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Master Thesis

Development of the methodology and the structure of a branded food composition database in Greece: Aims, design and preliminary findings of the HelTH BFCD

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Supervisor: Prof. Kapsokefalou Maria

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«ΑΝΑΠΤΥΞΗ ΜΕΘΟΔΟΛΟΓΙΑΣ ΚΑΙ ΔΗΜΙΟΥΡΓΙΑ ΒΑΣΗΣ ΔΕΔΟΜΕΝΩΝ ΕΠΕΞΕΡΓΑΣΜΕΝΩΝ ΤΡΟΦΙΜΩΝ. ΣΥΛΛΟΓΗ ΔΕΔΟΜΕΝΩΝ ΕΠΙΣΗΜΑΝΣΗΣ ΤΡΟΦΙΜΩΝ ΚΑΙ ΚΑΤΑΧΩΡΗΣΗ ΤΟΥΣ.»

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Abstract

Background: Nowadays, processed foods can make up almost 70% of the total energy intake while the existing BFCDs are not capable of imprinting the variability of these products. Therefore, the need of a new tool to study this new environment has caused a worldwide move towards setting up such BFCDs. Common characteristic of the existing ones, is that they are results of partnerships. USDA BFCD, which is considered the gold standard, was published in 2016, while, the last downloadable release of the database, on August 2018, contained over 239,000 food items. In the European context, OQALI, the French database, set up in 2008, now contains almost 60,000 food products, covering all processed food sectors. In Greece, available are Mrs. Trihopoulou' s food composition tables, which were implemented in 1982, and their last edition was published in 2004, containing 300 Greek recipes and traditional foods, in total. This limited number of foods, leads to the usage of FCDBs of other countries as main sources of data, while Mrs. Trihopoulou' s FCTs are used additionally, for Greek traditional recipes. This fact underlines the existing gap in Greece, while the nutritional habits adapted, such as the turnover to ready-to-eat foods and the abandon of cooking, indicate the necessity of studying processed foods.

Aim: This study is the first systematic attempt to create a BFCD in Greece. Its first aim is the building of the database. The objectives are the development of the methodology and the structure of the database, the detection of the data sources and the filling of the database, and the pilot utility testing.

Methods: Firstly, literature research was carried out to understand the structure and the methodology of building up a BFCD, which was followed by the selection of the data to be collected and the creation of the files that constitute the database. The source of data is the products' label, while data is collected through the available photographs at the web store' s page of one of the largest supermarket chains in Greece. Data entry took place from November 2019 to January 2020. Data was entered and checked manually. Crowdsourcing was used during the data entry process. 23 students of the Department of Food Technology and Human Nutrition of the Agricultural University of Athens, were asked, after receiving a mini training course, to enter data, according

to the instruction of the respective Manual. The result of the methodology followed is the HELth BFCD (Hellenic thesaurus of Branded Food Composition Data).

Results: HELth' s structure is composed by four files (3 excel, 1 pdf); the description, nutrients', claims' file and the photobook. The online sales' platform contains 5,928 food products, of which 4,351 agree with the inclusion criteria. By now, at the HELth database, more than 2,000 food products have been entered, exceeding the 50% coverage of the online store. Specifically, the current status of the HELth database is; the categorization is based on the categorization used by EuroFIR at LanguaL. The 2,008 food products have been hierarchized in 13 categories, 23 subcategories and 66 food groups, while data exist for 44 nutrients, in total. Concerning to the completeness of the database per macronutrient per subcategory, for energy, protein and fat, is over 90%, for saturates and sugars over 85% and for carbohydrates and salt, over 78%. In contrast, trans are mentioned at the nutritional declaration at a nearly zero percentage, while the completeness of fibers seems to depend on the subcategory, as the percentages range from 0 to 100%. It is also observed that micronutrients, with a few exceptions, are mentioned exclusively at the nutrition declaration of fortified or foods constituting a natural source of them. Relatively to the prevalence of claims in labels, 4,1% of the products entered bear a nutrition claim, 32,4 % bears at least one nutrition claim, 32,4% a special diet claim, 23,9% a natural claim and 27% bears another claim that does not fit to anyone of the previous categories. 2,3% of the products are biological, no one of the products entered carries a quality scheme, 42,8% of the products declares its Greek origin, 5,2% of the products are for kids, and 16,5% is fortified. Finally, the wide ranges of the values of salt, total and saturated fats and sugars content indicate the variability of branded foods and so, the utility of the HELth BFCD' s existence.

Conclusions: The multiple uses of the HELth BFCD indicate its capacities. The compatibility to the European standards, the capability of its electronic availability and the fact that it remains an active project, constitute some of the main strengths of the database, while the limited timeline -as this action was part of my master thesis- was an important limitation. An opportunity, and a threat simultaneously, for the HELth BFCD is the need of collaborations, the achievement of which, can convert this database to a valuable key-tool for food policy to enhance public health, as well as for every imminent user.

Keywords: (Branded) Food Composition Database, branded food, processed food, food composition, food labelling, labels, nutrition declaration, public health, food reformulation, Front of Pack Labelling Systems

Περίληψη

Εισαγωγή: Στις μέρες μας, η κατανάλωση των επεξεργασμένων τροφίμων μπορεί να φτάσει έως και το περίπου 70% της συνολικής προσλαμβανόμενης ενέργειας. Την ίδια στιγμή, οι υπάρχουσες Βάσεις Δεδομένων Σύνθεσης Τροφίμων, δεν είναι ικανές να αποτυπώσουν την ποικιλομορφία των προϊόντων αυτών. Η ανάγκη λοιπόν δημιουργίας ενός νέου εργαλείου, που να επιτρέπει τη μελέτη του νέου περιβάλλοντος, έχει προκαλέσει τη δημιουργία βάσεων δεδομένων σύνθεσης επεξεργασμένων τροφίμων παγκοσμίως. Χρυσό κανόνα αποτελεί η βάση των Ηνωμένων Πολιτειών, η οποία δημιουργήθηκε το 2016, ενώ στην τελευταία διαδικτυακή έκδοσή της, το 2018, περιείχε περισσότερα από 239.000 τρόφιμα. Για τα ευρωπαϊκά δεδομένα, το OQALI, η γαλλική βάση δεδομένων επεξεργασμένων τροφίμων, δημιουργήθηκε το 2008, ενώ πλέον περιέχει περίπου 60.000 τρόφιμα, καλύπτωντας όλους τους τομείς των επεξεργασμένων τροφίμων. Στην Ελλάδα, διαθέτουμε τους πίνακες σύστασης της κας Τριοπούλου, οι οποίοι δημιουργήθηκαν το 1982, ενώ η τελευταία έκδοση τους δημοσιεύθηκε το 2004. Αποτελούνται από συνολικά 300 ελληνικές συνταγές, και παραδοσιακά τρόφιμα. Ο περιορισμένος όμως αριθμός των τροφίμων, οδηγεί στη χρησιμοποίηση ξένων Βάσεων Δεδομένων ως βασική πηγή πληροφοριών κατά τη διατροφική αξιολόγηση, ενώ οι πίνακες αυτοί χρησιμοποιούνται συμπληρωματικά, για τις ελληνικές παραδοσιακές συνταγές. Το γεγονός αυτό υπογραμμίζει το υπάρχον κενό στην Ελλάδα, ενώ οι διατροφικές συνήθειες που έχουν υιοθετηθεί τα τελευταία χρόνια, όπως η στροφή προς το έτοιμο φαγητό και η εγκατάλειψη του μαγειρέματος στο σπιτι, υποδεικνύουν την ανάγκαιότητα της μελέτης των επεξεργασμένων τροφίμων.

Σκοπός: Η παρούσα μελέτη αποτελεί την πρώτη συστηματική προσπάθεια δημιουργίας μίας βάσης δεδομένων σύνθεσης τυποποιημένων τροφίμων στην Ελλάδα. Πρωταρχικό σκοπό αποτελεί το χτίσιμο της βάσης. Στόχοι είναι η ανάπτυξη της μεθοδολογίας και της δομής της, η ανίχνευση των πηγών δεδομένων και το γέμισμά της, καθώς και η πιλοτική εξέταση της χρησιμότητάς της.

