Nutritional Data on Selected Food Products Consumed in Oman

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معا لغذاء آمن

This study was done :

- **with cooperation with:**
- WHO – EMRO
- Al Jisr Foundation

- **Research Team :**
- Nutrition Department
- Prof Jalila El Ati
- Dr Ayoub Al Jawaldah

- **Lab analysis was done in** :

United Integrated Laboratories – Barka

- What do we carry in our shopping carts each time we go to the hypermarket?

Objectives of the study :

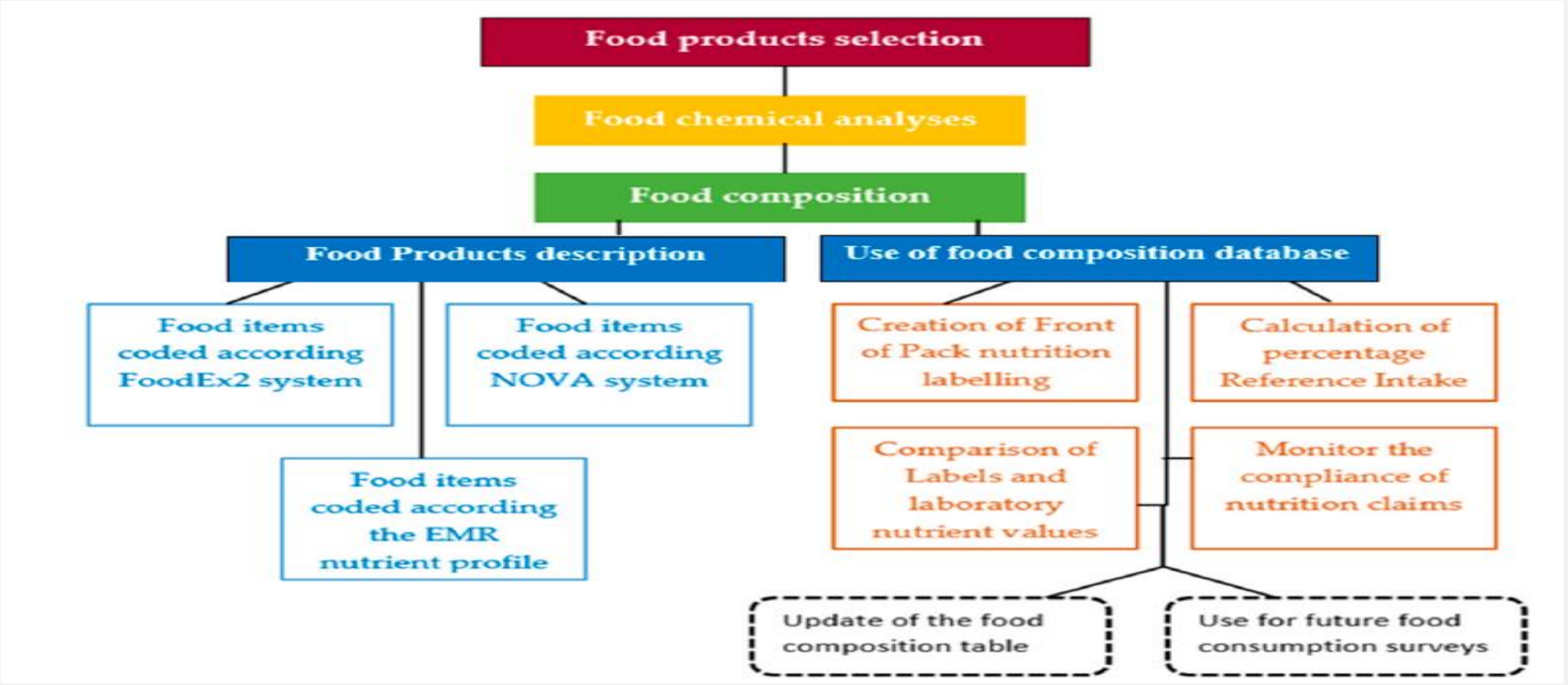
- (i) classify the selected food products based on their degree of processing and nutritional composition.
- (ii) compare labels with corresponding laboratory values.
- (iii) develop a Front-of-Pack nutrition labeling system as a critical tool for informing consumers about the nutritional content of purchased items .
- (iv) assess the contribution of these products to reference intake.
- (v) monitor the compliance of nutrition claims, when available.
- (vi) ultimately, serve as the cornerstone for the development of a comprehensive FCT specifically tailored for the country and for utilization in future food consumption surveys.

How do we Know what the people carry in their shopping carts ?

Identification of Food Products :

- The design, sampling and laboratory analyses were performed in 2022.
- Four of the big hyper markets from the Governorate of Muscat were contacted.
- One of those hypermarkets responded to us and sent us the list of all foods and drinks sold in the market, as this type of information is confidential for most markets.
- The list was sorted according to their sales rate, and the most consumed products were selected.
- The top 5 of food categories were selected and including the Omani brand.
- A final list of 221 food items selected .

Flow chart presents the design of the methods used to analyze the food composition data provided by laboratory analysis of the selected food products.



Analytical Parameters :

- For every food item, the contents of total fat (g), SFAs (g), polyunsaturated fatty acids (PUFAs) (g), monounsaturated fatty acids (MUFAs) (g), TFAs (g), carbohydrates (g), total nitrogen (g), total sugars (g), glucose (g), sucrose (g), maltose (g), lactose (g), and sodium (PUFAs) (g), monounsaturated fatty acids (MUFAs) (g), TFAs (g), carbohydrates (g), total nitrogen (g), total sugars (g), glucose (g), sucrose (g), maltose (g), lactose (g), and sodium (g) were analyzed.

- Official methods of analysis of :Association of Official Analytical Chemist (AOAC) were used to analyze nutrients in foods

Analytical methods of nutrient in food products

Test Parameters	UIL Method of Test	Reference Method
Total Fat (TF)	UIL-SOP-TECH-033	AOCS Official Method Ce 2-66, 2017 (23)
Saturated Fatty Acids (SFAs)	UIL-SOP-TECH-033	
Poly Unsaturated Fatty Acids (PUFAs)	UIL-SOP-TECH-033	
Monounsaturated Fatty Acids (MUFAs)	UIL-SOP-TECH-033	
Trans Fatty Acids (TFAs)	UIL-SOP-TECH-033	
Sodium (Na)[1]	UIL-SOP-TECH-008	Official methods of analysis of AOAC international, 2008 (24)
Total Sugar	UIL-SOP-TECH-023	Official methods of analysis of AOAC international, 2007 (25)
Glucose	UIL-SOP-TECH-023	
Fructose	UIL-SOP-TECH-023	
Sucrose	UIL-SOP-TECH-023	
Maltose	UIL-SOP-TECH-023	
Total Nitrogen[2]	UIL-SOP-TECH-014	Official methods of analysis of AOAC international, 2008. (26)
Carbohydrates	UIL-SOP-TECH-016	Official methods of analysis of AOAC international, 2002. (27)

- [1]. Salt values are calculated from total sodium (Na) value multiplied by sodium conversion factor: *Salt = Na*2.5* (8).
- [2]. Total protein values are derived from the total nitrogen (N) value multiplied by the nitrogen conversion factor: *Total protein = N*6.25* (8)
- Energy kcal (kJ) = [carbohydrates*4 kcal/g (17 kJ/g) + total fat*9 kcal/g (37 kJ/g) + protein*4 kcal/g (17 kJ/g) + fiber*2 kcal/g (4 kJ/g)

Use of food Compositions Database

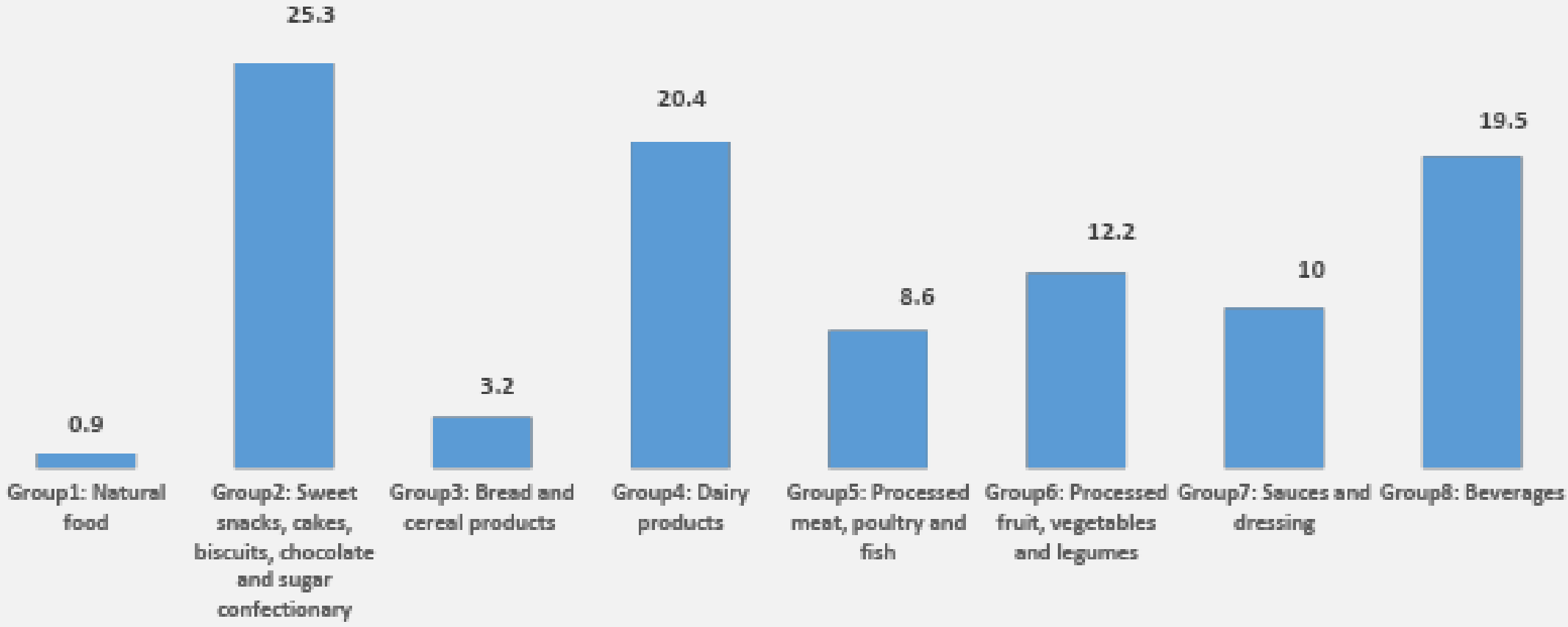
3. Comparison of Label and Laboratory nutrient values. For every food item, food labelling value is considered compliant with the analyzed value if this later value is within the lower and the higher tolerance of the declared value. European Commission, Health and Consumers Directorate-General. Labelling Nutrition Vitamins Minerals-Guidance Tolerances. 2012. Available online: https://food.ec.europa.eu/system/files/2016-10/labelling_nutrition-vitamins_minerals-guidance_ tolerances_1212_en.pdf (accessed on 12 August 2023).

