 0.3	

Food Colours	Parameter	FSS	JECFA	BIS	USFDA
	(c) Leuco base, percent by Mass, Maximum	0.3 5	Not more than 5% Weigh accurately 130±5 mg sample and proceed as directed under <i>Leuco Base in Sulfonated Triarylmethane Colours</i> (Vol. 4) Absorptivity (a) = 164 L/(g·cm) at 629 nm Ratio = 0.971	5	
	Heavy metals, (as Pb), mg/kg, Maximum	40		40	
	Lead, mg/kg, Maximum	10	Not more than 2 mg/kg Determine using a method appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4 (under “General Methods, Metallic Impurities”).	10	

Food Colours	Parameter	FSS	JECFA	BIS	USFDA
	Arsenic, mg/kg, Maximum	3		3	
	Chromium, mg/kg, Maximum	50	Not more than 50 mg/kg Determine using a method appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4 (under “General Methods, Metallic Impurities”).	50	
	Manganese		Not more than 100 mg/kg Determine using a method appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4 (under “General Methods,		

Food Colours	Parameter	FSS	JECFA	BIS	USFDA
			Metallic Impurities”).		
	Solubility		Soluble in water; slightly soluble in ethanol		
	Organic compounds other than colouring matters		Not more than 1.5%, sum of 2-, 3- and 4-formylbenzenesulfonic acids Not more than 0.3% 3-[[N-ethyl-N-(4-sulfophenyl)amino]methyl]-benzenesulfonic acid See description under TESTS		
	Unulfonated primary aromatic amines		Not more than 0.01% calculated as aniline		

Food Colour	Parameter	FSS	JECFA	BIS	USFDA
Canthaxanthin	Solubility	no	Insoluble in water, insoluble in ethanol, practically insoluble in vegetable oils, very slightly soluble in acetone	no	
	Positive test for carotenoids		The colour of a solution of		

Food Colour	Parameter	FSS	JECFA	BIS	USFDA
			canthaxanthin in acetone disappears after successive additions of a 5 % solution of sodium nitrite and 1 N sulfuric acid		
	Sulfated ash		Not more than 0.1% Test 2 g of the sample (Method I)		
	Subsidiary colouring matters		Carotenoids other than canthaxanthin: not more than 5% of total colouring matters See description under TESTS		
	lead		Not more than 2 mg/kg Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the methods described in Volume 4,		not more than 10 parts per million

Food Colour	Parameter	FSS	JECFA	BIS	USFDA
			“Instrumental Methods”.		
	Arsenic				not more than 3 parts per million
	mercury				not more than 1 part per million.
	Melting range (decomposition)				207 deg. C. to 212 deg. C. (corrected).
	Loss on drying				not more than 0.2 percent
	Residue on ignition				not more than 0.2 percent
	Total carotenoids other than trans-canthaxanthin				not more than 5 percent

Food colour	Parameter	Type	FSS	JECFA	BIS	USFDA
Caramel	Solid content, per cent by mass	Type 1	62-77	62-77	62-77	
		Type 2	65-72	65-72	65-72	
		Type 3	53-83	53-83	53-83	
		Type 4	40-75	40-75	40-75	
	Colour intensity, percent by mass	Type 1	0.01-0.12	0.01-0.12	0.01-0.12	
		Type 2	0.06-0.10	0.60-0.10	0.06-0.10	
		Type 3	0.08-0.36	0.08-0.36	0.08-0.36	
		Type 4	0.10-0.60	0.10-0.60	0.10-0.60	
	Ammonical nitrogen per cent by mass, max	Type 1	0.01	-	0.01	
		Type 2	0.01	-	0.01	
		Type 3	0.4	Max. 0.4%	0.4	
		Type 4	0.5	Max. 2.8%	0.5	
	4-Methylimidazole	Type 1	-	-	-	

		Type 2	-	-	-	
		Type 3	Max.300 mg/kg &max. 200 mg/kg on equivalent colour basis	Max.300 mg/kg &max. 200 mg/kg on equivalent colour basis	Max.300 mg/kg &max. 200 mg/kg on equivalent colour basis	
		Type 4	Max. 1000 mg/kg & max. 250 mg/kg on equivalent colour basis	Max. 1000 mg/kg & max. 250 mg/kg on equivalent colour basis	Max. 1000 mg/kg & max. 250 mg/kg on equivalent colour basis	
	Lead (as Pb), mg/kg, Max		5	Not more than 2 mg/kg	5	Not more than 10 parts per million
	Arsenic(as AS) mg/kg		3	Not more than 1 mg/kg	3	Not more than 3 parts per million
	Mercury					Not more than 0.1 part per million
	Total nitrogen	Type 1		Max. 0.1%		
		Type 2		Max. 0.2%		
		Type 3		1.3-6.8%		
		Type 4		0.5-7.5%		
	Total sulfur	Type 1		Max 0.3%		
		Type 2		1.3-2.5%		
		Type 3		Max 0.3%		
		Type 4		1.4-10.0%		
	Sulfur dioxide	Type 1		-		
		Type 2		Max 0.2%		
		Type 3		-		
		Type 4		Max. 0.5%		

Food colour	Parameter	FSS	JECFA	BIS	USFDA
Carmoisine (red)	Total dye content, corrected for Sample dried at 105±10C for 2 hours, per cent by mass, Min.	87		87	no
	Loss on drying at 135oC, percent by mass, Max. And Chlorides and Sulphates expressed as sodium salt, per cent by mass, Max	13	Not more than 15% at 135° together with chloride and sulfate calculated as sodium salts	13	
	Water insoluble matter, percent by mass, Max.	0.2	Not more than 0.2%	0.2	
	Combined ether extracts, percent by mass. Max.	0.2		0.2	
	Subsidiary dyes, percent by mass, Max.	1.0	Not more than 1% Use the following conditions: Developing solvent: No. 4 Height of ascent of solvent front: approximately 17 cm	1.0	
	Dye intermediates, per cent by	0.5		0.5	

Food colour	Parameter	FSS	JECFA	BIS	USFDA
	mass, Max.				
	Lead, mg/kg, Max.	10	Not more than 2 mg/kg Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the 3 principles of the 3 method described in Volume 4, "Instrumental Methods."	10	
	Arsenic, mg/kg, Max.	3		3	
	Heavy metals, mg/kg, Max.	40		40	
	Solubility		Soluble in water, sparingly soluble in ethanol		
	Organic compounds other than colouring matters		Not more than 0.5% of 4-Amino-1-naphthalenesulfonic acid and 4-Hydroxy-1-naphthalenesulfonic		