Μεθοδολογία: Αρχικά διεξήχθη βιβλιογραφική ανασκόπηση για την κατανόηση της δομής και του τρόπου χτισίματος μίας βάσης δεδομένων σύνθεσης τυποποιημένων τροφίμων. Στη συνέχεια, ακολούθησε η επιλογή των δεδομένων που επρόκειτο να συλλεχθούν και η δημιουργία των φακέλων που αποτελούν τη βάση. Πηγή των δεδομένων είναι οι ετικέτες των τροφίμων, ενώ τρόπος συλλογής τους, οι διαθέσιμες φωτογραφίες που υπάρχουν στο διαδικτυακό κατάστημα μίας από τις μεγαλύτερες ελληνικές αλυσίδες σούπερ μάρκετ (ΑΒ Βασιλόπουλος). Η καταχώρηση των δεδομένων διήρκησε από το Νοέμβριο του 2019 έως και τον Ιανουάριο του 2020. Τα δεδομένα καταχωρήθηκαν, και ελέγχθηκαν χειρονακτικά. Στην καταχώρηση συμμετείχαν και 23, μεταπτυχιακοί κυρίως, φοιτητές του Τμήματος Επιστήμης των Τροφίμων και Διατροφής του Ανθρώπου του ΓΠΑ. Το‘crowdsourcing’ είναι μία σχετικά νέα μεθοδολογία που έχει χρησιμοποιηθεί για το γέμισμα και την επικαιροποίηση μεγάλων βάσεων δεδομένων που χρησιμοποιούνται κυρίως σε εφαρμογές όπως το FoodSwich, το ‘diet tracking’ και το ‘my fitness pall’. Αποτέλεσμα

των προηγούμενων βημάτων αποτελεί η HELth BFCD (ελληνικό αποθετήριο δεδομένων σύνθεσης τυποποιημένων τροφίμων).

Αποτελέσματα:. Η δομή της HELth συνίσταται σε 4 φακέλους (3 excel, 1με pdf): τον φάκελο περιγραφής, θρεπτικών, ισχυρισμών και το photobook. Από το ηλεκτρονικό κατάστημα του ΑΒ Βασιλόπουλος, το οποίο περιλαμβάνει 5.928 τρόφιμα, τα 4.351 συμφωνούν με τα κριτήρια συμπερίληψής τους στη βάση. Στην HELth αυτή τη στιγμή έχουν καταχωρηθεί περισσότερα από 2.000 τρόφιμα, ξεπερνώντας το 50% σε κάλυψη του διαδυκτιακού καταστήματος. Συγκεκριμένα, η παρούσα κατάσταση της HELth, αποτυπώνεται ως εξής: Η κατηγοριοιποίηση έχει βασιστεί στην κατηγοριοποίηση του EuroFIR στη LanguaL. Τα 2008 τρόφιμα έχουν ιεραρχηθεί σε 13 κατηγορίες, σε 23 υποκατηγορίες και 66 ομάδες τροφίμων, ενώ δεδομένα υπάρχουν για συνολικά 44 θρεπτικά. Όσον αφορά την πληρότητα της βάσης ανα μακροθρεπτικό ανά υποκατηγορία, για την ενέργεια, την πρωτεΐνη και τα λιπαρά είναι μεγαλύτερη από 90%, για τα κορεσμένα και τα σάκχαρα, μεγαλύτερη από 85% και για τους υδατάνθρακες και το αλάτι μεγαλύτερη από 78%. Αντιθέτως, η αναγραφή των τρανς είναι μηδενική σχεδόν σε όλες τις υποκατηγορίες τροφίμων, ενώ η πληρότητα των φυτικών ινών φαίνεται να εξαρτάται από την υποκατηγορία, με διακύμανση από 0 έως και 100%. Παρατηρείται επίσης ότι τα μικροθρεπτικά, εκτός ελαχίστων εξαιρέσεων, αναγράφονται στη διατροφική δήλωση μόνο στις περιπτώσεις των εμπλουτισμένων τροφίμων ή όταν το προϊόν είναι φυσική πηγή κάποιου. Σχετικά με τον επιπολασμό ισχυρισμών στις ετικέτες, το 4,1% φέρει κάποιον ισχυρισμό υγείας, το 32,4% έναν τουλάχιστον ισχυρισμό διατροφής, το 32,4% ισχυρισμό ειδικής διατροφής, το 23,9% ισχυρισμό για τη φυσικότητα του προϊόντος, το 27%, κάποιον άλλο ισχυρισμό που δεν εμπίπτει σε καμία από τις προηγούμενες κατηγορίες. Βιολογικά είναι το 2,3% των προϊόντων, κανένα από τα 2008 προϊόντα δεν φέρει σήμα ποιότητας, την ελληνική τους προέλευση δηλώνουν το 42,8% των προϊόντων, σε παιδιά απευθύνεται το 5,2% και εμπλουτισμένα είναι το 16,5%. Όλα τα προϊόντα διαθέτουν τουλάχιστον μία φωτογραφία της εμπρόσθιας όψης τους, στον αντίστοιχο φάκελό τους, στο photobook. Τέλος, τα μεγάλα εύρη τιμών της περιεκτηκότητας σε αλάτι, ολικά και κορεσμένα λιπαρά και σάκχαρα, φανερώνουν την ποικιλομορφία των επεξεργασμένων τροφίμων και συνεπώς τη χρησιμότητα ύπαρξης της HELth.

Συμεράσματα: Οι πολυάριθμες πιθανές χρήσεις της HELth, αναδεικνύουν τις δυνατότητες αυτής της βάσης. Επιπλέον πλεονεκτήματα αποτελούν η συμβατότητά της με τα ευρωπαϊκά πρότυπα, η δυνατότητα ηλεκτρονικής διαθεσιμότητάς της, καθώς και το ότι παραμένει ένα ενεργό project. Βασικό περιορισμό αποτέλεσε το στενό χρονοδιάγραμμα, αφού η δράση αυτή διεξήχθη στα πλαίσια της διπλωματικής μου μελέτης. Ευκαιρία και απειλή για την HELth αποτελεί η ανάγκη συνεργασιών, η επίτευξη των οποίων θα μπορούσε να τη μετατρέψει σε ένα πολύτιμο εργαλείο-κλειδί για την άσκηση διατροφικής πολιτικής προς όφελος της δημόσια υγεία, καθώς επίσης και για κάθε επικείμενο χρήστη της.

Λέξεις-κλειδιά: Βάση Δεδομένων Σύνθεσης Τυποποιημένων Τροφίμων, επεξεργασμένα τρόφιμα, σύνθεση των τροφίμων, επισήμανση, ετικέτες, διατροφική δήλωση, δημόσια υγεία

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Acronyms

ANSES	French Agency for Food, Environmental and Occupational Health & Safety
AOAC	Association of Official Analytical Chemists
ARS	Agricultural Research Service
BFCD	Branded Food Composition Database
BFPD	Branded Food Products Database
BOP	Back of Pack
EuroFIR	European Food Information Resource
FCDB	Food Composition Database
FCT	Food Composition Table
FOP	Foront of Pack
FSVO	Federal Food Safetyand Veterinary
GS1	Global Standard 1
GDSN	Global Data Synchronization Network
ILSI	International Life Sciences Institute
INRA	the French National Institute for Agricultural Research
MTL	Multipple Traffic Lights
NCDs	Non Communicable Diseases
NES	National Supplement Database
NethFIR	Netherland Food Information Resource
NEV0	Dutch Food Composition Data
NGO	Non Governmental Organization
NIP	Nutrient Information Panel
NUBEL	Nutrients of Belgium
OQALI	French Observatory of Food Quality
PHE	Public Health England
RIS	
RIVM	Dutch National Institute for Public Health and the Environment

UK	United Kingdom
UNIPAD	Unilever Dietary Analysis Program
USA	United States of America
USDA	United States Department of Agriculture
WHO	World Health Organization
CIQUAL	French Food Composition Table
ETC	Swiss Institute for Particle Physics and Astrophysics
FOPH	Swiss Federal Office of Public Health
HFSS	High Fat, Sugar and Salt foods
INFORMAS	The International Network for Food and Obesity/Non-communicable Diseases (NCDs) Research, Monitoring and Action Support

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INTRODUCTION

1. What are FCDBs?

Food composition databases (FCDBs) are resources providing detailed information on the nutritional composition of foods, usually from a particular country. They usually contain information on a wide range of components, including energy, macronutrients, vitamins and minerals. In addition, some FCDBs have values for individual amino acids and/or vitamin fractions (e.g. individual carotenoids, such as lycopene and lutein). Some specialized databases are also available; for example, bioactive compounds are included in the US isoflavone database and in the French Phenol-Explorer database.