Nutrient	Tolerances for food products
Protein, carbohydrates, sugars	<10 g/100 g: ± 2 g 10-40 g/100g: ± 20% >40 g/100 g: ± 8 g
Total Fat	<10 g/100 g: ± 1.5 g 10-40 g/100g: ± 20% >40 g/100 g: ± 8 g
Saturated fatty acids	<4 g/100g: ± 0.8 g ≥4 g/100 g: ± 20%
Sodium	<0.5 g/100g: ± 0.15 g ≥0.5 g/100 g: ± 20%
Trans Fatty Acids	Not exceed 2 g per 100 grams of fat

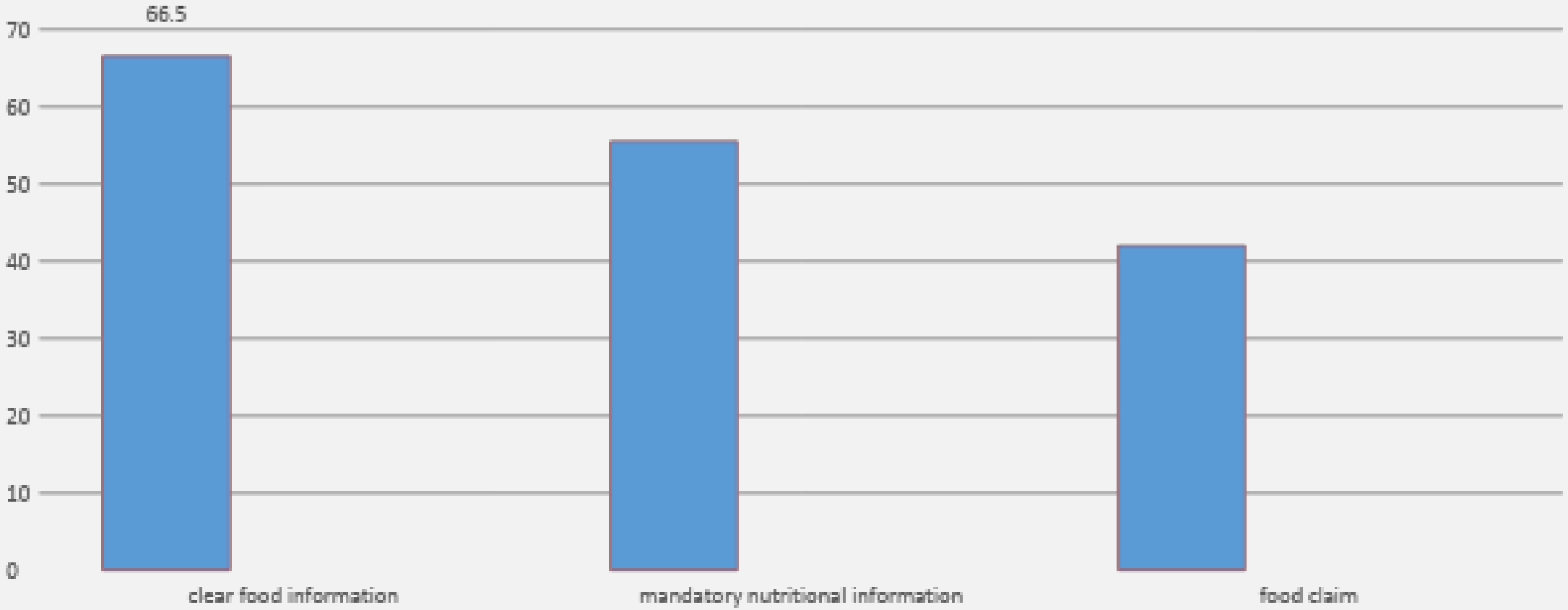
Nutrient	Conditions applying to nutrition claims
Low energy	The product does not contain more than 40 kcal (170 kJ)/100 g for solids or more than 20 kcal (80 kJ)/100 ml for liquids.
Sugar free	The product contains no more than 0.5 g of sugar per 100 g or 100 ml
Source of protein	At least 12 % of the energy value of the food is provided by protein
High protein	At least 20 % of the energy value of the food is provided by protein
Low salt	the product contains no more than 0,12 g of sodium, or the equivalent value for salt, per 100 g or per 100 ml

Results

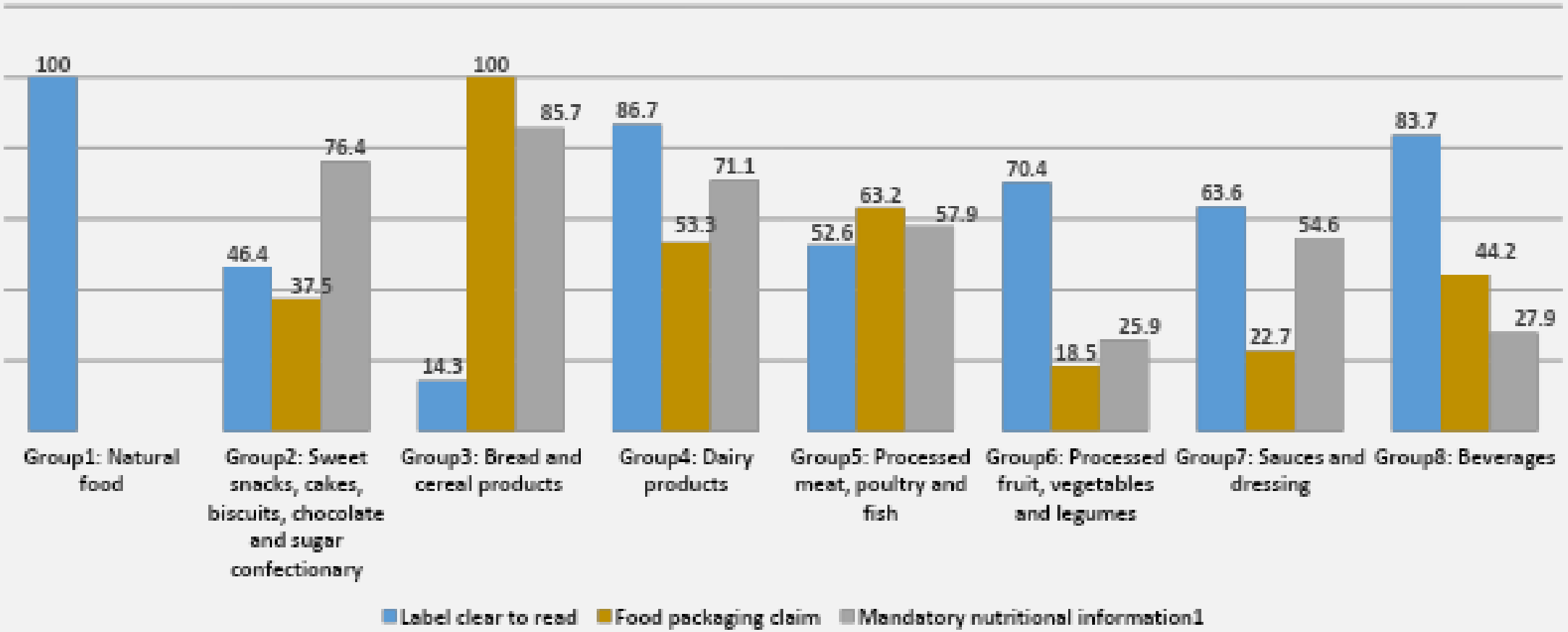
Proportion of Food products *description* were categorized into eight food groups



Proportion of nutrition components found on the product label



Proportion of nutrition components found on the product label by category of food groups