Food colour	Parameter	FSS	JECFA	BIS	USFDA
			acid together Use HPLC under the following conditions: HPLC elution gradient: 1 to 100% at 2.0% per min (exponential)		
	<i>Unsulphonated primary aromatic amines</i>		Not more than 0.01% calculated as aniline of		
	<i>Ether extractable matter</i>		Not more than 0.2%		

Food colour	parameter	FSS (general not type specific)	JECFA				BIS 160a (i)	USFDA
			Carotenes, beta (synthetic) 160a (i)	Carotenes (vegetable)	Beta carotenes from Blackslea trispora	Carotenes (algae)		
Beta Carotenes	Arsenic	3 ppm					3	no
	Lead	10 ppm	Not more than 2 mg/kg Determine	Not more than 5 mg/kg Determine using an	Not more than 2 mg/kg Determine using an atomic	Not more than 5 mg/kg Determine using an	10	

			using an AAS/ICP-AES technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, under "General Methods, Metallic Impurities."	atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental Methods."	absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental methods".	atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental Methods."		
	Heavy metal	40 ppm					40	
	Subsidiary colouring matter, percent by weight, Max	3	Carotenoids other than β -carotene: Not more than 3% of total				3	

			colouring matters. See description under TESTS					
	Sulphated ash, percent of total colouring matters, Max	0.1	Not more than 0.1% Test 2 g of the sample (Method I)		Not more than 0.2%		0.1	
	Solubility		Insoluble in water; practically insoluble in ethanol; slightly soluble in vegetable oils.	Insoluble in water	Insoluble in water; practically insoluble in ethanol, slightly soluble in vegetable oil.	Insoluble in water		
	Residual solvents			Not more than 50 mg/kg, singly or in combination, of acetone, hexane, methanol, ethanol and propan-2-ol	Ethanol: Ethyl acetate: } Not more than 0.8% singly or in combination Isopropanol: Not more than 0.1% (Vol. 4) Isobutyl acetate: Not more than	Not more than 50 mg/kg, singly or in combination, of acetone, hexane, methanol, ethanol and propan-2-ol		

					1.0% See description in Volume 4			
	Carotenoids, other than beta carotene				Not more than 3.0% of total colouring matters See description under TESTS			
	tocopherols					Not more than 0.5% See description under TESTS		
	Purity, percent of total colouring matters, expressed as beta carotene, max.						96	

Food colour	parameter	FSS	JECFA	BIS	USFDA
Mixed carotenoids	Synthetic colors	no	Samples should be free of synthetic pigments, canthaxanthin, and apocarotenoic acid ethyl ester. See description	no	no

Food colour	parameter	FSS	JECFA	BIS	USFDA
			under TESTS		
	Residual solvent		<p>Samples should be free of synthetic pigments, canthaxanthin, and apocarotenoic acid ethyl ester.</p> <p>See description under TESTS</p>		
	Lead		<p>Not more than 5 mg/kg</p> <p>Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental Methods."</p>		

Food colour	parameter	FSS	JECFA	BIS	USFDA
Chlorophyll	Arsenic	3 ppm	Not more than 3 mg/kg (Method II)	no	no
	lead	10 ppm	Not more than 5 mg/kg Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental Methods."		
	Copper	30 ppm			
	Zinc	50 ppm			
	Solubility		No specifications for magnesium complex but has specifications for following complexes: Chlorophyll copper complex, and Chlorophyll, sodium		

Food colour	parameter	FSS	JECFA	BIS	USFDA
			and potassium salts		
	Residual solvents		<p>Acetone, methanol, ethanol, propan-2-ol, hexane: Not more than 50 mg/kg, singly or in combination</p> <p>Dichloromethane: Not more than 10 mg/kg</p> <p>Determine by gas chromatographically using either the method of entrainment distillation (Determination of Residual Solvents) or headspace analysis (Limit Test for Solvent Residues).</p>		

Food colour	parameter	FSS	JECFA	BIS	USFDA
Chlorophyll-magnesium complex	Total combined phaeophytines and their magnesium complexes, percent by weight, max.	10	No specifications for magnesium complex but has specifications for following	10	no

			complexes: Chlorophyll copper complex, and Chlorophyll, sodium and potassium salts		
	Residual solvents, mg/kg, Max. Acetone, methanol, ethanol, propan-2-ol, hexane	50		50	
	Dichloromethane	10		10	
	Arsenic, mg/kg, Max.			3	
	Lead, mg/kg, Max.			10	

Food colour	parameter	FSS	JECFA	BIS	USFDA
Chlorophyll copper complex	Solubility	no	Insoluble in water; soluble in ethanol, diethyl ether, chloroalkanes, hydrocarbons and fixed oils		
	Residual solvents		Acetone, methanol, ethanol, propan-2-ol, hexane: Not more than 50 mg/kg, singly or in combination Dichloromethane: Not more than 10 mg/kg Determine <i>gas</i> <i>chromatographically</i> using either the method of entrainment distillation (<i>Determination of</i>	Acetone, methanol, ethanol, propan-2-ol and hexane: not more than 50 mg/kg. singly or in combination	

Food colour	parameter	FSS	JECFA	BIS	USFDA
			<i>Residual Solvents</i>) or headspace analysis (<i>Limit Test for Solvent Residues</i>).		
	Free ionisable copper		Not more than 200 mg/kg Accurately weigh about 1 g of the sample and dissolve in 20 ml of arachid oil, with the aid of gentle heat. Add exactly 200 ml of water, stir mechanically, and adjust to pH 3.0 by careful addition of 0.5 N hydrochloric acid (avoid overshooting). Allow the mixture to stand for 10 min. If necessary readjust to pH 3.0 by careful addition of 0.5 N hydrochloric acid. Transfer to a separating funnel and allow to stand for about 20 min. Filter the aqueous phase through a No. 50 Whatman filter paper, rejecting the first 10 ml. Subject this solution to analysis for copper by <i>atomic absorption spectrometry</i> (see Volume 4).	200 mg/kg Max.	Free copper: not more than 200 parts per million
	Total copper		Not more than 8% of the total copper phaeophytins Ignite about 0.1 g, accurately	Total copper phaeophytins, percent by weight,	not less than 0.2 percent and not more than 0.3

Food colour	parameter	FSS	JECFA	BIS	USFDA
			<p>weighed, of the sample contained in a silica dish, at a temperature not exceeding 500°, until all carbon is removed; moisten with one or two drops of concentrated sulphuric acid and re-ash. Dissolve the ash by boiling with 3 portions (each of 5 ml) of 10% (w/w) hydrochloric acid, filtering each addition through the same small filter paper into a 100 ml volumetric flask. Cool, and make up to volume with purified water. Subject this solution to analysis for copper by <i>atomic absorption spectrometry</i> (see Volume 4).</p>	<p>Max. : 10. Total copper, percent of total copper phaeophytins, Max.: 8</p>	percent.
	Arsenic		Not more than 3 mg/kg (Method II)	3 mg/kg, max.	not more than 5 parts per million
	lead		<p>Not more than 5 mg/kg Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the</p>	10 mg/kg, max.	not more than 20 parts per million