Originally, these resources existed only in printed form, with the oldest tables dating back to the early 1800s. Nowadays, a trend towards electronically available FCDBs can be observed. They can hold large amounts of data and allow easy access to and manipulation of data. More recently, many European FCDBs have become available online on the Internet.

The number and range of foods covered by FCDBs varies. Some databases include a wider range of processed foods, composite dishes and recipes as well as foods prepared and cooked in different ways.

2. Why are they important?

"A knowledge of the chemical composition of foods is the first essential in the dietary treatment of disease or in any quantitative study of human nutrition" (McCance & Widdowson, 1940).

While the importance of the knowledge of food composition has been recognized before the middle of the last century, nowadays, FCDBs represent fundamental information resources for nutrition science and the dietary assessment. However, their use is not limited to the field of nutrition science and the public health domain; food industry, legislation and consumers all need and/or use data on food composition.

FCDBs are also an important tool in planning menus in care homes, hospitals and prisons to ensure adequate nutrient content. There is also a move towards the provision of point-of-sale nutritional information in food service outlets, which has increased the application of food composition data in the food service industry. The demand for point-of-purchase information on nutrient content has also been a driving force behind the inclusion of nutritional information on food labels. This is in the form of nutrition panels and, increasingly, front-of-pack or 'signpost' labelling, which provides information for consumers in a simplified format. Nutrient profiling, a tool for

categorizing foods on the basis of their nutrient content, is a relatively new application of FCDB. It helps to assess the eligibility of foods to bear nutrition and health claims under new EU regulations. Other uses of food composition data in relation to food manufacturing include optimization of product composition when developing new products.

FCDBs are also used to help identify the needs of nutrition education and health promotion and to implement appropriate strategies, such as targeted interventions. They form an integral part of, and an educational resource for, food and nutrition training in schools, tertiary education and, increasingly, in workplace settings. They also have more general applications in agriculture and trade. Improvements to the food supply, such as plant breeding, and new methods of cultivation, harvesting and preservation can be assessed using FCDB. Finally, they form part of the evidence base in support of initiatives on nutrition and biodiversity.

Advances in information technologies allowing rapid transmission of large data volumes (e.g. third generation cell phone technologies 3G, WLAN) encourage the development and dissemination of consistent and coherent FCDB through multiple channels, in forms appropriate to local culture, age and needs. In the future, food or health information from web portals could be retrieved at the time and location (at home or in shops) as needed, through the use of ultra-mobile computers, mobile phones or stationary devices having incorporated access to the Internet (EuroFIR, 2009).

3. Why Branded Food Products?

Chronic diseases are the leading cause of premature death and disability in the world and cause the greatest proportion of disease burden in all but the least developed countries. These diseases are largely attributable to poor diet, with overnutrition a major cause of diet-related ill health (World Health Organization, 2004). World data have shown that 8 out of the 20 main causes of morbidity and mortality are due to unhealthy nutrition. (Magriplis , et al., 2019).

In developed countries the majority of food eaten is processed or pre-prepared by the food industry (van Raaij, et al., 2009). Processed foods can make up almost 70% of the total energy intake and their contribution to the diet has been linked to poor health especially in the Western diet (Baraldi, 2018). Food industry and associated distribution networks have enabled a constant supply of affordable food (Yach , et al., 2010). However, a large proportion of the world's population is now exposed to foods that are energy dense and high in saturated fat, sugar, and salt (World Health Organization, 2002), (Faergeman, 2006), (Monteiro, 2009).

Therefore, while the existing generic BFCDs, regardless their size, are not capable of imprinting this new environment, the need of studying the nutritional variability of processed foods, has driven towards an international move on setting up Branded Food Composition Databases (BFCDs). BFCDs are fundamental for many governmental and

non-governmental activities, including research, assessment of national health status, and use by private citizens (Kretser, et al., 2017). The composition of the food supply and consumer dietary choices are also key inputs for agricultural and food policy decisions, which require comprehensive food composition data, but the volume and fluidity of branded and store-brand food products in the marketplace are key challenges to the robustness of such data (Kretser, et al., 2017). The information included in BFCDs provides evidence capable of guiding on issues such as food reformulation, advertising, and labelling and driving changes in the nutrient composition of processed food in order to enhance the public health.

4. BFCDs around the world

U.S.D.A.

The USDA BFCD is the result of a Public-Private Partnership, whose goal is to enhance public health and the open sharing of nutrient composition of branded and private label foods provided by the food industry. The partners for the USDA BFPD are the Agricultural Research Service (ARS), USDA, the International Life Sciences Institute (ILSI) North America, the GS1 US, 1WorldSync, the Label Insight, and the University of Maryland, Joint Institute for Food Safety and Applied Nutrition.

The USDA National Nutrient Database is widely recognized as the gold standard for food composition data. Many databases, including proprietary databases, build from the USDA National Nutrient Database. The USDA BFCD is seamlessly integrated into the existing USDA National Nutrient Database to be more reflective of the nation's food supply, and it is publicly available for all to use. In addition, data from the Special Interest Databases (Flavonoids, Isoflavones, Proanthocyanidins) are shown along with the corresponding food items from the USDA National Nutrient Database for Standard Reference.

At the time of the launch, on September, 2016, the initial rollout of the USDA BFCD contained 68,000 branded and store-brand food products from thousands of manufacturers and retailers. On August 2018, the release of downloadable database contained over 239,000 food items.

The database contains four files: the Products file; the Nutrient file; the Data Derivation Code Description file; and the Serving Size file (Figure 1).

1. Products File

Field name	Description
NDB_ No	8-digit Nutrient Database Number (NDB) that uniquely identifies a food item. Links to the Nutrient file and the Serving Size file.
Long_ Name	200-character description of food item
Data_ Source	A code designating the source of the data: GDSN = Global Data Synchronization Network via 1WorldSync LI = Label Insight
GTIN_ UPC	A unique code identifying a specific product: UPC = Universal Product Code GTIN = Global Trade Item Number
Manufacturer	The company that manufactured the product
Date_ Modified	Date when the food record was last updated by the data provider
Date_ Available	Date when the food record was made available for inclusion in the database
Ingredients	Ingredients of the product

2. Nutrient File

Field name	Description
NDB_ No	8-digit Nutrient Database Number (NDB) that uniquely identifies a food item. Links to the Nutrient file and the Serving Size file.
Nutrient_Code	Unique 3-digit identifier code for a nutrient
Nutrient_Name	Name of nutrient/food component
Derivation_ Code	A code indicating how the Output_Value was determined. The codes used are defined in the Derivation Code Description file
Output_ Value	Amount in 100 g, edible portion. This value is calculated from the amount per serving value on the Nutrition Facts Panel supplied by the data provider
Output_UOM	Units of measure for the Output Value

3. Data Derivation Code Description File

Field name	Description
Derivation_Code	A code indicating how the Output Value was determined. Links to the Nutrient file.
Derivation_Code_ Description	Description of the Derivation Code

4. Serving Size File

Field name	Description
NDB_No	8-digit Nutrient Database Number (NDB) that uniquely identifies a food item. Links to the Nutrient file and the Serving Size file.
Serving_Size	Weight of the specified serving
Serving_ Size_UOM	Unit of Measure for the serving size g: Serving size reported in grams m: Serving size reported in milliliters
Household_Serving	The amount of the Household_Serving_Size_UOM, i.e., the number of cups, tablespoons, teaspoons in a serving. May be a fraction, such as 0.25 or 0.50.
Household_ Serving_ Size_UOM	The Units of Measure for the Household Serving, i.e., cup, tablespoon, teaspoon.
Preparation_ State	Indicates if the information from the Nutrition Facts Panel is for the prepared or unprepared food. Only included if supplied.

***Figure 1**. Structure of the U.S.D.A. BFPDB, field names and their descriptions (USDA, 2016).*

Companies submit product data either to Label Insight or 1WorldSync through the Global Data Synchronization Network. The food industry organizations who supply the data—the data providers—are responsible for the information supplied for the BFPD. The submission of data to the BFCD is voluntary. However, once manufacturers or retailers decide to participate and submit data, they must provide the mandatory attributes agreed upon during the development phase of the public-private partnership. The mandatory attributes include: product name and generic descriptor, serving size and servings per package, nutrients shown on the Nutrition Facts Panel or the Expanded Nutrition Facts Panel, weights and measures, the ingredient list and sub-list, and a date stamp associated with the most current formulation of the branded or private-label food product.