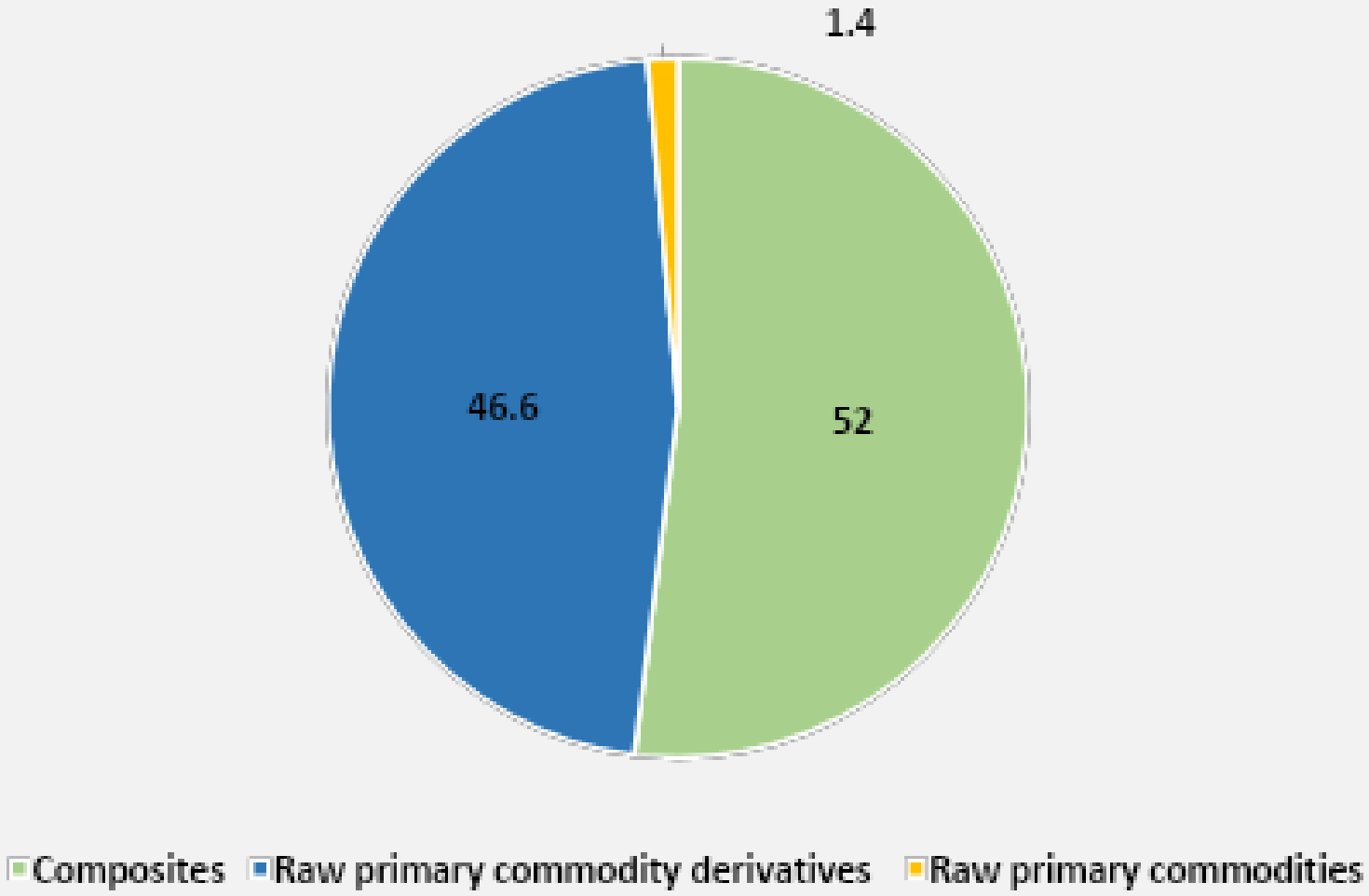
FoodEx2: a standardized system of Global Dietary Database and WHO/FAO GIFT, for classifying and describing food data .

1. Raw primary commodities (RPCs) :Parts of plants physically separated after harvesting or animals after slaughtering Processes not to change the nature of food (e.g. freezing) can be applied

1. RPC derivatives :Obtained from raw commodities applying processes changing the 'nature' of food

1. Composite foods :Obtained by: Multiple commodities and/or derivatives/ ingredients Processes. Always involve recipes

Percentage of food products analyzed laboratory according to FoodEx2 system



The NOVA Food Classification System

- Designed by Center for Epidemiological Studies in Health and Nutrition, School of Public Health, University of Sao Paulo, Brazil.
- “group foods according to the extent and purpose of the processing they undergo. Food processing as identified by NOVA involved physical, biological and chemical processes that occur after foods are separated from nature, and before they are consumed or used in the preparation of dishes and meals.”

GROUP 1: UNPROCESSED OR MINIMALLY PROCESSED FOODS

- Unprocessed or Natural foods are obtained directly from plants or animals and do not undergo any alteration following their removal from nature.
- Minimally processed foods are natural foods that have been submitted to cleaning, removal of inedible or unwanted parts, fractioning, grinding, drying, fermentation, pasteurization, cooling, freezing, or other processes that may subtract part of the food, but which do not add oils, fats, sugar, salt or other substances to the original food.

GROUP 2: OILS, FATS, SALT, AND SUGAR

- Group 2 is also called Processed Culinary Ingredients. These are products extracted from natural foods or from nature by processes such as pressing, grinding, crushing, pulverizing, and refining. They are used in homes and restaurants to season and cook food and thus create varied and delicious dishes and meals of all types.

GROUP 3: PROCESSED FOODS :

- Processed foods are products manufactured by industry with the use of salt, sugar, oil or other substances (Group 2) added to natural or minimally processed foods (Group 1) to preserve or to make them more palatable.

GROUP 4: ULTRA-PROCESSED FOODS :

- Ultra-processed foods are industrial formulations made entirely or mostly from substances extracted from foods (oils, fats, sugar, starch, and proteins), derived from food constituents (hydrogenated fats and modified starch), or synthesized in laboratories from food substrates or other organic sources (flavor enhancers, colors, and several food additives used to make the product hyper-palatable). Manufacturing techniques include extrusion, moulding and preprocessing by frying.

NOVA Food Classification

Unprocessed or minimally processed foods

Foods which did not undergo processing or underwent minimal processing technics, such as fractioning, grinding, pasteurization and others.

Processed culinary ingredients

These are obtained from minimally, processed foods and used to season, cook, and create culinary dishes.

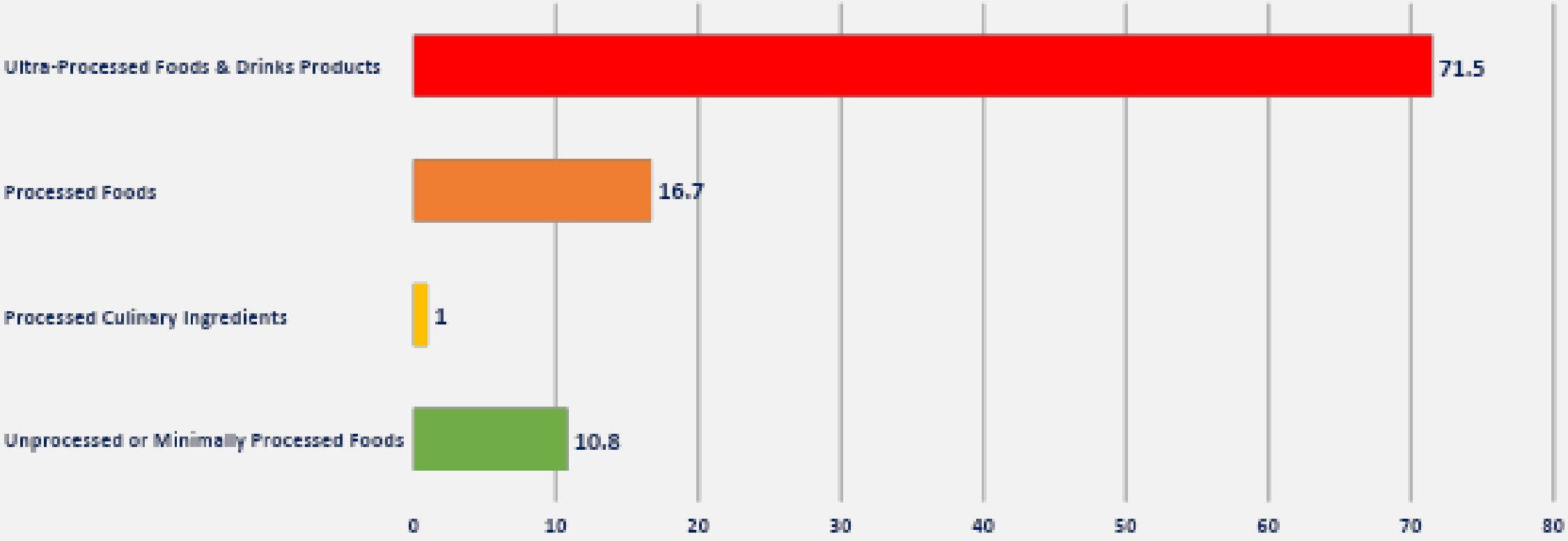
Processed foods

These are unprocessed or minimally processed foods or culinary dishes which have been added processed culinary ingredients. They are necessarily industrialized.