Food colour	parameter	FSS	JECFA	BIS	USFDA
			method described in Volume 4, "Instrumental Methods."		
	Dichloromethane, mg/kg, Max.		10		
	moisture				not more than 0.5 percent.
	nitrogen				not less than 0.2 percent and not more than 0.3 percent.
	Sulphated ash				not more than 2.5 per cent
	Total color				not less than 4.5 percent and not more than 5.5 percent

Food colour	parameter	FSS	JECFA	BIS	USFDA
Chlorophyll copper complex, sodium and potassium salts	solubility	no	Soluble in water; very slightly soluble in lower alcohols and ketones and diethyl ether; insoluble in chloroalkanes, hydrocarbons and fixed oils	no	

Food colour	parameter	FSS	JECFA	BIS	USFDA
	Basic dyes		To 5 ml of a 0.5% aqueous solution of the sample in a test-tube add 1 ml of 1 N hydrochloric acid and add 5 ml of diethyl ether. Mix thoroughly and allow to separate. The ether layer should be no darker than pale green.		
	Residual solvents		Acetone, methanol, ethanol, propan-2-ol, hexane: Not more than 50 mg/kg, singly or in combination Dichloromethane: Not more than 10 mg/kg Determine gas chromatographically using either the method of entrainment		
	Free ionisable copper		Not more than 200		Free copper-not

Food colour	parameter	FSS	JECFA	BIS	USFDA
			mg/kg Accurately weigh about 1 g of the sample and dissolve in 20 ml of arachid oil, with the aid of gentle heat. Add exactly 200 ml of water, stir mechanically, and adjust to pH 3.0 by careful addition of 0.5 N hydrochloric acid (avoid overshooting). Allow the mixture to stand for 10 min. If necessary readjust to pH 3.0 by careful addition of 0.5 N hydrochloric acid. Transfer to a separating funnel and allow to stand for about 20 min. Filter the aqueous phase through a No. 50 Whatman filter paper, rejecting the first 10 ml. Subject		more than 0.25 percent

Food colour	parameter	FSS	JECFA	BIS	USFDA
			this solution to analysis for copper by atomic absorption spectrometry (see Volume 4).		
	Total copper		<p>Not more than 8% of the total copper phaeophytins</p> <p>Ignite about 0.1 g, accurately weighed, of the sample contained in a silica dish, at a temperature not exceeding 500°, until all carbon is removed; moisten with one or two drops of concentrated sulphuric acid and re-ash. Dissolve the ash by boiling with 3 portions (each of 5 ml) of 10% (w/w) hydrochloric acid, filtering each addition through the same small filter</p>		not less than 4 percent and not more than 6 percent

Food colour	parameter	FSS	JECFA	BIS	USFDA
			paper into a 100 ml volumetric flask. Cool, and make up to volume with purified water. Subject this solution to analysis for copper by atomic absorption spectrometry (see Volume 4).		
	arsenic		Not more than 3 mg/kg (Method II)		not more than 5 parts per million
	lead		Not more than 5 mg/kg Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental		not more than 20 parts per million

Food colour	parameter	FSS	JECFA	BIS	USFDA
			Methods.”		
	moisture				not more than 5.0 percent.
	nitrogen				not more than 5.0 percent.
	iron				not more than 0.5 percent
	Total color				not less than 75 percent.
	Ratio, absorbance at 405 m[μ] to absorbance at 630 m[μ]				not less than 3.4 and not more than 3.9.

Food colour	Parameter	FSS	JECFA	BIS	USFDA
Curcumin	Solubility	no	Insoluble in water and in diethyl ether; soluble in ethanol and in glacial acetic acid.	no	no
	Residual solvents		Acetone: Not more than 30 mg/kg Hexane: Not more than 25 mg/kg Methanol: } Not more		

			<p>than 50 mg/kg</p> <p>Ethanol: Isopropanol: Ethyl acetate: See description in Volume 4</p>		
	lead		<p>Not more than 2 mg/kg</p> <p>Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4 , “Instrumental Methods.”</p>		

Food colour	parameter	FSS	JECFA	BIS	USFDA
Erythrosine	solubility		Soluble in water and in ethanol		no
	<i>Loss on drying at 135°</i>	13	Not more than 13% together with chloride and sulfate calculated as sodium	13	

Food colour	parameter	FSS	JECFA	BIS	USFDA
			salts		
	Inorganic iodides	0.1 % by mass as sodium iodide, max.	Not more than 0.1% calculated as sodium iodide See description under TESTS	0.1 % by mass as sodium iodide, max.	
	Water insoluble matter	0.2% by mass, Max.	Not more than 0.2%	0.2% by mass, Max.	
	Zinc	50 mg/kg, max.	Not more than 50 mg/kg	50 mg/kg, max.	
	Lead	10 mg/kg, max	Not more than 2 mg/kg Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4,	10 mg/kg, max.	

Food colour	parameter	FSS	JECFA	BIS	USFDA
			“Instrumental Methods.”		
	Subsidiary coloring matter	4 % by mass, max. (except fluorescin)	Not more than 4% (except fluorescein) Use the following conditions: Developing solvent: No. 5 Height of ascent of solvent front: 17 cm Note: Take special care not to allow the chromatograms to be exposed to direct sunlight.	4 % by mass, max. (except fluorescin)	
	Fluorescin		Not more than 20 mg/kg See description under TESTS	20 mg/kg, max.	
	<u>Organic compounds other than colouring matters</u>	Tri-iodoresorcinol: 0.2% by mass, max. 2-(2,4-dihydroxy-3,5-di-iodobenzoyl) benzoic acid: 0.2% by mass, max.	Tri-iodoresorcinol: Not more than 0.2% 2-(2,4-dihydroxy-3,5-di-iodobenzoyl) benzoic acid: Not	Tri-iodoresorcinol: 0.2% by mass, max. 2-(2,4 dihydroxy-3,5-di-	