Manufacturers and retailers have two options for data submission to the USDA BFPD. Brands that are already using the GS1 Global Data Synchronization Network (GDSN; http:// www.gs1.org/gdsn) can synchronize product data directly. Additionally, Label Insight allows brands to submit their product data via a simple "drag and drop" portal (https://www.labelinsight.com/ USDA-database). All data provided by manufacturers or retailers through the GDSN system will be labelled "Based on the GS1 Global Data Synchronization Network, powered by 1WorldSync" anywhere such data appear in the USDA BFPD. All data provided by manufacturers or retailers through Label Insight will be labelled "Powered by Label Insight" wherever such data appear in the USDA BFPD.

Once the data providers submit the data, the University of Maryland's Joint Institute for Food Safety and Applied Nutrition, in collaboration with the USDA, reformats and

standardizes the reported values by calculating nutrient values per 100 grams from those values provided per serving, which are taken from the Nutrition Facts Panel of the product, so that the data presentations are consistent across the USDA Food Composition Databases.

The USDA BFPD is fundamental for many governmental and nongovernmental activities, including research, development of public policy, assessment of Americans' health status, and use by private citizens (Kretser, et al., 2017).

France

The French Observatory of Food Quality (OQALI) -a French database on processed foods- is a project implemented in 2008, by the French Agency for Food, Environmental and Occupational Health & Safety (ANSES) and the French National Institute for Agricultural Research (INRA). It first aim is to develop indicators on nutritional variability and on the quantity and quality of labelling parameters, by food sector and possibly by type of brands. These indicators could be weighted by market shares, so as to reflect the nutritional impact of the processed foodstuffs most frequently sold. The second OQALI aim is to follow up the possible changes of these indicators over years (Menard, et al., 2011).

OQALI database contains almost 60,000 food products from 30 different food sectors (all processed food sectors covered). The specificity of the OQALI database is to collect data on branded foodstuffs. The major source of data for the OQALI database is the product packaging. All labelled indications presented in the product sheet part (Figure 2) are entered in the OQALI database such as the nutrition labelling values, the nutrition and health claims. As the monitoring is done at the product level, only a limited number of nutrients can be studied due to financial and practical reasons. Indeed, the major studied nutritional parameters are the eight components of the 'group 2' nutrition labelling (Energy value, Protein, Carbohydrates, Sugars, Fat, Saturated fat, Fiber, Sodium) as defined in amended Directive 90/496/EEC (European Community, 2008). Other nutrients may be studied according to the specificities of the surveyed food sectors (e.g. calcium for dairy products). However, nutrition labelling is currently not mandatory and could concern only the four components of the 'group1' nutrition labelling (Energy value, Protein, Carbohydrates, Fat). For the OQALI project, analyses can be conducted on foodstuffs with no or a less detailed nutrition labelling.

Purchase unpublished data of 17,150 French households of the Kantar Worldpanel (a global network that specializes in providing actionable insights into consumer purchasing and usage habits on a local and global scale in diverse) are also collected, in particular sale volumes and mean prices of branded products, by food sector. These data are essential to ensure that OQALI surveys by food sector are as complete and representative of the market as possible. They are needed to identify missing products with high market shares that should be collected, and to assess the market shares of the products without nutrition labelling that should be analyzed. They

are also used to develop indicators based on the market share of each product, in order to assess whether all consumers benefit from identified changes in nutrient contents.

To organize data collection and exchanges with manufacturers, retailers or professional unions, OQALI project leaders set up working groups by food sector, formalized by written agreements signed by professional organizations or retailers, ANSES and INRA. These agreements guarantee data confidentiality.

The OQALI database, is composed of two sections: the product sheets and the analytical section (Figure 2).

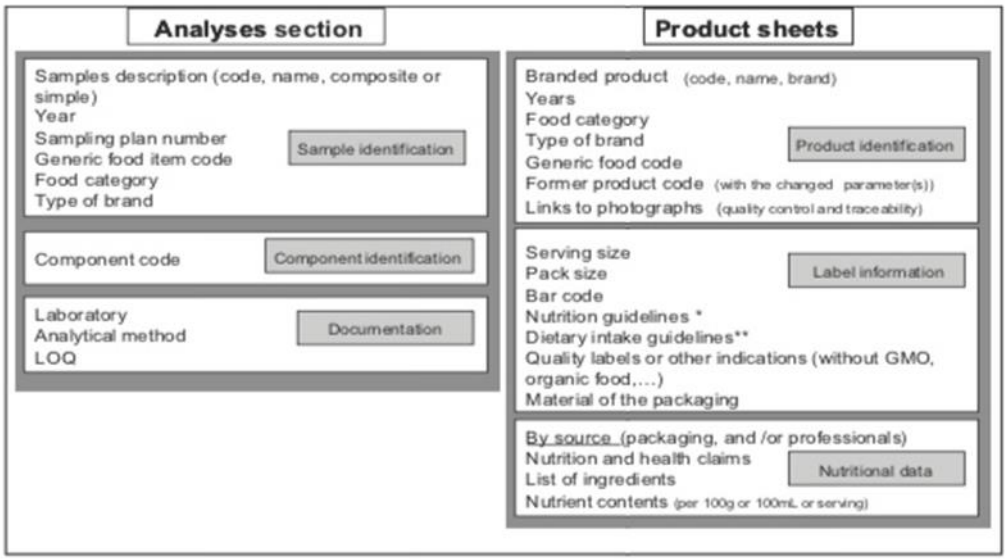


***Figure 2**. Structure of the OQALI database and collected data.*

The product sheets are composed by the product identification, information on labels, nutritional and economic data. This part can contain various nutrition and composition data according to the data source. All indications are entered as mentioned on the packaging and are matched to standard thesauri (EuroFIR thesauri). Annual mean price and market share of each product are also mentioned.

Analytical section was designed to be as compatible as possible with the CIQUAL FCDB (Afssa_Ciqual, 2008). Indeed, the OQALI FCDB on processed food can be an interesting source of data for the CIQUAL FCDB on generic food. Each single or composite sample is described and matched to a food category, and possibly to a generic food and a type of brand, in accordance with published recommendations (Castanheira, et al., 2009), (Schlotke, et al., 2000). The sampling plan number and the sampling year are also mentioned. Analytical results are expressed in previously validated units, and entered with details on the laboratory and the analytical methods (EuroFIR thesauri).

OQALI teams from ANSES and INRA (located in two sites near Paris) can update this database simultaneously via one secured Internet access. A product can be updated only by the team that created it, so as to control data modifications. No general public access to the database is possible, to guarantee data confidentiality. Automatic or manual controls exist to detect possible errors made during the data entry. Besides, the accuracy of each labelled indication entered in the database can be checked at any time thanks to the compiled photographs of the studied products (Menard, et al., 2011).

Food groups (e.g. yoghurts, fruit juices etc.) are studied in a sequential order. This allows an extensive collection of data for the given food group in a precise time frame. So, excellent representativeness of data for this time frame is achieved: labelling data collected accounts for about 80% of market shares. Oqali is responsible for collecting these data and coding them in the Oqali databank. Oqali transmits the food composition data to the Ciqual team in charge of the food composition table. This enables Ciqual to take into account changes of the food offer and reformulations of products. Food sectors mentioned at Table 1 have been studied at least one time since 2008, that the OQALI project was implemented. Data are not continuously updated. The gap between 2 updates is generally a period of 3 to 4 years. (OQALI, 2019).

Table 1. *The 30 food sectors of processed foods entered at the OQALI database.*

Food Sectors	
Baby food	Margarins
Crackers	Bread products
Cereal bars	Frozen snacking
Cakes and biscuits	Ready-to-eat canned meals
Soft drinks	Ready-to-eat fresh meals
Soups and broths	Ready-to-eat frozen meals
Breakfast cereals	Dessert mixes
Delicatessen meat	Fresh dairy products and similar
Chocolate products	Fresh delicatessen products
Fruit purees, compotes and desserts	Processed potato products
Jams	Hot sauces
Canned fruits	Cold sauces
Ice creams and sorbets	Syrups
Fruit juices and nectars	Cheese
Infant milk	Frozen pastry and desert

U.K.

Public Health England (PHE) is responsible for maintaining up-to-date data on the nutrient content of the UK food supply in order to support the National Diet and Nutrition Survey, and funds nutrient analysis of foods commonly consumed in the UK.