Ultra-processed foods

These are food products derived from foods or parts of foods, being added cosmetic food additives not used in culinary.

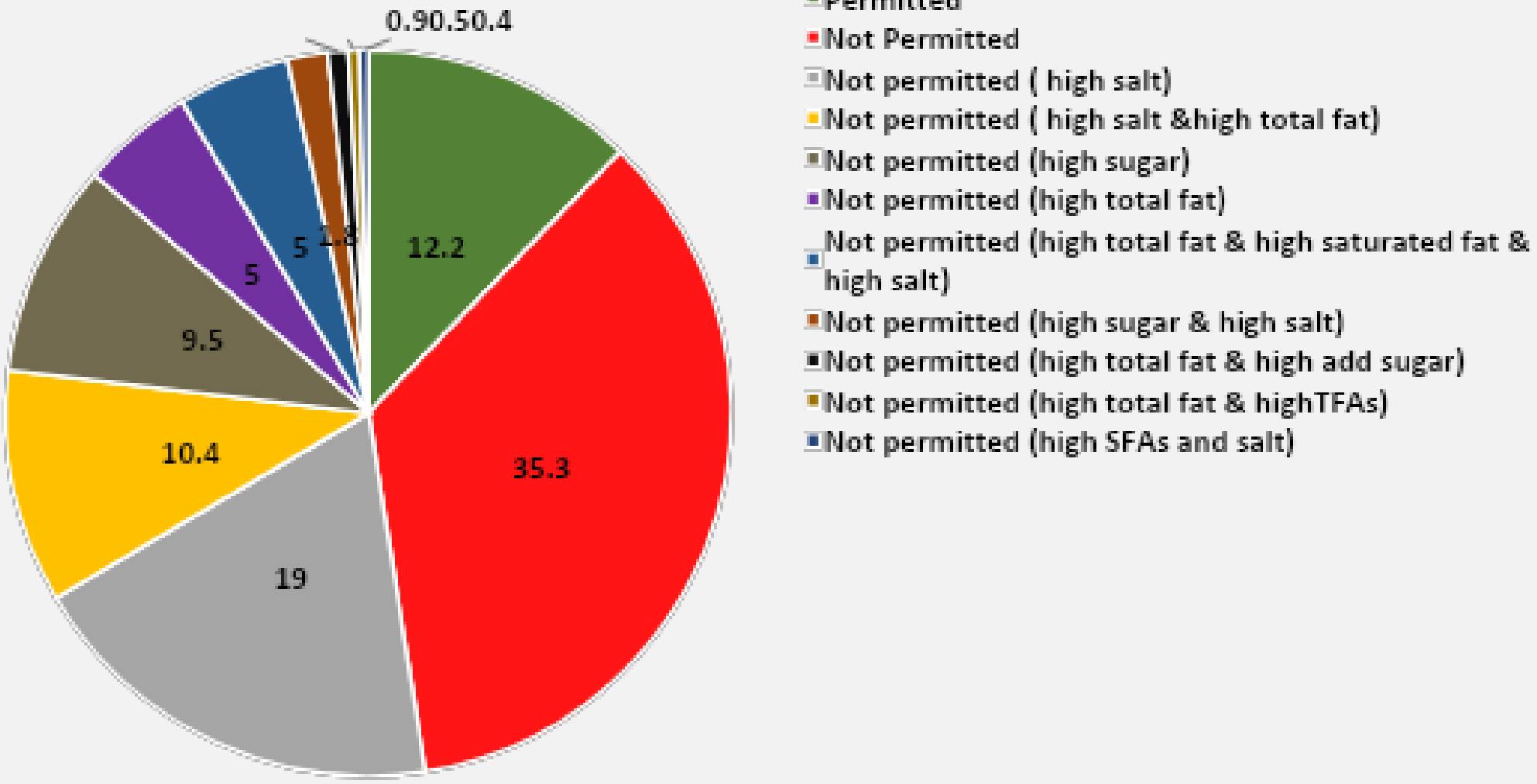
Frequency (%) of food products classed according to the NOVA system



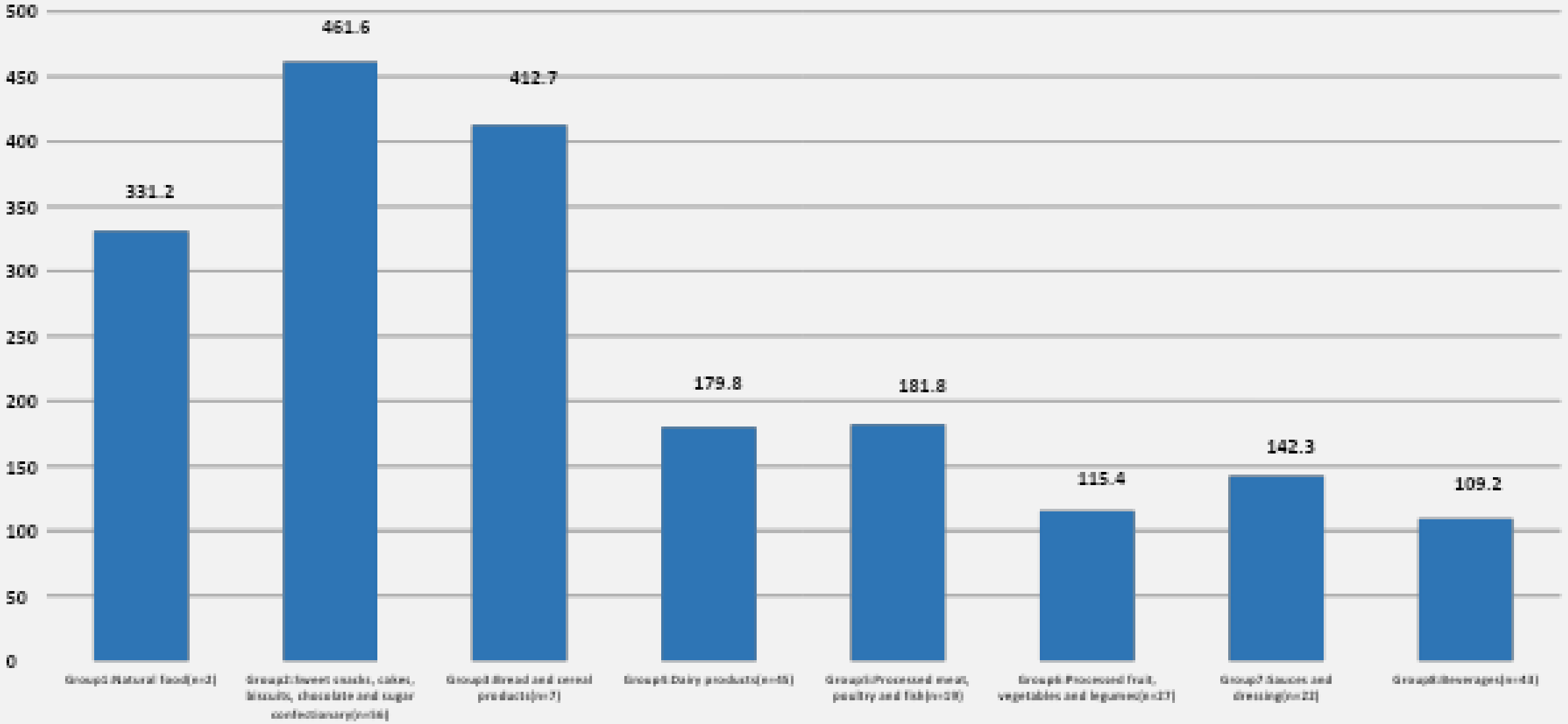
Nutrient Profile :

- Food items classified according the EMR nutrient profile The model consists of 18 food categories or groups for which thresholds have been established in relation to the energy, total fats, saturated fats, total sugars, added sugars, non-sugar sweeteners and salt.
- This model was used to classify our food items in three groups according the permission or not of their advertisement: “permitted”, “permitted subject to certain conditions” and “not permitted”