Food colour	parameter	FSS	JECFA	BIS	USFDA
			<p>more than 0.2%</p> <p>Proceed as directed under Column chromatography, using, for example, the following absorptivities:</p> <p>2(2,4-dihydroxy-3,5-di-iodobenzoyl)benzoic acid: $0.047 \text{ mg L}^{-1} \text{ cm}^{-1}$ at 348 nm (alkaline)</p> <p>Tri-iodoresorcinol: $0.079 \text{ mg L}^{-1} \text{ cm}^{-1}$ at 223 nm (acidic).</p>	<p>iodobenzoyl) benzoic acid: 0.2% by mass, max.</p>	
	Ether extractable matter	0.2% by mass, max.	From a solution of pH not less than 7, not more than 0.2%	0.2% by mass, max.	
	Total dye content, corrected for sample dried at $105 \pm 1^\circ\text{C}$ for 2 h, percent by mass, min.	87		87	
	arsenic	3 mg/kg, max.		3 mg/kg, max.	
	Heavy metals, mg/kg, max.	40		40	

Food colour	parameter	FSS	JECFA	BIS	USFDA
Ethyl ester of beta-apo-8'-carotenal	Purity as C ₂₂ H ₄₄ O ₈ , per cent. by mass, Min	96		96	no
	Sulphated ash, per cent. by mass, Max	0.1	Not more than 0.1% Test 2 g of the sample (Method I)	0.1	
	Melting range, 0C	134-138			
	Arsenic , mg/kg, Max	3.0		3.0	
	Lead, mg/kg, Max	2.0	Not more than 2 mg/kg Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental Methods."	10.0	
	solubility		Insoluble in water, very		

Food colour	parameter	FSS	JECFA	BIS	USFDA
			slightly soluble in ethanol, slightly soluble in vegetable oils, soluble in chloroform		
	Subsidiary colouring matter		Not more than 3% of total colouring matters See description under TESTS		

Food colour	parameter	FSS	JECFA	BIS	USFDA
Fast Green FCF	Total dye content, corrected for Sample dried at 105±10C for 2 hours, percent by mass, Minimum	85		85	
	Loss on drying at 135oC, and, percent by Mass, Maximum and chlorides and Sulphates expressed as sodium salt, percent by mass, Maximum	13	Not more than 15% together with chloride and sulfate calculated as sodium salts	13	
	Water insoluble matter, percent by Mass, Maximum	0.2	Not more than 0.2%	0.2	not more than 0.2 percent
	Combined ether extracts,	0.2		0.2	

	percent by Mass. Max				
	Subsidiary dyes, percent by mass, Maximum	1.0	Not more than 6% See description under TESTS	1.0	Not more than 6 %
	Organic compound other than colouring matter uncombined intermediates and products of side reactions				
	(a) Sum of 2-, 3-, 4-formyl benzene sulphonic acid, sodium salts, percent by Mass, Maximum	0.5	Not more than 0.5%,	0.5	Not more than 0.5 percent
	(b) Sum of 3- and 4-[ethyl (4-sulfo)phenyl] amino methyl benzene sulphonic acid, disodium salts, Percent by Mass, Maximum	0.3	Not more than 0.3	0.3	Not more than 0.5 percent.
	(c) 2-formyl-5-hydroxybenzene sulphonic acid sodium salt, percent by Mass, Maximum	0.5	Not more than 0.5% Proceed as directed under Column Chromatography, using, for example, the following absorptivities: 3-formylbenzenesulfonic acid: $0.495 \text{ mg L}^{-1} \text{ cm}^{-1}$ at 246 nm in dilute HCl 3-[(ethyl)(4-sulfo)phenyl]amino]methylbenzenesulfonic acid: $0.078 \text{ mg L}^{-1} \text{ cm}^{-1}$ at 277 nm in dilute ammonia 2-formyl-5-hydroxybenzenesulfonic acid: $0.080 \text{ mg L}^{-1} \text{ cm}^{-1}$ at 335 nm in dilute	0.5	not more than 0.5 percent

	(d) Leuco base, percent by Mass, Maximum	5.0	ammonia	5.0	not more than 5 percent
	(e) Unsulphonated primary aromatic amines (calculated as aniline), percent by Mass, Maximum	0.01	<p>Not more than 5.0%</p> <p>Weigh accurately 130±5 mg sample and proceed as directed under Leuco Base in Sulfonated Triarylmethane Colours</p> <p>Absorptivity (a) = 0.6 mg L⁻¹ cm⁻¹ at approx. 625 nm</p> <p>Ratio = 0.971</p> <p>Not more than 0.01% calculated as aniline</p>	0.01	
	Lead, mg/kg, Maximum	10	<p>Not more than 2 mg/kg</p> <p>Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume</p>	10	Not more than 10 parts per million

			4, "Instrumental Methods."		
	Arsenic, mg/kg, Maximum	3		3	Not more than 3 parts per million
	Chromium, mg/kg, Maximum	50	Not more than 50 mg/kg	50	Not more than 50 parts per million
	Mercury, mg/kg, Maximum	ABSENT		Absent	Not more than 1 part per million
	Heavy metals, mg/kg, Maximum	40		40	
	solubility		Soluble in water; sparingly soluble in ethanol		
	Ether extractable matter		Not more than 0.4%		
	Sum of volatile matter at 135 deg. C (275 deg. F) and chlorides and sulfates (calculated as sodium salts),				not more than 15 percent.
	Total color				Not less than 85 percent
Food colour	parameter	FSS	JECFA	BIS	USFDA
Grape skin extract	solubility	no	Soluble in water	no	
	Sulphur dioxide		Not more than 0.005% per 1 colour value Distil 1 g of the		

Food colour	parameter	FSS	JECFA	BIS	USFDA
			<p>sample with 100 ml of water and 25 ml of phosphoric acid solution (2 in 7) in a distilling flask with the Wagner tube (Figure 1). In an absorption flask, place 25 ml of lead acetate solution (1 in 50) previously prepared. Insert the lower end of condenser into lead acetate solution in the absorption flask. Distil until the liquid in the absorption flask reaches about 100 ml and rinse the end of the condenser with a little amount of water. To the distilled solution</p>		

Food colour	parameter	FSS	JECFA	BIS	USFDA
			add 5 ml of hydrochloric acid and 1 ml of starch TS, and titrate with 0.01 N iodine. Each ml of 0.01 N iodine is equivalent to 0.3203 mg of SO ₂ .		
	Basic colouring matters		Add 1 g of the sample to 100 ml sodium hydroxide solution (1 in 100) and shake well. Take 30 ml of this solution and extract with 15 ml of ether. Extract this ether extract twice with each 5 ml of dilute acetic acid TS. The acetic acid extract is colourless.		
	Other acidic colouring matters		Add 1 ml of ammonia TS and 10 ml of water to		

Food colour	parameter	FSS	JECFA	BIS	USFDA
			<p>1 g of the sample and following the directions</p> <p><i>Chromatography</i></p> <p>place 0.002 ml of the solution on the chromatographic sheet and dry it. Use a mixture of pyridine and ammonia TS (2:1 by volume) as developing solvent and stop the development when the solvent front reaches about 15 cm height from the point where the sample solution was placed. No spot is observed at the solvent front after drying under daylight. If any spot is observed, it</p>		

Food colour	parameter	FSS	JECFA	BIS	USFDA
			should be decolourized when sprayed with a solution of stannous chloride in hydrochloric acid (2 in 5).		
	Arsenic		Not more than 3 mg/kg		Not more than 1 part per million
	lead		Not more than 2 mg/kg Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental Methods."		Not more than 10 parts per million.