In 2016, as the current UK food composition tables were limited, containing ~3,300 mostly generic food and drink items, in order to reflect the wide range of food products available to British consumers and to potentially improve accuracy of dietary assessment, a large UK specific electronic FCDB was developed. The development of this new comprehensive UK FCDB took place so as to be incorporated into an online

dietary assessment tool, myfood24. The database has also been incorporated into “My Meal Mate”, a smartphone application for weight loss. Version 1.0 of the new database contains 40,274 generic and branded items with associated 120 macronutrient and micronutrient data and 5,669 items with portion images. This database has increased the size of the current UK food composition tables by tenfold with the inclusion of branded food products. A micronutrient mapping exercise has been conducted to match food and drink items based on their description and BOP nutrient data to generic foodcodes. This mapping process has provided a comprehensive macronutrient and micronutrient UK FCDB. Management, quality checking and updating of the database is an ongoing process. There is potential for improving dietary assessment with a detailed branded food database. The myfood24 FCDB represents a new resource but there remains a challenge to keep it up to date and to fully reflect the large number of branded products available to the UK consumer.

Branded data came directly from the manufacturer (new analytical values used and gap filled with existing data). Most product details can come from labels and information generally available from the manufacturers. Any analysis is considered reliable as most methods for nutrients other than vitamins are fairly standard now without important difference between one and another, except from fiber where confirmation of AOAC or NSP is needed.

The food products are divided into 19 categories. Information needed for composition data from Industry includes; food description; product name; ingredient list; nutrition claims (e.g. fortification details); description of analyzed portion (if relevant) e.g. whole product or part of product; cooked or raw; as consumed or as purchased; cooking method; serving/portion size, value description; unit (e.g. g/100g edible portion, g/serving); value type e.g. single analysis, mean of 'n' analyses, calculation; number of analytical samples; analytical method; calculation method (Carter, et al., 2016).

Belgium

NUBEL (Nutrients of Belgium) is a non-profit organization that manages nutrition related information in Belgium. NUBEL consists of both private and public partners. Next to the Board of Directors and the Scientific Council, NUBEL has numerous additional members working in the area of nutrition and which are using the Nubel products as basic information for several target groups. The objective is to develop, update and manage a scientific food composition database of nutrients from all kinds of food products and to distribute the data to potential users. For each nutrient NUBEL tracks the origin of the data. This can be an analysis carried out in accredited laboratories, corrected values, calculated values, data from GS1 Belgilux, literature, other databases.

The Belgian BFCD is an interactive database on the Internet. The pictures, household measures and portions are available in close collaboration with the food

industry. In return the food industry receives objective information on nutritional values of generic foods based on a scientific background that can be used to improve the quality of food products and to label food products. NUBEL wishes to inform her users by using the NUBEL Foodplanner about a healthy lifestyle based on a well-balanced nutrition (Seeuws, 2017).

***Figure 3**. Categorization of food products and data available for consumers by the interactive online Belgian BFCD.*

The BFCD on the Internet can be consulted free of charge (www.internubel.be). Each year the number of brand name products in NUBEL database increases. Until now more than 8,800 products are published, of which 5,000 are branded foods. Only the brandname products of companies who signed a confidential agreement with NUBEL are published on the website. Generic foods and farmhouse products are also presented in the database. The good collaboration and understanding with the food industry are one of the main contributors to the evolution of this database (Seeuws, 2016).

The database is created in 4 languages: Dutch, French, English and German. Standard measures and weights are used, so as to allow the analysis and representation of quantitative data of a food product in a uniform manner. In this way, comparisons of the values of different foods can be made for well-considered choices. The search can be carried out by product name, product group, brand or company. For more specific information nutrient content can be chosen. Updates and new product information are added to this database on a regular basis. With the trustbox application of GS1 even a daily update of the industrial data is possible.

The products are divided into 19 product groups, while the database provides information except from the measures, weights and pictures, that were mentioned above, about macro- and micro- nutrients (27 nutrients, such as energy, saturated and

unsaturated fatty acids, sugars, minerals, vitamins, and so on, were included), and in some cases additional information such as reduction factor, edible portion, packing, amount, dimensions, source, date are also available.

Switzerland

The Swiss FCDB contains information on the composition of foods that are available in Switzerland. Version 1.0 of the Swiss FCDB was completed in 2002. It is the result of a joint project between the FOPH and the ETH Zurich. Version 1.0 contained 900 foodstuffs and 32 nutrients and in addition to the support provided by the FOPH and the ETH Zurich was co-financed with a generous sum by the food industry (FSVO, 2019). The database contains now over 10,500 foods that have been classified into 19 main and 105 sub categories. The database is operated by the Federal Food Safety and Veterinary Office. These are available in two separate collections of generic (generic-foods.csv) and branded (branded-foods.csv) foods.

Branded foods data is published through www.naehrwertdaten.ch (in 4 languages including English). The data is managed through FoodCASE. The label data is provided by the food industry and main retailers. They sent the label data (mostly in Excel) to the compiler. For each food the following information is received; name, company own product number, bar code, declared nutrient content per 100g or 100ml, ingredient list, company own categorization, packaging size. Sometimes additional information is received, such as specific gravity, portion size and pictures of foods.

The Netherlands

NEVO (the Dutch FCDB) is part of the Netherlands Food Information Resource (NethFIR), owned by the Ministry of Health, Welfare and Sports and maintained by RIVM.

NethFIR is a database for food composition data in both generic and brand foods (nutrients, allergens and characteristics such as sustainability and portion sizes). NethFIR is a shared activity of the Netherlands Nutrition Centre and RIVM. RIVM focuses on professional users and use of the data in food research, whilst the Netherlands Nutrition Centre targets the public and use of the data in education. In parallel with NEVO, also the National Supplement Database (NES) is maintained at RIVM as part of NethFIR.

NEVO contains data on the composition of foods eaten frequently by a large part of the Dutch population. These foods contribute significantly to the intake of energy and nutrients. Foods of importance for specific groups of the Dutch population are also included.

The NEVO online website contains data on 133 nutrients of 2,152 food items. The most recent version of NEVO online dates from November 2019: NEVO online version 2019/6. The products are divided into 24 food groups, while the database

includes the following information: Product group, product group code, product code, control number, product description (the name of the product in Dutch and in English), manufacturer, code non active , amount, unit, eaten part, trust code, comments, nutrients code.

Preferably, food composition data should come from chemical analyses by accredited laboratories. Quality criteria apply for food identification, sampling, and methods of analysis. Other data sources include scientific publications, foreign food composition tables, the food industry, derived nutrients from comparable foods, calculations from recipes and estimations. Manufactures can supply nutritional information to the web application of NethFIR. Because of the generic character of NEVO, the aim is to aggregate comparable foods to a more or less generic (branded) food. For some foods this is not possible, e.g. in case of fortified foods which are then published under their own brand name. So, proprietary brands are only mentioned when needed to identify the food item and if the information appertains exclusively to that specific brand. For every nutrient value present in the database the source is known and presented by a reference code. These codes consist of a main reference code and a reference specification code.

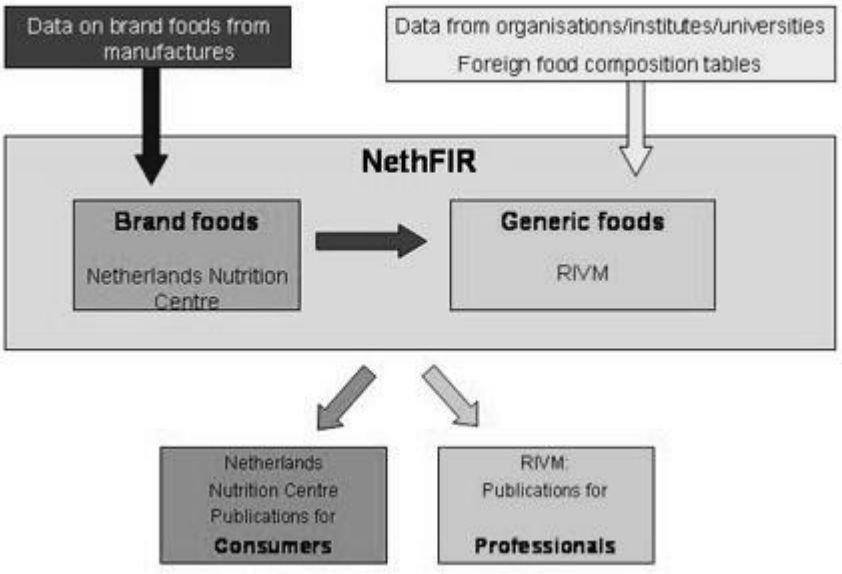


***Figure 4**. Methodology used by NethFIR during the data entry process at the NEVO database.*

At the EuroFIR Food Forum on April, 2019, the Netherlands declared the existence of a national database for branded foods (maintained by the Dutch Nutrition Centre), which dataset is available for RIVM. Data in this database is provided by GS1

NL, a large supermarket chain representing a large number of supermarkets in NL, the largest Dutch supermarket (AH), Brtandbank a wholesale database, and some individual companies. Due to the new of the situation, they are still in the process of integrating some of the data in the national food composition table.