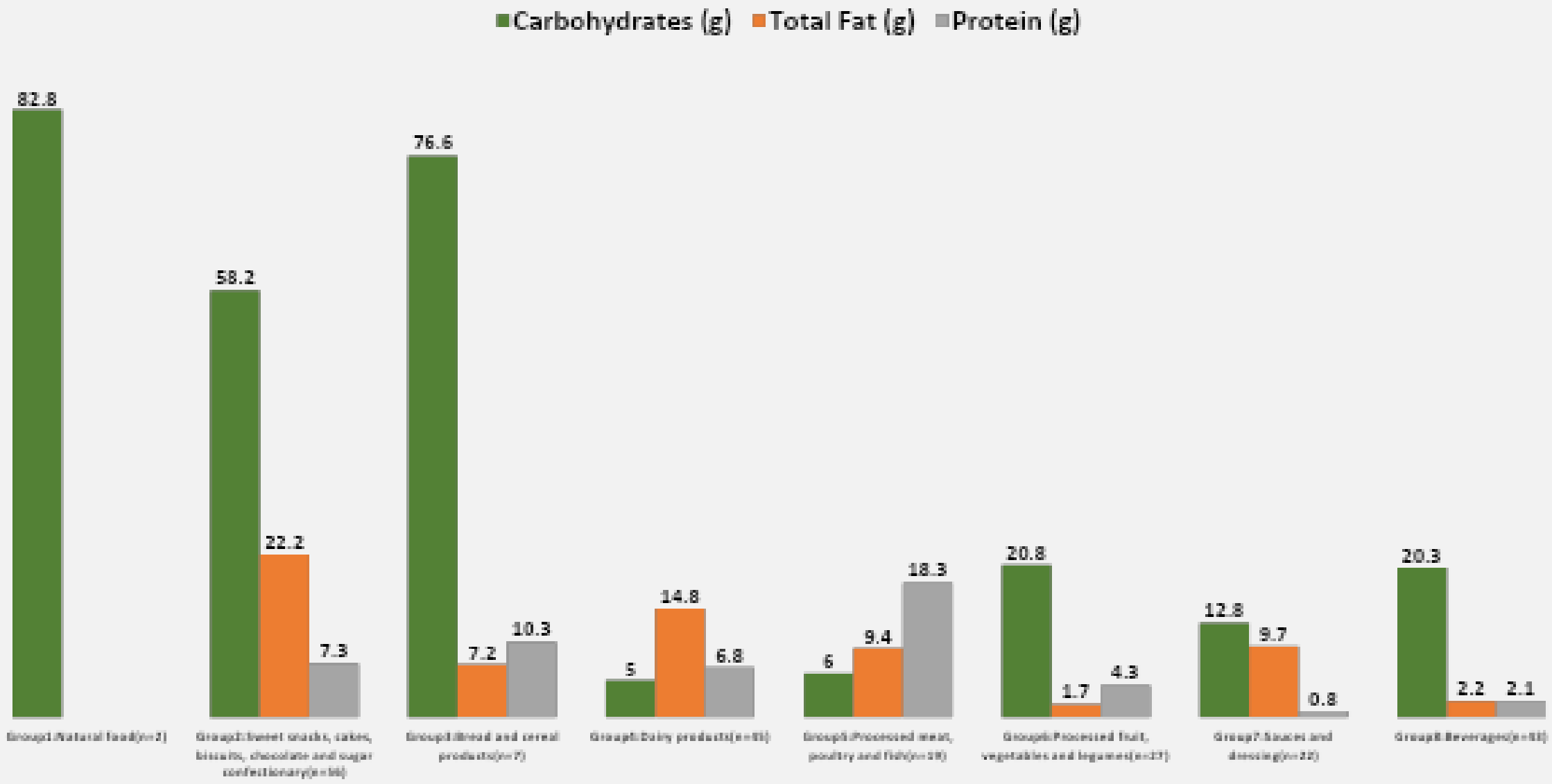
Frequency (%) of food products classed Marketing Permitted/not Permitted according the EMR nutrient profile



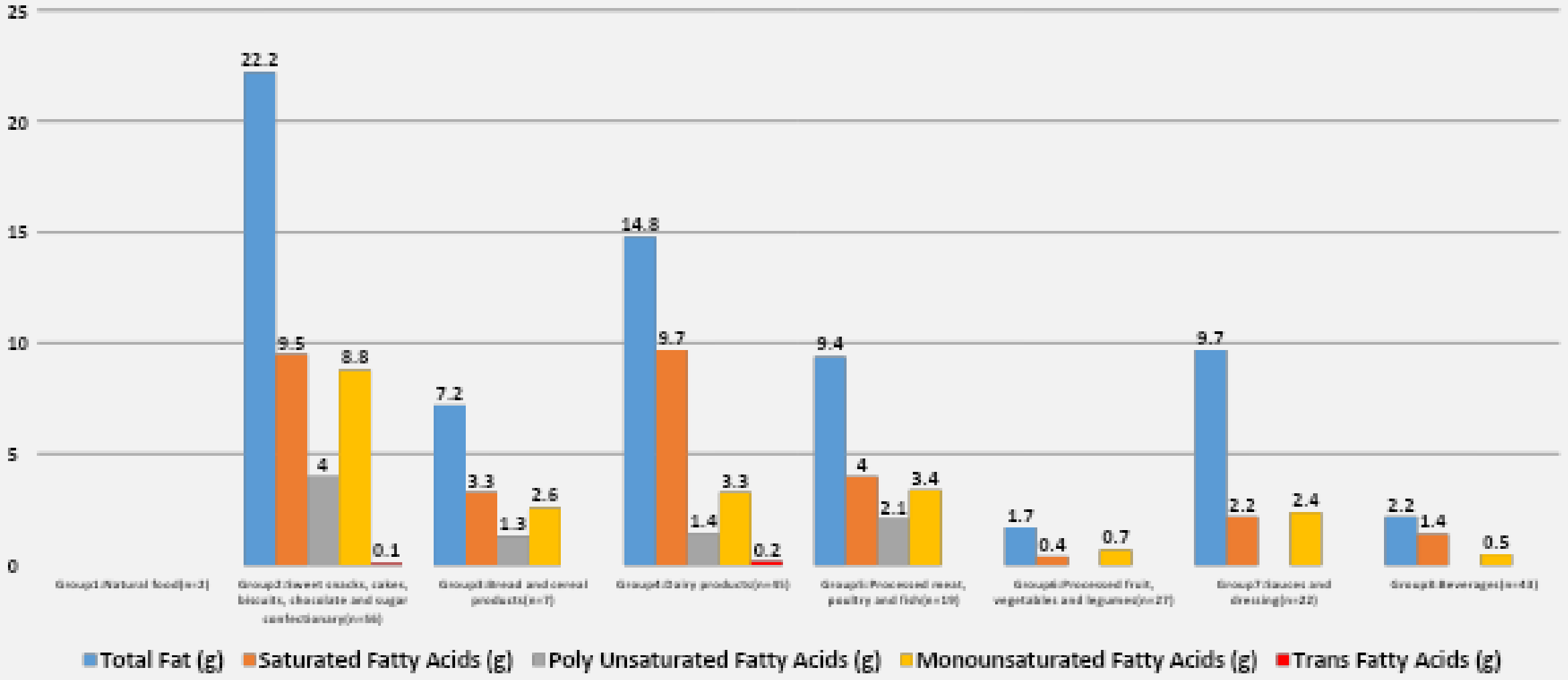
Mean of Energy(kcal) Per100 g edible portion of food products distributed into categories



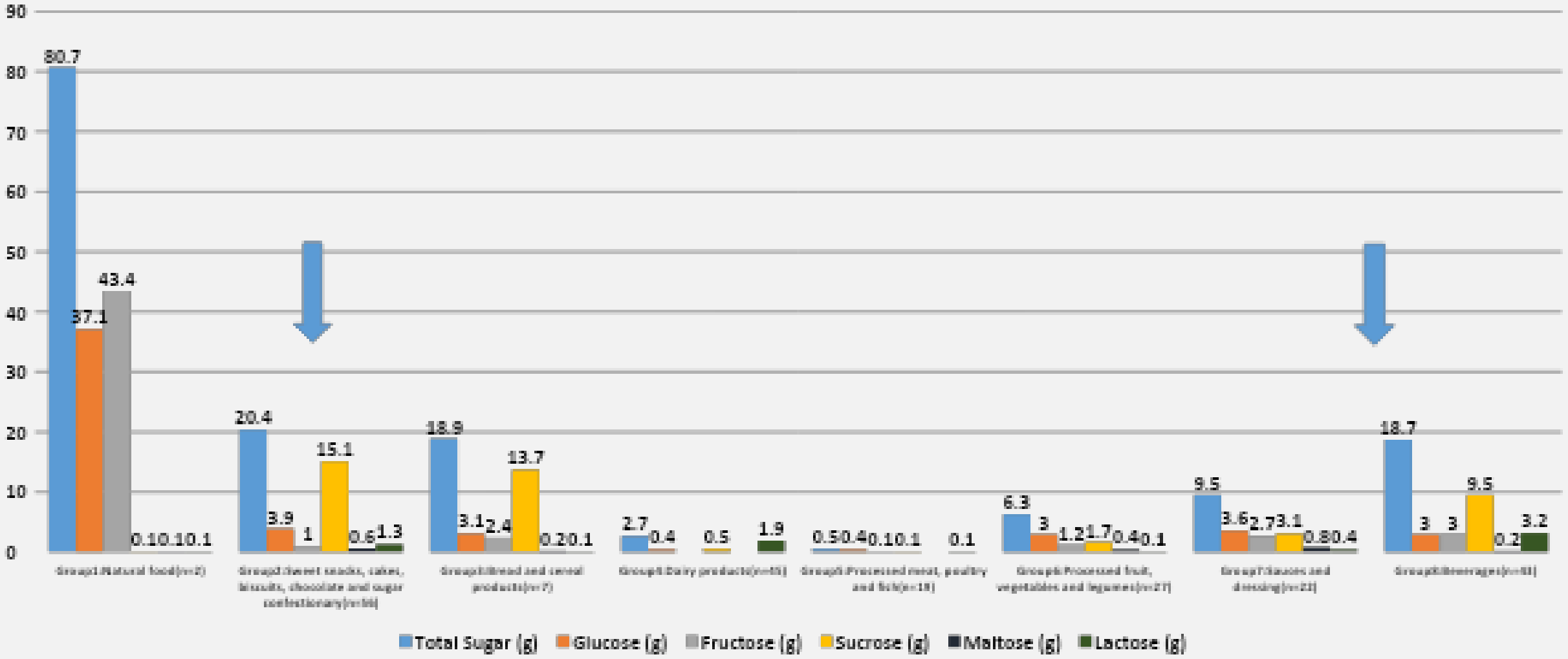
Mean of Carbohydrates (g), Total Fat (g),Protein (g) Per100 g edible portion of food products distributed into categories