Food colour	parameter	FSS	JECFA	BIS	USFDA
Indigo carmine	Total dye content, corrected for Sample dried at 105±1oC for 2 hours, per cent by mass, Min	85		85	
	Water insoluble matter, percent by mass, Max.	0.2	Not more than 0.2%	0.4	not more than 0.4 percent
	Combined ether extracts, percent by mass. Max.	0.2		0.4	
	Subsidiary dyes, percent by mass, Max.	1.0	<p>Not more than 1% (except disodium 3,3'-dioxo-^{2,2'}[delta - biindoline]- 5,7'-disulfonate)</p> <p>Use the following conditions:</p> <p>Developing solvent: No. 3</p> <p>Height of ascent of solvent front: approximately 17 cm</p> <p>Note 1. The 5,7' isomer is separated as a</p>	3.0	

Food colour	parameter	FSS	JECFA	BIS	USFDA
			<p>wide blue zone just in front of the main blue band. Do not include this zone in the subsidiary colouring matter zones which are cut out and measured.</p> <p>Note 2. The 15 ml sodium hydrogen carbonate solution used in the general procedure is replaced by 15 ml 0.05 N hydrochloric acid in order to avoid the decomposition which the sulfonated indigo undergoes in alkaline solution.</p>		
	Isatin Sulphonic acid, percent by mass, Max.	0.5		1	not more than 0.4 percent.
	Lead, mg/kg, Max	10	<p>Not more than 2 mg/kg</p> <p>Determine using</p>	10	not more than 10 parts per million

Food colour	parameter	FSS	JECFA	BIS	USFDA
			an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental Methods."		
	Arsenic, mg/kg, Max.	3		3	not more than 3 parts per million
	mercury				not more than 1 part per million
	Heavy metals, mg/kg, Max.	40		40	
	solubility		Soluble in water; sparingly soluble in ethanol		
	Loss on drying at 135°C		Not more than 15% together with chloride and sulfate calculated	15	

Food colour	parameter	FSS	JECFA	BIS	USFDA
			as sodium salts		
	Organic compounds other than colouring matters		<p>Not more than 0.5% of sum of isatin-5-sulfonic acid, 5-sulfoanthranilic acid and anthranilic acid</p> <p>Use liquid chromatography under the following conditions:</p> <p>HPLC elution gradient: 2 to 100% gradient followed by elution at 100%</p>		
	Unsulfonylated primary aromatic amines (Vol. 4)		Not more than 0.01% calculated as aniline		
	Ether extractable matter		<p>Not more than 0.2%</p> <p>Weigh accurately</p>		

Food colour	parameter	FSS	JECFA	BIS	USFDA
			about 2 g sample instead of the 5 g stated in the general methods		
	Sum of volatile matter at 135 deg. C (275 deg. F) and chlorides and sulfates (calculated as sodium salts),				not more than 15 percent
	5-Sulfoanthranilic acid				not more than 0.2 percent
	Disodium salt of 2-(1,3-dihydro-3-oxo-7-sulfo-2H -indol-2-ylidene)-2,3-dihydro-3-oxo-1H -indole-5-sulfonic acid				not more than 18 percent
	Sodium salt of 2-(1,3-dihydro-3-oxo-2H -indol-2-ylidene)-2,3-dihydro-3-oxo-1H -indole-5-sulfonic acid				not more than 2 percent
	Total colour				not less than 85 percent

Food colour	parameter	FSS	JECFA	BIS	USFDA
Iron oxides	solubility	no	Insoluble in water and organic solvents; soluble in concentrated mineral acids	no	
	Loss on drying		Iron Oxide Red :		

Food colour	parameter	FSS	JECFA	BIS	USFDA
			Not more than 1.0% (105°, 4 h)		
	Water soluble matter		Not more than 1.0% See description under TESTS		
	arsenic		Not more than 3 mg/kg Determine by the atomic absorption hydride technique. The selection of sample size and method of sample preparation may be based on the principles of the methods described in Volume 4 (under "General Methods, Metallic Impurities").		not more than 3 milligrams per kilogram (mg/kg) (3 parts per million (ppm)).
	cadmium		Not more than 1 mg/kg Determine using an atomic absorption/ICP technique appropriate to the specified level.		

Food colour	parameter	FSS	JECFA	BIS	USFDA
			The selection of sample size and method of sample preparation may be based on the principles of the methods described in Volume 4 (under “General Methods, Metallic Impurities”).		
	lead		Not more than 10 mg/kg Determine using an atomic absorption/ICP technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the methods described in Volume 4 (under “General Methods, Metallic		not more than 5 mg/kg (5 ppm).

Food colour	parameter	FSS	JECFA	BIS	USFDA
			Impurities”).		
	mercury		Not more than 1 mg/kg Determine by the cold vapour atomic absorption technique.		not more than 1 mg/kg (1 ppm).

Food colour	parameter	FSS	JECFA	BIS	USFDA
Paprika extract	solubility	no	Practically insoluble in water, soluble in acetone	no	no
	Residual solvents		Acetone Ethanol Ethyl acetate Hexane Not more than 50 mg/kg, singly or in combination Isopropanol Methanol See description		

			under TESTS		
	Capsaicinoids		Not more than 200 mg/kg See description under TESTS		
	Arsenic		Not more than 1 mg/kg Determine using an AAS (Hydride generation technique) appropriate to the specified level. The selection of sample size and method of sample preparation may be based on principles of methods described in Volume 4 (under "General Methods, Metallic Impurities").		
	lead		Not more than 1 mg/kg Determine using an AAS (Electrothermal atomization technique)		

			appropriate to the specified level. The selection of sample size and method of sample preparation may be based on principles of methods described in Volume 4 (under “General Methods, Metallic Impurities”).		
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Food colour	Parameter	FSS	JECFA	BIS	USFDA
Paprika oleoresin	solubility	no	Practically insoluble in water: partially soluble with oily separation in ethanol; insoluble in glycerin	no	
	Residual solvent		Dichloromethane and trichloroethylene: Not more than 30/mg/kg, singly or in combination Acetone: Not more than 30 mg/kg		Paprika oleoresin shall contain no more residue of the solvents listed in paragraph (a)(1) of this section than is permitted of the corresponding solvents in spice oleoresins under applicable food additive regulations in parts 170 through 189 of this