New Zealand

The New Zealand FCDB contains the nutrient content of over 2,700 foods commonly prepared and eaten in New Zealand. For the New Zealand FCDB the majority of branded food data is by analysis. The focus is much more for fresh foods, but commonly consumed processed foods are included. Some of these, however are composite samples, so not by brand (e.g. white bread). There is a small number of specific branded foods in the database (mainly foods consumed in large amounts/frequency, needed for national nutrition surveys). At present, only incomplete datasets exist in the database (e.g. foods where only the NIP data is available or a reduced number of vitamins & minerals). A BFCD that runs totally separately does exist, but is not publicly available. It runs through a University of New Zealand and it includes the NIP and other relevant label information, used for compliance and food monitoring purposes. Efforts are being made to access this data and make it available through the New Zealand FCDB in a similar way to the USDA, to extend its utility, as well as communication with GS1 about accessing their data.

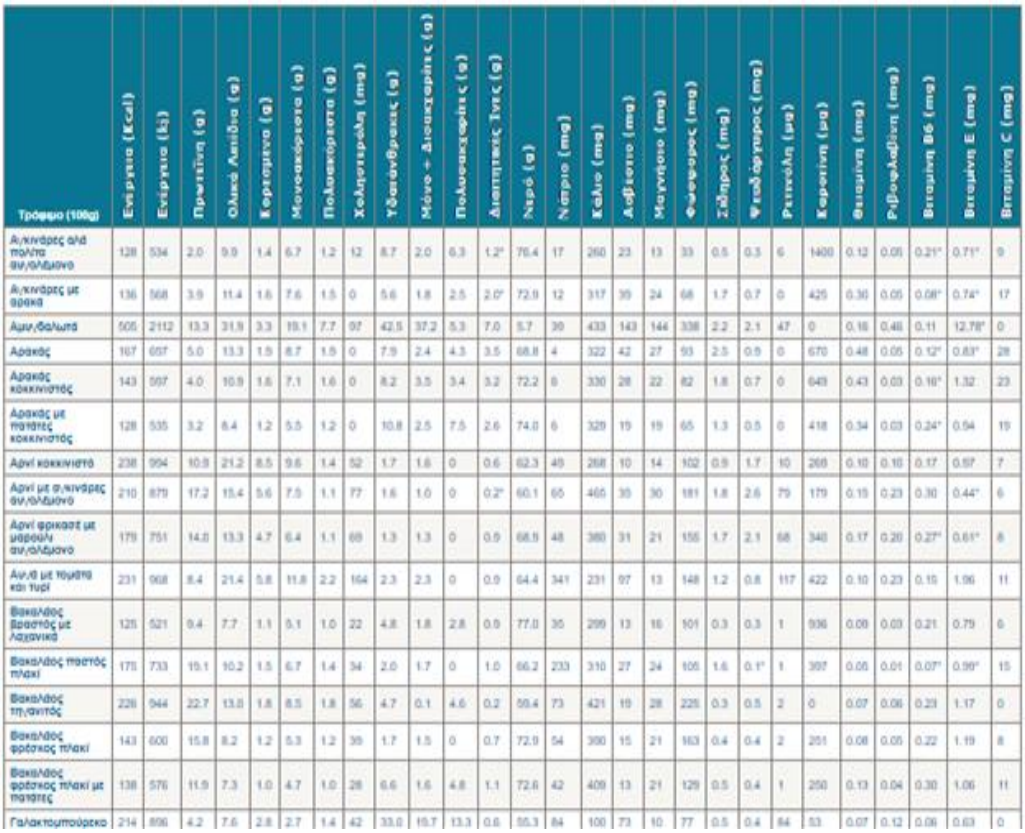
Ireland

According to the information presented at the EuroFIR' s Food Forum, on April 2019, efforts on building their own BFCD are now being carried out in Ireland. To our knowledge, there is no literature published available. However, information such as the fact that data is provided by manufacturer's information, added by a data team upon food requests from the user base; GS1 brandbank; and My Net Diaries 'verified' food database, and that field work in retail stores using photo capture and OCR system is under process at present, were presented at the EuroFIR' s Food Forum.

5. Greek FCTs

The first edition of the Greek Food Composition Tables was published in the form of a booklet circulated to hospitals and other institutions in 1982. This book was based on a study of recipes used in a large hospital and the boarding house of a Visiting Nurses' School in Athens, Greece. A second edition was published in 1992 with revised and expanded data including values for energy and 26 nutrients of 114 Greek cooked foods and dishes. The composition of the Greek recipes was calculated using the Unilever Dietary Analysis Program (UNIDAP), whereas the composition of raw foods

was based mainly on British food information. The third edition was published in 2004 and reflects efforts to edit, enrich and expand the data in the tables over a period of one decade since the publication of the second edition. It includes the composition of 214 Greek recipes (prepared foods) and, in addition, and for the first time, values for energy and 16 nutrients resulting from the chemical analyses of 86 traditional Greek raw foods and dishes (prepared foods).



Τρόφιμο (100g)	Ενέργεια (Kcal)	Ενέργεια (kJ)	Πρωτεΐνη (g)	Ολικά Λιπίδια (g)	Κορεσμένα (g)	Μονοακόρεστα (g)	Πολυακόρεστα (g)	Χοληστερόλη (mg)	Υδατάνθρακες (g)	Ολικά + Διαιτητικές ίνες (g)	Πολυσακχαρίτες (g)	Διαιτητικές Ίνες (g)	Νερό (g)	Νάτριο (mg)	Κάλιο (mg)	Ασβέστιο (mg)	Μαγνήσιο (mg)	Φώσφορος (mg)	Σίδηρος (mg)	Ψευδάργυρος (mg)	Ρετινόλη (μg)	Καροτίνη (μg)	Θειαμίνη (mg)	Ριβοφλαβίνη (mg)	Βιταμίνη Β6 (mg)	Βιταμίνη Ε (mg)	Βιταμίνη C (mg)
Αγκινάρες ολά πολτα αν/όλιδμονο	128	534	2.0	9.9	1.4	6.7	1.2	12	8.7	2.0	0.3	1.2*	76.4	17	260	23	13	33	0.5	0.3	6	1400	0.12	0.05	0.21*	0.71*	9
Αγκινάρες με αραχά	136	568	3.9	11.4	1.6	7.6	1.5	0	5.6	1.8	2.5	2.0*	72.9	12	317	39	24	68	1.7	0.7	0	425	0.30	0.05	0.08*	0.74*	17
Αμυγδαλωτά	505	2112	13.3	31.9	3.3	19.1	7.7	97	42.5	37.2	5.3	7.0	5.7	30	433	143	144	338	2.2	2.1	47	0	0.16	0.46	0.11	12.78*	0
Αρακάς	167	697	5.0	13.3	1.9	8.7	1.9	0	7.9	2.4	4.3	3.5	68.8	4	322	42	27	93	2.5	0.9	0	670	0.48	0.05	0.12*	0.83*	28
Αρακάς κοκκινιστός	143	597	4.0	10.9	1.6	7.1	1.6	0	8.2	3.5	3.4	3.2	72.2	6	330	28	22	82	1.8	0.7	0	649	0.43	0.03	0.16*	1.32	23
Αρακάς με πατάτες κοκκινιστός	128	535	3.2	8.4	1.2	5.5	1.2	0	10.8	2.5	7.5	2.6	74.0	6	329	19	19	65	1.3	0.5	0	418	0.34	0.03	0.24*	0.54	19
Αρνί κοκκινιστό	238	994	10.8	21.2	8.5	9.6	1.4	52	1.7	1.6	0	0.6	62.3	48	268	10	14	102	0.9	1.7	10	268	0.10	0.10	0.17	0.57	7
Αρνί με σ/κινάρες αν/όλιδμονο	210	879	17.2	15.4	5.6	7.5	1.1	77	1.6	1.0	0	0.2*	60.1	65	465	35	30	181	1.8	2.6	79	179	0.15	0.23	0.30	0.44*	6
Αρνί φρικασέ με μαρούλι αν/όλιδμονο	179	751	14.8	13.3	4.7	6.4	1.1	68	1.3	1.3	0	0.9	68.9	48	380	31	21	155	1.7	2.1	68	348	0.17	0.20	0.27*	0.61*	8
Αυγά με τομάτα και τυρί	231	968	8.4	21.4	5.8	11.8	2.2	164	2.3	2.3	0	0.9	64.4	341	231	97	13	148	1.2	0.8	117	422	0.10	0.23	0.15	1.06	11
Βακαλάος βραστός με λαχανικά	125	521	9.4	7.7	1.1	5.1	1.0	22	4.8	1.8	2.8	0.9	77.0	35	299	13	16	101	0.3	0.3	1	936	0.09	0.03	0.21	0.79	6
Βακαλάος παστός πλακί	171	733	19.1	10.2	1.5	6.7	1.4	34	2.0	1.7	0	1.0	66.2	233	310	27	24	105	1.6	0.1*	1	397	0.05	0.01	0.07*	0.99*	15
Βακαλάος τηγανητός	226	944	22.7	13.0	1.8	8.5	1.8	56	4.7	0.1	4.6	0.2	59.4	73	421	19	28	225	0.3	0.5	2	0	0.07	0.06	0.23	1.17	0
Βακαλάος φρέσκος πλακί	143	600	15.8	8.2	1.2	5.3	1.2	39	1.7	1.5	0	0.7	72.9	54	390	15	21	163	0.4	0.4	2	251	0.08	0.05	0.22	1.19	8
Βακαλάος φρέσκος πλακί με πατάτες	138	576	11.9	7.3	1.0	4.7	1.0	28	6.6	1.6	4.8	1.1	72.6	42	409	13	21	129	0.5	0.4	1	250	0.13	0.04	0.30	1.06	11
Γαλακτομπούρεκο	214	896	4.2	7.6	2.8	2.7	1.4	42	33.0	19.7	13.3	0.6	55.3	84	100	73	10	77	0.5	0.4	84	53	0.07	0.12	0.06	0.63	0