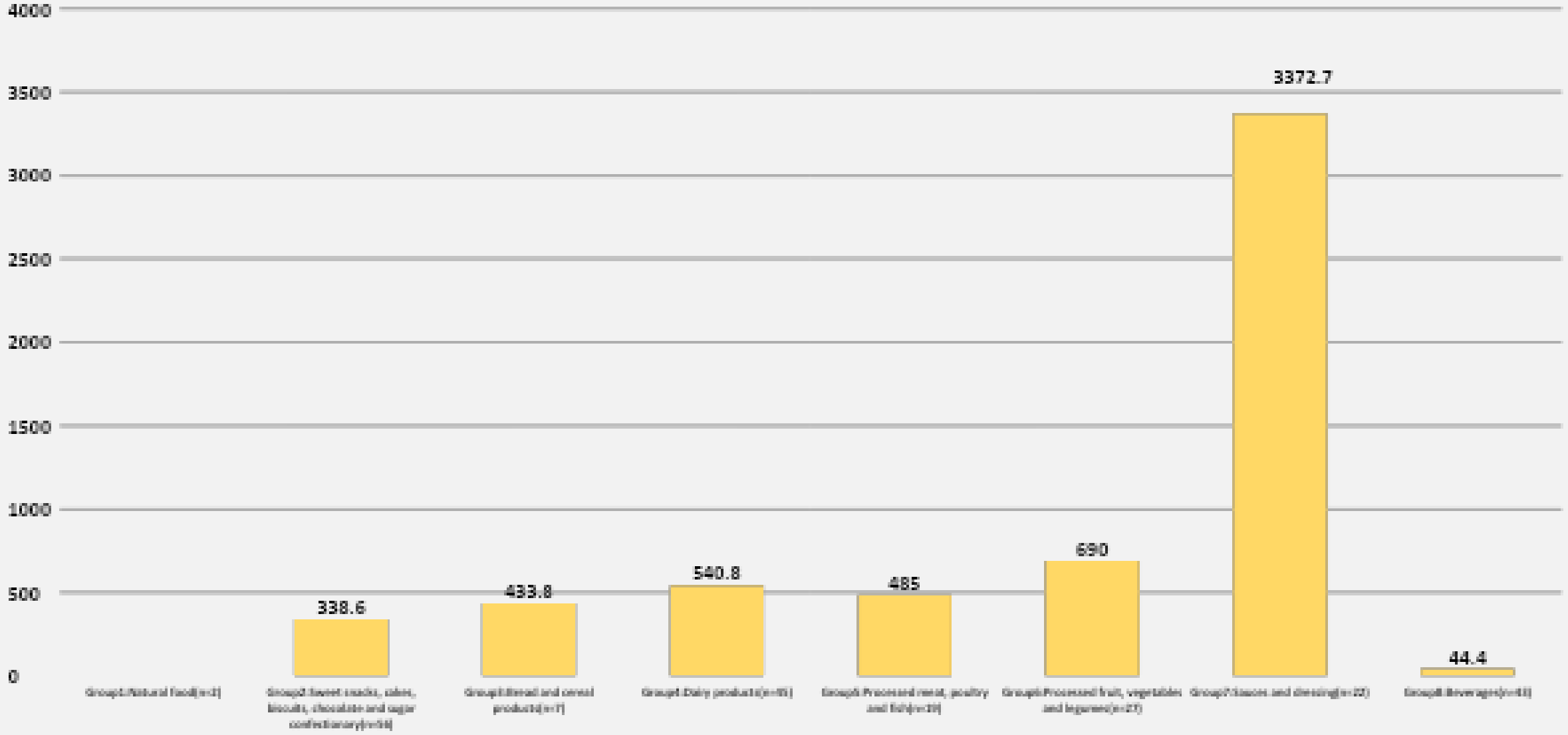
Mean of Types of Fat (g) Per100 g edible portion of food products distributed into categories



Mean of Types of Sugar (g) Per100 g edible portion of food products distributed into categories



Mean of Types of Sodium (mg)Per100 g edible portion of food products distributed into categories

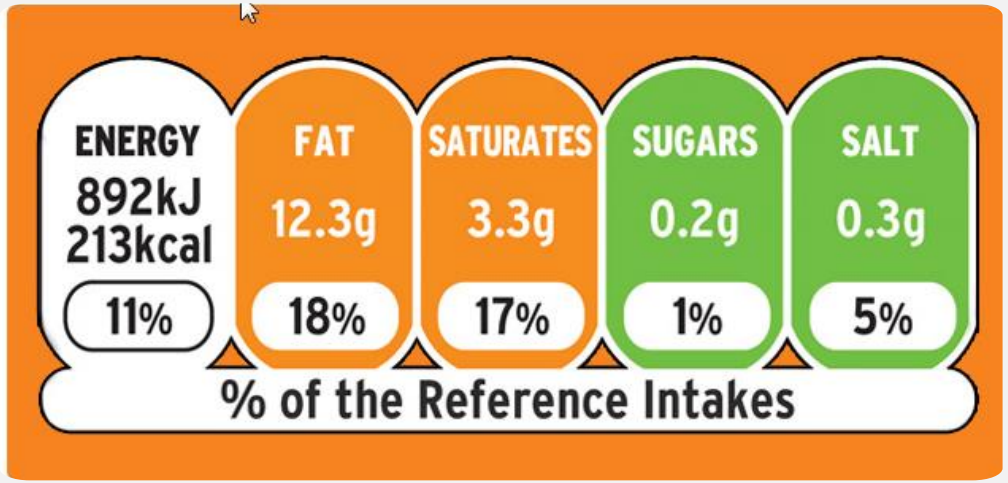


Percentage Reference Intake :

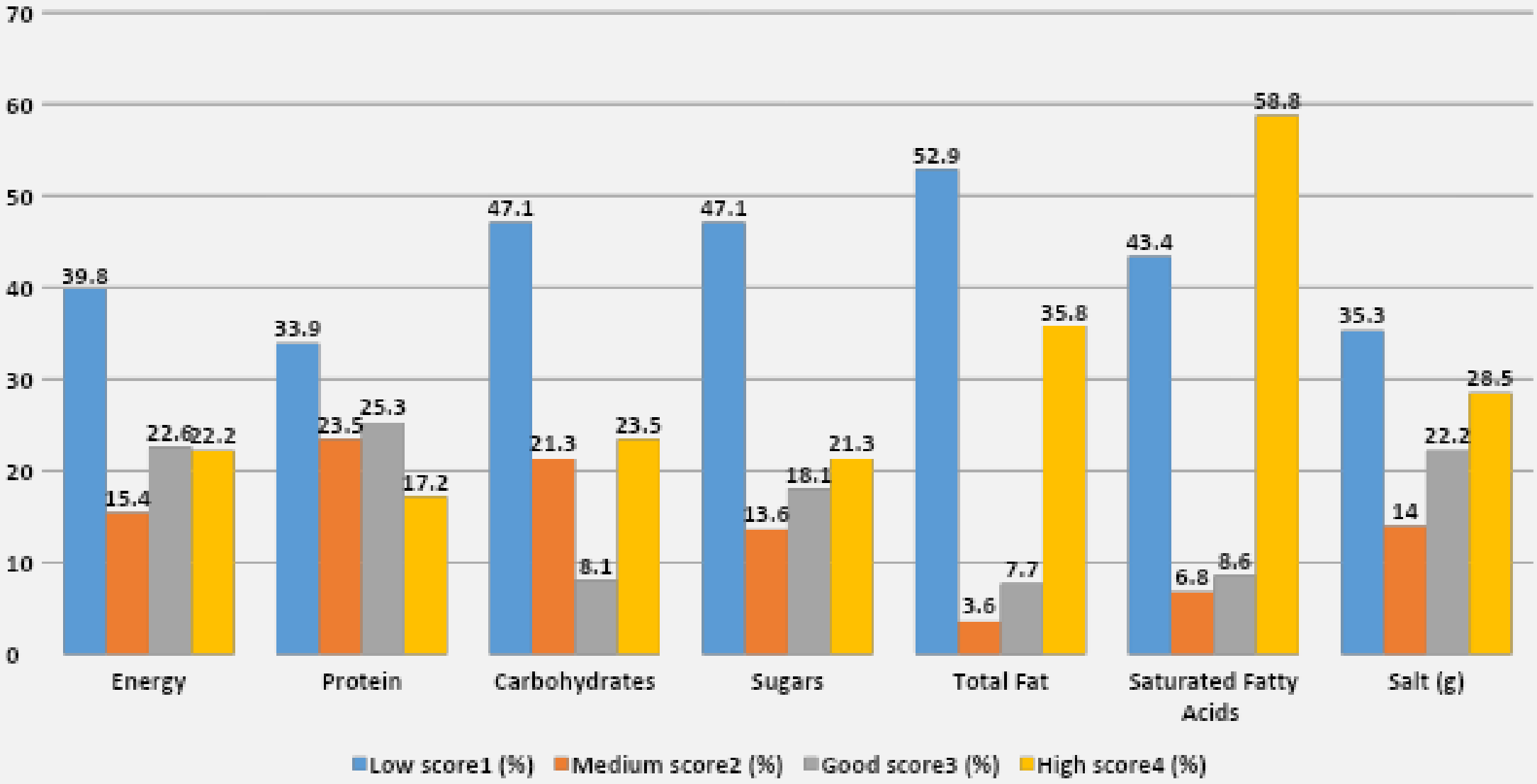
- RIs for fat, saturated fatty acids, sugars, and salt are the maximum amounts that should be consumed per day.