			<p>Propan-2-ol: Not more than 50 mg/kg</p> <p>Methanol: Not more than 50 mg/kg</p> <p>Ethanol: Not more than 50 mg/kg</p> <p>Hexane: Not more than 25 mg/kg</p>		<p>chapter.</p> <ol style="list-style-type: none"> 1. Acetone 2. Ethyl alcohol 3. Ethylene dichloride 4. Hexane 5. Isopropyl alcohol 6. Methyl alcohol 7. Methylene chloride 8. Trichloroethylene
	capsaicin		Not more than 0.5%		
	arsenic		Not more than 3 mg/kg (Method II)		
	lead		<p>Not more than 2 mg/kg</p> <p>Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental Methods."</p>		

Food colour	parameter	FSS	JECFA	BIS	USFDA
Ponceau 4R	Total dye content, corrected for Sample dried at 105±10C for 2 hours, per cent by mass, Min.	85		82	no
	Loss on drying at 135oC, percent by mass, Max. and Chlorides and Sulphates expressed as sodium salt, per cent by mass, Max	18	Not more than 20% at 135° together with chloride and sulfate calculated as sodium salts Determine using Loss on Drying under “GENERAL METHODS”, Chloride as Sodium Chloride and Sulfate as Sodium Sulfate under “SPECIFIC METHODS, Food Colours” in Volume 4.	18	
	Water insoluble matter, percent by mass, Max	0.2	Not more than 0.2%	0.4	
	Combined ether extracts, percent by mass. Max.	0.2		0.4	
	Subsidiary dyes, percent by mass, Max	1.0	Not more than 1% See description under TESTS	1.0	
	Dye intermediates, per cent by mass, Max.	0.5		0.5	
	Lead, mg/kg, Max.	10	Not more than 2 mg/kg	10	

			Determine using an AAS/ICP-AES technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4 (under “General Methods, Metallic Impurities”).		
	Arsenic, mg/kg, Max	3		3	
	Heavy metals, mg/kg, Max	40		40	
	Solubility		Soluble in water; sparingly soluble in ethanol		
	Organic compounds other than colouring matters		Not more than 0.5% of sum of 4-amino-1-naphthalenesulfonic acid, 7-hydroxy-1,3-naphthalenedisulfonic acid, 3-hydroxy-2,7-naphthalenesulfonic acid, 6-hydroxy-2-naphthalenesulfonic acid, and 7-hydroxy-1,3,6-		

			naphthalenetrisulfonic acid. (See Volume 4 under “SPECIFIC METHODS, Food Colours”) Proceed as directed under <i>Determination by High Performance Liquid Chromatography</i> using the conditions of Subsidiary colouring matters except detector wavelength (238 nm).		
	Unsulphonated primary aromatic amines (Vol. 4)		Not more than 0.01% calculated as aniline (See Volume 4 under “SPECIFIC METHODS, Food Colours”)		
	Ether extractable matter		Not more than 0.2% (See Volume 4 under “SPECIFIC METHODS, Food Colours, Method II”) Use 2 g of sample for the test.		

Food colour	parameter	FSS	JECFA	BIS	USFDA
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RIBOFLAVINS	Arsenic, Max.	5 ppm		3 mg/kg, max.	Riboflavin shall meet the specifications given in the Food Chemicals Codex, 3d Ed. (1981), which is incorporated by reference. The availability of this incorporation by reference is given in paragraph (a)(1) of this section.
	Lead, Max.	20 ppm	Not more than 2 mg/kg Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4,	10 mg/kg, max.	

			“Instrumental Methods.”		
	solubility		Very slightly soluble in water; practically insoluble in alcohol, chloroform, acetone and ether; very soluble in dilute alkali solutions		
	Loss on drying		Not more than 1.5% (105o, 4 h)	1.5 percent by mass, Max.	
	Sulphated ash		Not more than 0.1% Test 2 g of the sample (Method I)	0.1 % of total coloring	
	Subsidiary coloring matters		Prepare the standard for this test for the absence of lumiflavin by diluting 3 ml of 0.1 N potassium dichromate with water to 1000 ml. Pour some chloroform through an alumina column to		

			remove any ethanol. To 10 ml of this chloroform add 35 mg of the sample, shake for 5 min and filter. The colour of the filtrate should be no more intense than that of 10 ml of the standard when viewed in identical containers.		
	Primary aromatic amines (Vol. 4)		Not more than 100 mg/kg calculated as aniline	100 mg /kg, max	
	Purity, percent by mass (on dry basis), Min.			98	
	Lumiflavin, percent by mass, Max.			0.025	

Food colour	Parameter	FSS	JECFA	BIS	USFDA
Riboflavin 5'-phosphate, sodium	solubility		Soluble in water; insoluble in ethanol		?
	Loss on drying		Not more than 8% (100o, 5 h in a		

			vacuum over phosphorus pentoxide)		
	Sulphated ash		Not more than 25% Test 0.5 g of the sample		
	Inorganic phosphate		Not more than 25% Test 0.5 g of the sample		
	Subsidiary colouring matter		Not more than 6% of each of free riboflavin and riboflavine disphosphate See description under TESTS Passes test for absence of lumiflavin		
	Primary aromatic amines		Not more than 70 mg/kg calculated as aniline		
	lead		Not more than 2 mg/kg Determine using an atomic absorption technique appropriate to the specified level.		

			The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental Methods."		
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Food color	Parameter	FSS	JECFA	BIS	USFDA
Tartrazine	Total dye content, corrected for Sample dried at 105±1oC for 2 hours, per cent by mass, Min	87		87	NO
	Loss on drying at 135oC and Chlorides and Sulphates expressed as sodium salt, percent by mass, Max	13	Not more than 15% together with chloride and sulfate calculated as sodium salts	13	
	Water insoluble matter, percent by mass, Max.	0.2	Not more than 0.2%	0.2	
	Combined ether extracts, percent by mass,max	0.2		0.2	
	Subsidiary dyes, percent by mass, Max.	1.0	Not more than 1% Use the following	1.0	