Figure 5. *FCTs of Greek recipes and traditional foods, 3rd edition, (Trihopoulou, 2004)*

The recipes included concern foods, which are typically prepared and consumed in Greece. Their nutrient composition was calculated using a software. The UNIPAD system was originally based on the British Food Composition Tables, but has been enriched over the years with food information representative for Greek food items, which are derived from chemical analyses conducted in the context of research projects. In addition, in the context of the overall research activity of the Hellenic Health Foundation on the systematic investigation of the 86 traditional Greek foods, the nutrient value of the whole composite food (dishes), as well as its main ingredients, were determined.

The size of these tables indicates the need of using foreign, more frequently USDA' s or U.K.' s FCDBs, as the basic source of food composition data during nutritional assessment at Greek Diet and Health Surveys and generally in Greece, while Mrs. Trihopoulou' s FCTs are used additionally, for the Greek traditional recipes. This fact

underlines the current gap existing in Greece, while nutritional habits adopted nowadays, such as the trend towards ready, pre-packaged food and the abandon of cooking at home, indicate the need of studying processed foods and imprinting the current nutritional status of the food products that constitute the Greek food supply.

6. The aim of the study

The first aim of the study is the creation of a Greek BFCD. The objectives are:

1. Development of the methodology and structure of the database
2. Data source detection and database filling
3. Pilot utility testing of the database

In the present study, the aims, the design and some preliminary findings of the BFCD are explained below in detail.

METHODS

The HELth BFCD (Hellenic thesaurus of branded food composition data) is the first systematic attempt to build a Greek BFCD. Figure 5 presents the methodology followed during the conduction of this study.

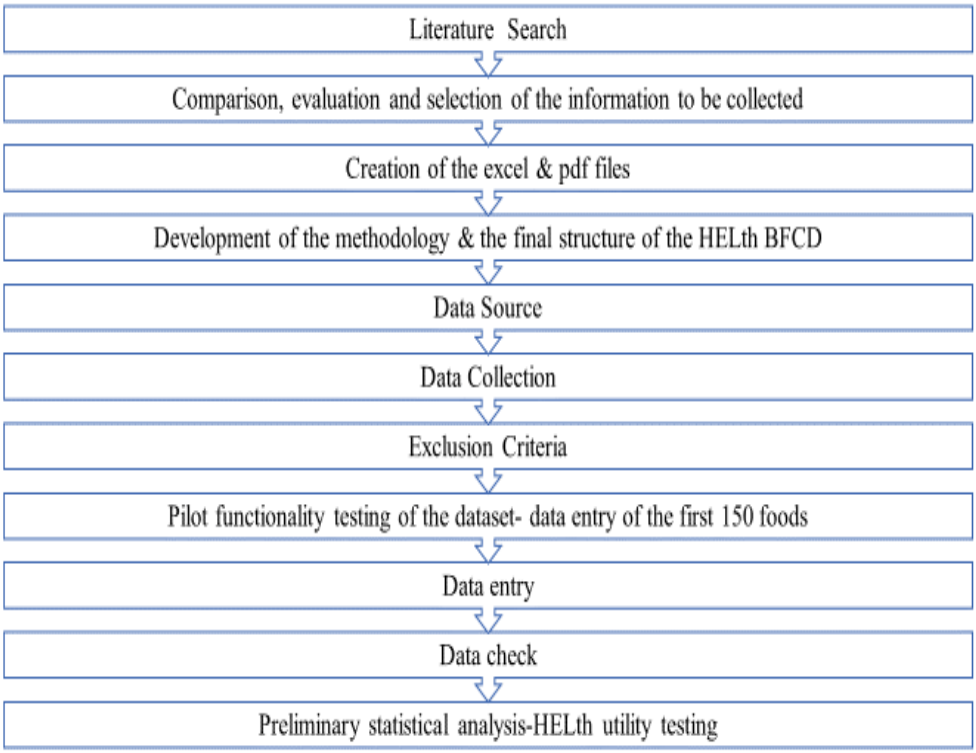


Figure 6. *Flow chart of the methodology used for the creation of the HELth BFCD.*

1. Literature Research

As BFCDs are a new tool, recently developed, the scientific literature available is restricted. During literature research, scientific papers for the methodology of building or the structure of BFCDs were found only for U.S.A. (U.S.D.A), France (OQALI), Belgium (NUBEL) and for the penetration of branded food products to the food composition database of U.K. The access to these databases is not permitted by all the countries that own such databases. Information from national websites of food composition data was also collected. In addition, information from EuroFIR's food forum 2019 on branded food composition databases, was also used.

2. Comparison, evaluation and selection of the information to be collected

Even though the available BFCDs have some common characteristics, no standards for the methodology, the structure or the categorization used, exist. The harmonization and the common use of such data is a subject of interest at present. Therefore,

information about each country was collected, compared with each other and evaluated, so that the information to be collected for the Greek BFCD could be selected.

3. Creation of the excel and pdf files

After deciding what information would be collected, data should be divided into files, so that the database would be more functionable and easy-to-use. Data would be organized at excel documents, while compiled photographs would be saved as pdf files.

4. Development of the methodology and the final structure of the HELth BFCD

According to the example of the American database, Greek database is composed by four files, too. However, products' description and serving size's data were put into one file at the Greek database. According to the French example, nearly all labelling indicators should be collected for the Greek database, including health, nutrition and other claims, as well as other quality indicators existing on the products packaging. In addition, photographs of the products should be collected, too.

5. Data source

The specificity of the HELth BFCD is to collect data on branded foodstuffs. The data was collected from nutrition information panels on product packaging. For each product, the data collected are presented later, at Figure 6 and described at the Tables 2 and 3. What is more, when it comes to interpreting missing data and zero values in BFPD, in some cases, values for particular nutrients are missing. This does not indicate a zero value. It means only that that the data was not mentioned at the nutritional declaration and this constitutes a missing value. Under EU labelling legislation, nutritional information for products where a nutrient is negligible is allowed to be labelled as 'trace' or provided with '<'. In these circumstances, where any nutrient was displayed as 'trace', this was replaced with 0. Similarly, where the nutrient content was <0.01, this was replaced with 0.01, <0.1 was replaced with 0.1, and <0.25 was replaced with 0.25 (PHE, 2020). No calculations are carried out, except from the correspondence between salt equivalent and the sodium content multiplied by 2.5.