- Percentage reference intake (% RI) given per 100 g/mL of the product “as sold” using ‘Reference intake’ of an average adult (2000 kcal)

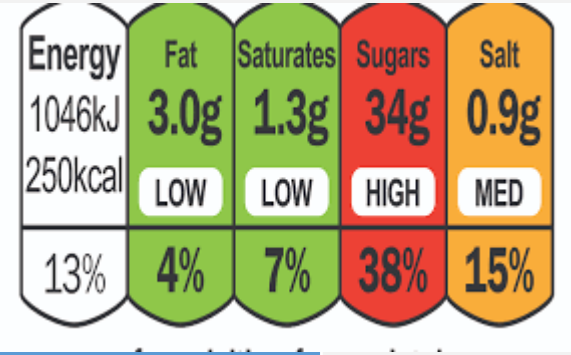
- The food item is considered :
- a high source of the considered nutrient if % RI is >20%,
- good source when % RI is between 11 and 20%,
- medium if % RI is between 5 and 10%, and
- low if % RI is <5%



Percentage of daily reference intake scores of analyzed food products



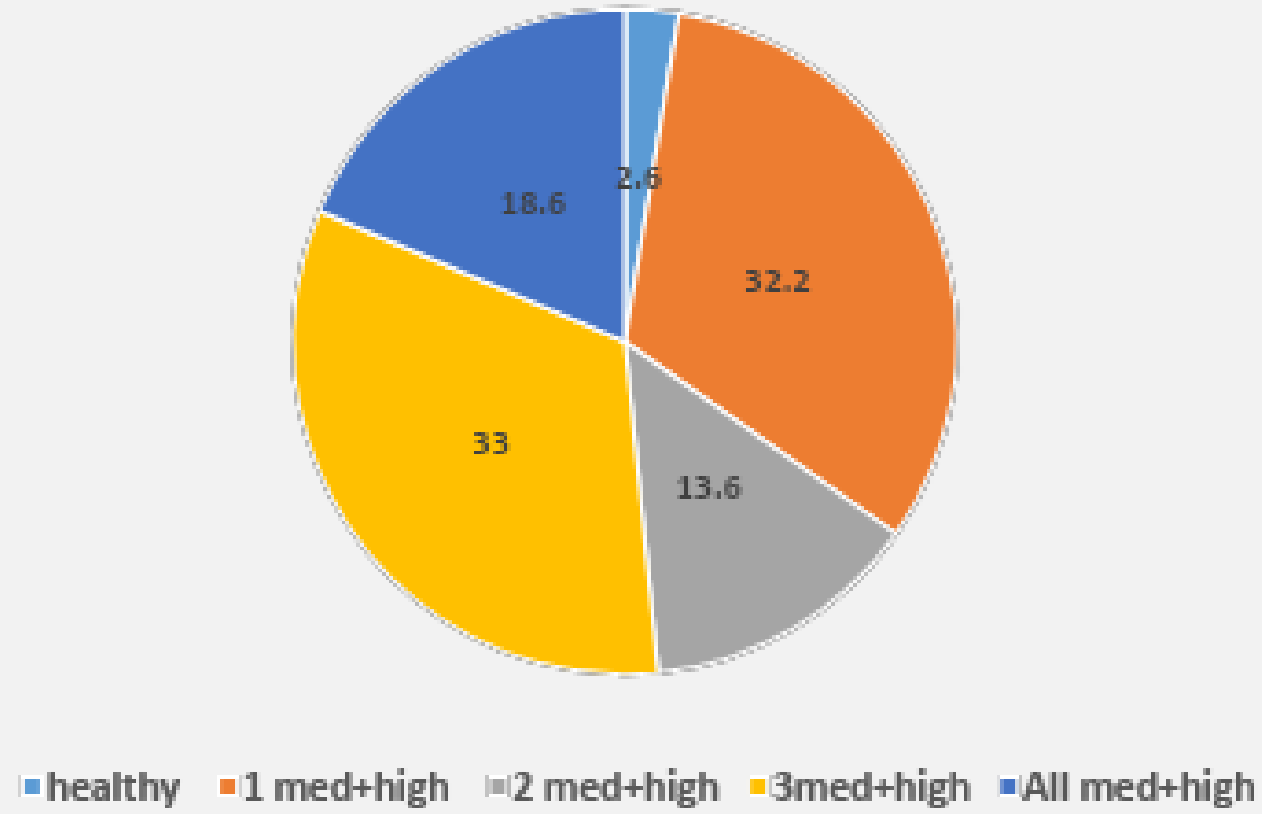
1. Creation of Front of Pack (FoP) nutrition labelling



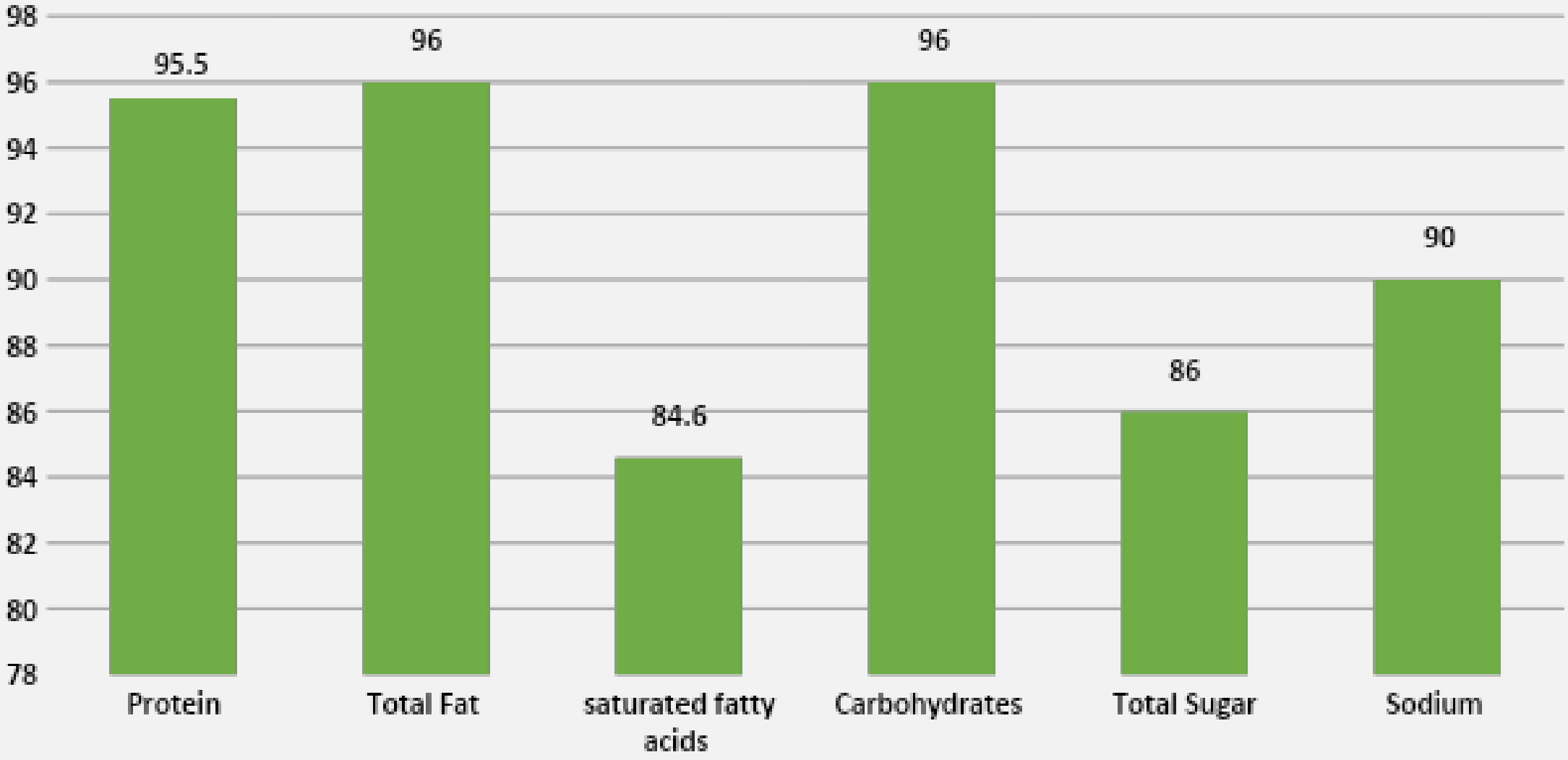
Food whether or not it is sold by volume						Drinks			
Text	LOW	MEDIUM	HIGH			LOW	MEDIUM	HIGH	
Color code	Green	Amber	Red			Green	Amber	Red	
			>25% of RIs	>30% of RIs				>25% of RIs	>30% of RIs
Total Fat	≤3.0 g/100g	>3.0 to ≤17.5 g/100g	>17.5 g/100g	>21 g/portion		≤1.5 g/100ml	>1.5 to ≤8.75 g/100ml	>8.75 g/100ml	>10.5 g/portion
SFAs	≤1.5 g/100g	>1.5 to ≤5.0 g/100g	>5.0 g/100g	>6.0 g/portion		≤0.75 g/100ml	>0.75 to ≤2.5 g/100ml	>2.5 g/100ml	>3.0 g/portion
Sugars	≤5.0 g/100g	>5.0 to ≤22.5 g/100g	>22.5 g/100g	>27 g/portion		≤2.5 g/100ml	>2.5 to ≤11.25 g/100ml	>11.25 g/100ml	>13.5 g/portion
Salt	≤0.3 g/100g	>0.3 to ≤1.5 g/100g	>1.5 g/100g	>1.8 g/portion		≤0.3 g/100ml	>0.3 to ≤0.75 g/100ml	>0.75 g/100ml	>0.9 g/portion