			<p>conditions:</p> <p>Developing solvent: No. 4</p> <p>Height of ascent of solvent front: approximately 12 cm</p>		
	Dye intermediates, percent by mass, Max.	0.5		0.5	
	Lead, mg/kg, Max.	10	<p>Not more than 2 mg/kg</p> <p>Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, "Instrumental Methods."</p>	10	
	Arsenic, mg/kg, Max.	3		3	
	Heavy metals, mg/kg, Max.	40		40	
	SOLUBILITY		<p>Soluble in water; sparingly soluble in ethanol</p>		
	Organic compounds other than coloring matters		<p>Not more than 0.5% sum of 4-Hydrazinobenzenesulfonic</p>		

			acid, 4-Aminobenzenesulfonic acid, 5-Oxo-1-(4-sulfophenyl)-2-pyrazoline-3-carboxylic acid, 4,4'-Diazoaminodi (benzenesulfonic acid), Tetrahydroxysuccinic acid Use HPLC under the following conditions: HPLC elution gradient: 2 to 100% at 2% per min (exponential)		
	<u>Un sulfonated primary aromatic amines</u>		Not more than 0.01% calculated as aniline		
	<u>Ether extractable matter</u>		Not more than 0.2%		

Food colour	parameter	FSS	JECFA	BIS	USFDA
Titanium dioxide	Purity as TiO ₂ , per cent. by mass, Min	99		99	
	Loss on drying at 105 0C for 3 hours, per cent. by mass, Max	0.5	Not more than 0.5% (105°, 3 h)	0.5	
	Loss on ignition (at 800 0C), per cent. by mass. Max	0.5	Not more than 1.0% (800o) on the dried basis	0.5	not more than 0.5 percent.
	Acid soluble substances, per	0.35	Not more than	0.35	

	cent. by mass, Max		0.5%; Not more than 1.5% for products containing alumina or silica. Suspend 5 g of the sample in 100 ml 0.5 N hydrochloric acid and place on a steam bath for 30 min with occasional stirring. Filter through a Gooch crucible fitted with a glass fibre filter paper. Wash with three 10-ml portions of 0.5 N hydrochloric acid, evaporate the combined filtrate and washings to dryness, and ignite at a dull red heat to constant weight.		
	Water soluble substances, per cent. by mass, Max	0.25	Not more than 0.5% Proceed as directed under	0.25	not more than 0.5 percent.

			acid-soluble substances (above), using water in place of 0.5 N hydrochloric acid.		
	Aluminium oxide and/or silicon dioxide (either singly or combined), per cent. by mass, Max	2.0	Not more than 2%, either singly or combined See descriptions under TESTS		
	Mercury, mg/kg, Max 1.0	1.0	Not more than 1 mg/kg Determine using the cold vapour atomic absorption technique. Select a sample size appropriate to the specified level	1	not more than 1 part per million
	Antimony, mg/kg, Max	2.0	Not more than 2 mg/kg See description under TESTS	2	not more than 2 parts per million
	Zinc, mg/kg, Max	50.0		50	
	Arsenic, mg/kg, Max	1.0	Not more than 1 mg/kg See description under TESTS	1	not more than 10 parts per million
	cadmium		Not more than 1 mg/kg See description		

			under TESTS		
	Lead, mg/kg, Max	2.0	Not more than 10 mg/kg See description under TESTS	10	not more than 10 parts per million
	Barium compounds, mg/kg, Max	3.0		5	
	Aluminium, mg/kg, Max	1.0.			
	Solubility		Insoluble in water, hydrochloric acid, dilute sulfuric acid, and organic solvents. Dissolves slowly in hydrofluoric acid and hot concentrated sulfuric acid.		

SECTION IV

NetProFaN (Network of professionals of Food and Nutrition)

NetProFaN or Network of Professionals of Food and Nutrition is the network of members affiliated with professional bodies like Indian Dietetic Association (IDA), Nutrition Society of India (NSI), Indian Medical Association (IMA), Association of Food Technologists and Scientists (AFSTI), Indian Federation of Culinary Associations (IFCA), and Association of Analytical Chemists, India Chapter (AoAC) who have come together to promote safe and healthy diets for over 130 crore people in India.

The **manifesto** of NetProFaN embodies the principles, objectives and activities developed by the joint effort of Food Safety and Standards Authority of India (FSSAI) and World Bank with the aim to promote health for all and help India achieve Sustainable Development Goals (SDGs) by the United Nations.

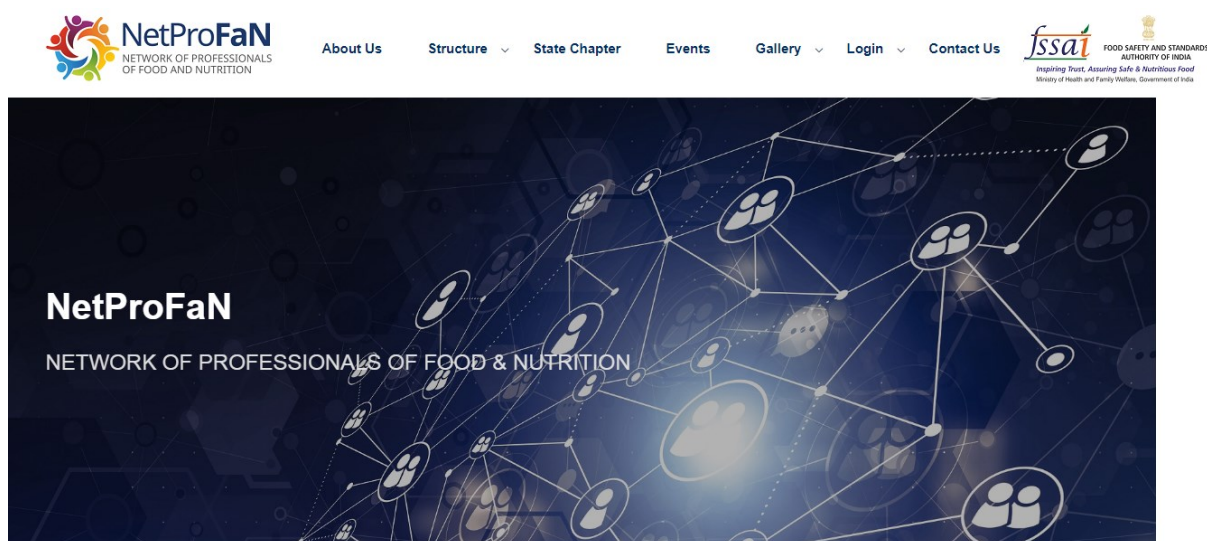
The document first explains the need for NetProFaN, highlights its key objectives and describes the six key thematic areas of action and aligns it with the SDGs. Further it provides suggestions for activities that can be carried out by members individually or as a part of a chapter. Next, it lays down the institutional structure and funding model of NetProFaN. Finally, it outlines a reward and recognition framework to incentives and motivates members.