Department of Health, Food Standards Agency, Northern Ireland and Wales and British Retail Consortium. Guide to Creating a Front of Pack (FoP) Nutrition Label for Pre-Packed Products Sold through Retail Outlets. 2016. Available online: https://www.gov. uk/government/publications (accessed on 21 December 2023)

Front of Pack Nutrition Labeling :



Percentage of *Accurateness of the nutritional labels*

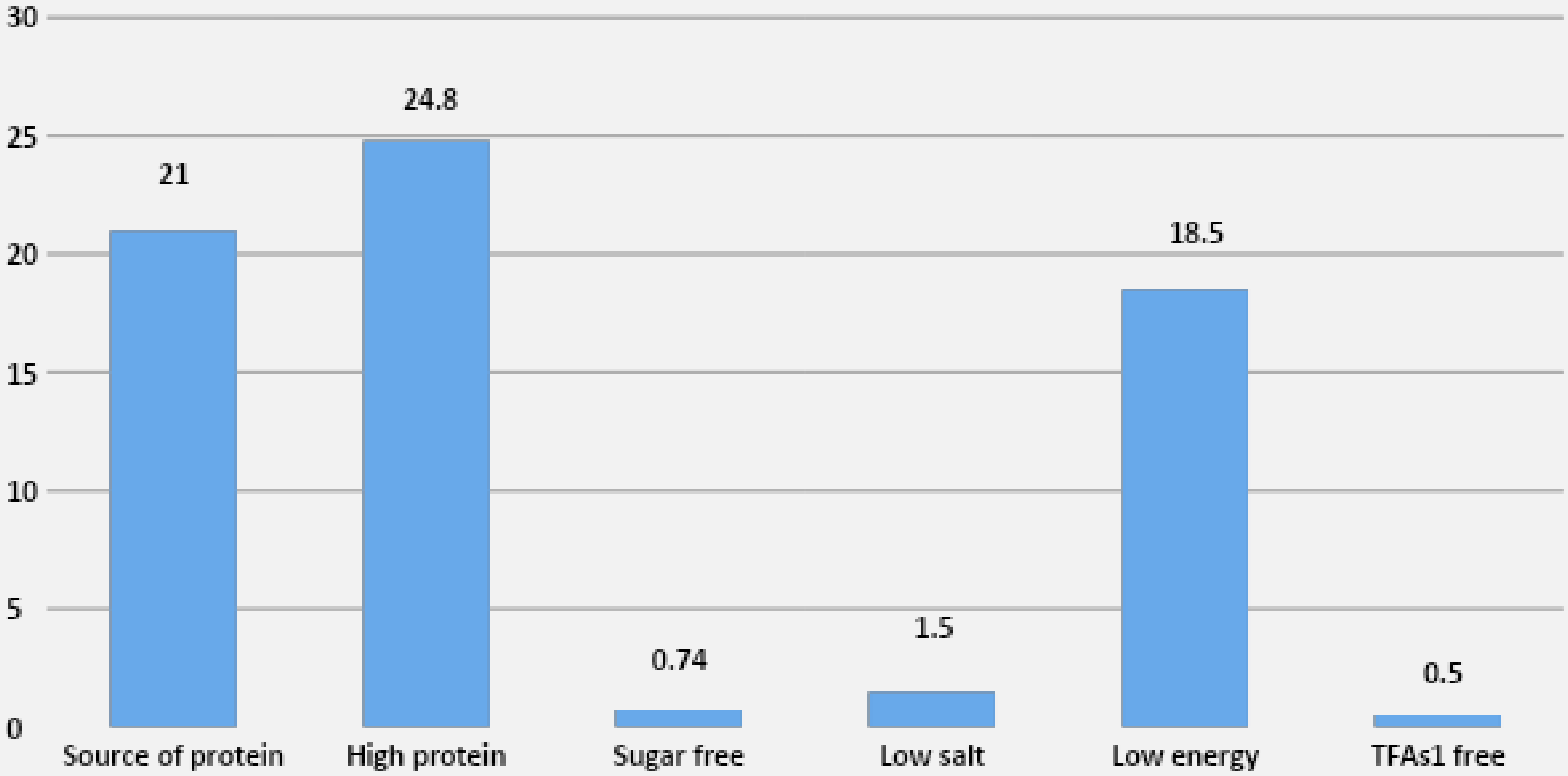


Monitors the compliance of nutrition claims

Table of Tolerances for food products with nutrition claims

Nutrient	Conditions applying to nutrition claims
Low energy	The product does not contain more than 40 kcal (170 kJ)/100 g for solids or more than 20 kcal (80 kJ)/100 ml for liquids.
Sugar free	The product contains no more than 0.5 g of sugar per 100 g or 100 ml
Source of protein	At least 12 % of the energy value of the food is provided by protein
High protein	At least 20 % of the energy value of the food is provided by protein
Low salt	the product contains no more than 0,12 g of sodium, or the equivalent value for salt, per 100 g or per 100 ml

Percentage *Accurateness of the nutrition claims*



Conclusion

The nutrient values stated on label generally align with the values obtained in the laboratory.

Among the tested food products in the study , the highest frequency (71.5%)consisted of UPFs.

Clear information data in the label was present in only 66% and 55% have the mandatory information with 40% have claims.

Only 2.4% of food products considered healthy according to NP.

The Publication :

- https://pubmed.ncbi.nlm.nih.gov/38472900/

foods

MDPI

Article

Nutritional Data on Selected Food Products Consumed in Oman: An Update of the Food Composition Table and Use for Future Food Consumption Surveys

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Abstract: Food composition data in the Eastern Mediterranean Region countries are often lacking, obsolete, or unreliable. The study aims to provide reliable nutrient data on food products consumed in Oman in order to evaluate their nutritional quality, the consistency of the nutrition labeling and claims, and, ultimately, the use for food consumption surveys and update the current food composition database. Contents of fat, fatty acids, carbohydrates, protein, sugars, and sodium were chemically analyzed in 221 foods and beverages. Products were classified according to their nutritional composition and the extent of processing and coded according to the FoodEx2 system. Labels and laboratory values were compared using the tolerance levels of the European Union. Results indicate that the nutrition labeling aligns with the values obtained in the laboratory, with the exception of 6.3% discrepancies in TFA content, where the reported values are higher than the appropriate reference values. The most frequent category (71.5%) was ultra-processed foods. In terms of inconsistencies in the nutritional claims, 5.1% of food products with claims did not comply with the statement "sugar-free" or "low salt". Our study provides evidence to support the necessity of comprehensive recommendations for consumers and food industries, which are aimed at enhancing the nutritional quality of products and augmenting consumer awareness.

Keywords: laboratory values; nutrition label; ultra-processed products; NOVA system; nutrient profile; FoodEx2 system; traffic light label

check for updates

Citation: Almaamari, S.; Al-Jawaldeh, A.; Al Ghammari, I.; Al Shammakhi, S.; Al Aamri, J.; El Ati, J. Nutritional Data on Selected Food Products Consumed in Oman: An Update of the Food Composition Table and Use for Future Food Consumption Surveys. *Foods* **2024**, *13*, 787. https://doi.org/10.3390/foods13050787

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1. Introduction

Food composition tables (FCT) are used for various sectors, including research, education, health, trade, agriculture, industry, and retailing, and are, therefore, useful in manifold ways, such as in nutritional surveillance, food consumption surveys, nutrition labeling, deciding a diet and disease evaluation challenges, developing school menus or standardizing meal planning, setting dietary guidelines, and even assessing the environmental impact of foods [1–7].

FCT provides information relating to the nutrient composition of foods, with specific reference to energy, major components (water, protein, fat, carbohydrate, alcohol, and ash), inorganic constituents, vitamins, and other components (flavonoids, phytoestrogens phytonutrients, additives, pesticides, and other residues). The nutrient values are either based on chemical analyses performed in analytical laboratories or calculated from the

- THE GOLDEN RULE:

“Always prefer natural or minimally processed foods and freshly made dishes and meals to ultra-processed foods.”

References :

- 1-European Commission, Health and Consumers Directorate-General. Labelling Nutrition Vitamins Minerals-Guidance Tolerances. 2012. Available online: https://food.ec.europa.eu/system/files/2016-10/labelling_nutrition-vitamins_minerals-guidance_ tolerances_1212_en.pdf (accessed on 12 August 2023).
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- https://pubmed.ncbi.nlm.nih.gov/38472900


Thank you