Numbers of activities are suggested in the manifesto that can be carried out by the members chapters. Some of my suggestions for activities that can be included were as follows:

1. Chefs who are popular on social media, television, YouTube may be included in the network in order to reach out to more number of people.
2. Doctors may use TV screens, posters as a mode of education in Clinics.
3. Dieticians and nutritionists may participate in seminars/workshops that can be conducted for citizens and not only for people in the field.
4. Inclusion of Nutrition Counseling in health check-up camps.

REVIEW OF THE NetProFaN WEBSITE:

NetProFaN website will serve as a platform where activities performed by the members and state chapters can be uploaded by them. At the same time



State chapter details were collated and converted into excel sheets in order to create database for easy inclusion of data in the website.

Chapter Details

Sl.No	Committee Member Name	Professional Association	Email	Org Details	Convener Name	Convener Email	Co-Convener Name	Co-Convener Email
1	Nigar Fatma	IDA	nigar.hena@gmail.com	Dietician	Ghazala Matin	ghazala.diet11@gmail.com	Anamika Chandra	anamikachandra02@gmail.com
2	Indrani Kumari	IDA	singhindrani24@gmail.com	Dietician	Ghazala Matin	ghazala.diet11@gmail.com	Anamika Chandra	anamikachandra02@gmail.com
3	Nanda Verma	IDA	nandaverma001@gmail.com	Asst. Lecturer	Ghazala Matin	ghazala.diet11@gmail.com	Anamika Chandra	anamikachandra02@gmail.com
4	Akansha Sinha	IDA	sinhaak24@gmail.com	Radio Jockey	Ghazala Matin	ghazala.diet11@gmail.com	Anamika Chandra	anamikachandra02@gmail.com
5	Tabassum	IDA	Not Available	Hospital Manager	Ghazala Matin	ghazala.diet11@gmail.com	Anamika Chandra	anamikachandra02@gmail.com
6	Sneha Kumari	IDA	Not Available	Dietician	Ghazala Matin	ghazala.diet11@gmail.com	Anamika Chandra	anamikachandra02@gmail.com
7	Puja Singh	IDA	pujasingh200491@gmail.com	Dietician	Ghazala Matin	ghazala.diet11@gmail.com	Anamika Chandra	anamikachandra02@gmail.com
8	Dr. Arun kumar Singh	IMA	singharun2004@yahoo.co.in	Not Available	Ghazala Matin	ghazala.diet11@gmail.com	Anamika Chandra	anamikachandra02@gmail.com
9	Umesh Kumar	Not Available	Not Available	Journalist	Ghazala Matin	ghazala.diet11@gmail.com	Anamika Chandra	anamikachandra02@gmail.com
10	Dr. Rajat Chakarwarty	Not Available	Not Available	General Physician	Ghazala Matin	ghazala.diet11@gmail.com	Anamika Chandra	anamikachandra02@gmail.com

Work was done on designing login interface for Members, Convenor, and National Committee.

[/](#) [Login](#) [Contact Us](#)

Member Login

Convenor Login

National Committee

Home / LOGIN



Select State

[--Not Selected --]

User Name

Please Enter User Name

Password

Please Enter Password

Confirm Identity

Register

By logging in, member will be able to upload about his/her participation in events and activities performed by him/her along with his personal details. This will help keep a record about members and their participation in activities.

Below is how a member dashboard looks:

Member Dashboard

CONTENT CREATION under Membership Category / Logout

Person Name

Select State
[--Not Selected --]

Role Description

Activity Group
[--Not Selected --]

Upload Supporting Documents
 No file chosen

Person City

Person Email


Activity Name
[--Not Selected --]
Developed New Book
Developed New Video
Developed New Flyer/Poster/Brochure
Updation or Translation of Book
Updation or Translation of Video
Updation or Translation of Flyer/Poster/Brochure
Development/Compilation of Healthy Recipes
Contribute Scientific Articles
Games/Activity for Website and Outreach Events
Others

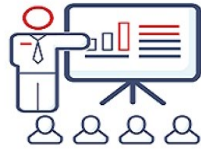
Convenor can approve those activities uploaded by the member and also upload their respective chapter's activities so that it can further be reviewed by steering committee.


NetProFaN Dashboard


Dashboard Services / Welcome, Delhi State Logout

Dashboard Home
Your Scores


CONTENT CREATION


TRAINING & CAPACITY BUILDING


MASS DISSEMINATION


OUTREACH ACTIVITY

Member of steering committee will be the one allocating marks for the activities.

NetProFaN Dashboard

National Committee Dashboard Logout

- [Dashboard Home](#)
- [Score Card](#)

CONTENT CREATION

Proceed

TRAINING and CAPACITY BUILDING

Proceed

MASS DISSEMINATION

Proceed

OUTREACH ACTIVITY

Proceed

Membership Dashboard Home Logout

Sl.No	Person Name	City	Email	State Code	Role Description	Activity Name	Credited Score	Status	Action
1	FDA	New Delhi	twary225@gmail.com	DL	AM	Organise and facilitate training programs for frontline	10	Accepted	
2	Pooja Ray	BENGALURU	twary225@gmail.com	BR	AM	Created Eat Right champions, health and wellness, coordinators at schools, university, workplaces	10	Rejected	
3	scfsdkljns	BENGALURU	vtwary672@gmail.com	DL	AM	Study visit for students to food labs, industries	10	Accepted	
4	Person	BENGALURU	pujajha0106@gmail.com	AP	CEO	Created Eat Right champions, health and wellness, coordinators at schools, university, workplaces	25	Accepted	
5	Test	DelhiCity Local Test	vtwary672@gmail.com	AP	DM	Updation or Translation of Video	10	Rejected	
6	Pooja Ray Test	BENGALURU	vtwary672@gmail.com	BR	DM	Faculty development workshop	10	Deactive	
7	Pooja Ray	BENGALURU	vtwary672@gmail.com	BR	Senior Manager	Media workshop	10	Accepted	
8	Pooja Ray	BENGALURU	vtwary672@gmail.com	DL	AM	Created Eat Right champions, health and wellness, coordinators at schools, university, workplaces	25	Rejected	
9	Shruti	Chhapra	shrutikm94@gmail.com	BR	Music Singer	FoS-TaC training	10	Rejected	
10	Shreya	Howrah	shreya@mamtajl.com	AP	Internship	Curriculum workshop	10	Deactive	
11	Joshita	New Delhi	joshita@gmail.com	DL	Project Co-ordinator	FoS-TaC training	25	Accepted	

Go Back

WAY FORWARD:

1. Login id and Password to be generated for members so that only members associated with associated professional bodies can access the member dashboard.

2. Details of remaining State chapters to be updated.
3. Dashboard for Top 5 chapters and Top 10 members to be designed.