6. Data collection

The most feasible way to collect data, depending upon the resources available was to identify a major retail outlet that disposes a web page for sales with available photographs of the existing food products and copy data from the products' labels. AB

Vassilopoulos together with Sklavenitis' super markets exceed the 50% of the market share (see Appendix III). Particularly, Sklavenitis possesses the 27.5% and AB Vassilopoulos the 23% of the market shares, and both retailers have an online sales' platform. However, AB Vassilopoulos' online sales' platform, Click2shop, was selected against Sklavenitis' one, due to the fact that it was the only one that disposes available pictures of all the sides of the products' packaging.

7. Exclusion criteria

Duplicates of the same product, constituting part of an offer or discount multi-package, or by human error existing twice at the online platform, were removed (multi-pack items were deleted where the single item was also available). In addition, products with no available photographs, or with photographs not clear enough to copy the data were also excluded. At the data entry process were not included neither the food products that according the EU Regulation No 1169/2011 are not tempted to bear a mandatory nutritional declaration, nor the food groups; candies, olive and seed's oil and baby food, considered as out of scope for the first data entry process.

8. Pilot functionality testing of the dataset-data entry of the first 150 foods

The first 150 food products were entered at the database, so that it would be checked for possible mistakes or deficiencies and its functionality would be tested.

9. Data entry

Data entry took place from November 2019 to January 2020. Data was entered manually. Crowdsourcing was also used during the data entry process. 23 pre- and post-graduate students of the Department of Food Science and Human Nutrition of the Agricultural University of Athens were asked to enter data at the HELth BFCD at the context of the subject 'Functional Foods', after participating in a mini training course and following the instructions of the HELth MANUAL, a booklet prepared for this particular aim (see Appendix V).

10. Data check

Data was checked manually. All data were double-checked after entry, and a further 5% of entries were checked against the original source in a random selection of

products. The accuracy of each labelling indication can also be checked thanks to the compiled food products' photographs.

11.Preliminary statistical analysis-HELth utility testing

The trends of the content of salt, total and saturated fatty acids and total sugars were calculated at specific food groups. Descriptive statistics were carried out to calculate variables such as the completeness of data and its percentage per macronutrient, per food subcategory entered, as well as the percentage of the food products bearing a health, nutrition or other claim, or another quality indication on the packaging.

RESULTS

Design of the HELth BFCD

Structure

The HELth BFCD is composed of four files: the description file, the nutrients' file, the claims' file and the photobook (Figure 6).

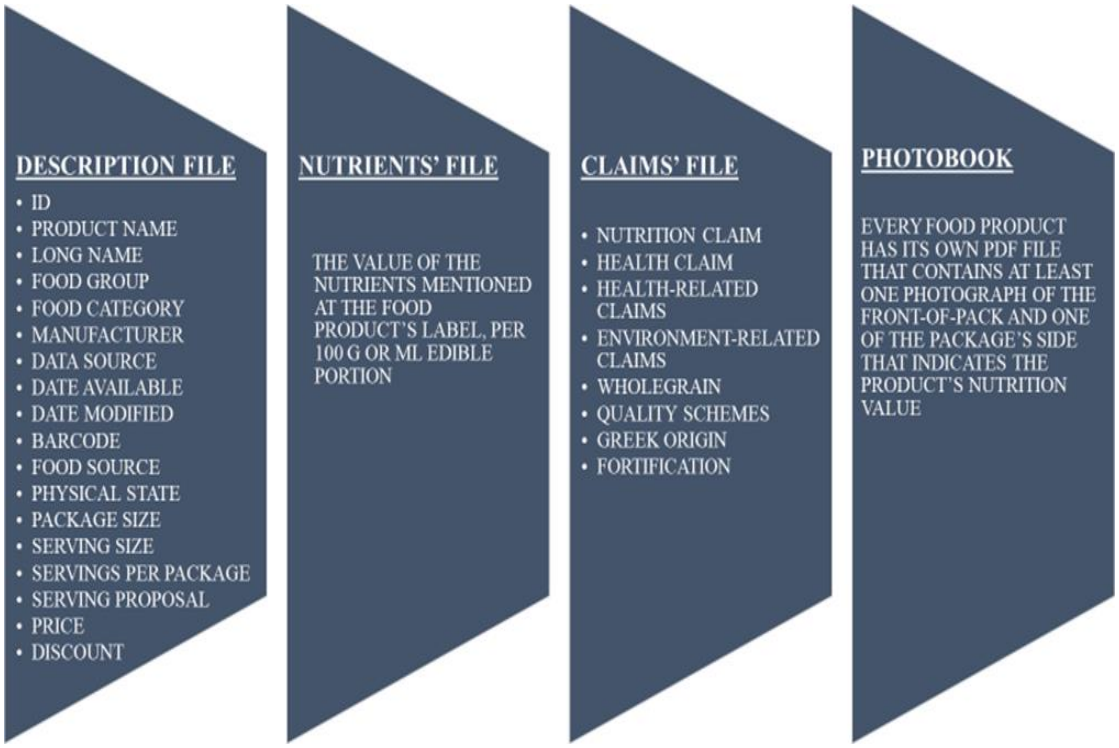


Figure 7. *Structure of the HELth BFCD and collected data.*

i. Description file

Data are entered for product identification (id, long name etc.), its description (food group, food category, food source, physical state), as well as general information provided on the packaging such as the barcode, the pack size, the serving size, the serving proposal. The price and the possible discount are also entered at the database for future use. At the following table (Table 2), there is the description of every field entered at the Description File.

Table 2. *The Description File of the HELth BFCD, its field names and their descriptions.*

Description File

Field Name	Description
Id	An 8-digit id number that uniquely identifies a food item. Links to all files
Product name	The name of the product exactly as mentioned at the supermarket's online platform
Long name	Short description of the product, translated in English. Contains the manufacture's name, the product name, the food group, basic characteristics of the product/and the package size
Food group	The food group that the product belongs to
Food category	A 5-digit code. The food category that the product belongs to. It is based on the EuroFIR' s categorization and constitutes the first LanguaL descriptor
Manufacturer	The name of the company that manufactured the product
Data source	The way that the data was acquired e.g. labelling, analytical methods etc.
Date available	Date when the food record was first made available for inclusion in the database
Date modified	Date when the food record was last updated in the database
Barcode	The number of the barcode. Barcode is a machine-readable code in the form of numbers and a pattern of parallel lines of varying widths, printed on a commodity and used especially for stock control
Food source	Whether the food product or its major ingredient is derived by animal, plant, liquid(alcohol) or chemical (food supplements, vitamin and mineral substances or food additives) food sources. Food source constitutes the second LanguaL descriptor
Physical state	Whether the physical state of food product is solid, liquid, semisolid or semiliquid. Physical state constitutes the fourth LanguaL descriptor.
Package size	Weight of the product. It includes the size unit
Serving size	The serving/portion size mentioned at the package. Weight of the specified serving/portion. It includes the serving size unit
Servings per package	The servings/portions that the package contains. Only included if mentioned
Serving proposal	Whether a serving proposal, such as 'with' (water/milk etc.), a recipe or a cooking method are mentioned at the packaging
Retailer	The name of the company that shelled the specific product from which the data was acquired
Price per 100g/mL	The price of the product at the retailer mentioned at the previous cell at the date of data entering per 100g or 100mL
Discount	Whether the product is on discount or not

ii. Nutrients' file

All nutrients' values are entered as mentioned on the packaging, per 100g/mL edible portion. The nutrients' file contains 44 nutrients, which means every nutrient found at the nutrition labelling of the food products that have been entered at the database. No

calculations are carried out, except from the correspondence between salt equivalent and the sodium content multiplied by 2.54, so that the information is comparable and usable for further research. In many cases, values for particular nutrients are missing. This does not indicate a zero value. It means only that this information was not mentioned at the nutrition labelling. Furthermore, under EU labelling legislation, nutritional information for products where a nutrient is negligible is allowed to be labelled as 'trace' or provided with '<'. In these circumstances, where any nutrient was displayed as 'trace', this was replaced with 0. Similarly, where the nutrient content was <0.01, this was replaced with 0.01, <0.1 was replaced with 0.1, and <0.25 was replaced with 0.25 (PHE, 2020).

iii. Claims' file

The taxonomy developed by The International Network for Food and Obesity/Non-communicable Diseases (NCDs) Research, Monitoring and Action Support (INFORMAS) was used to classify different types of claims featuring on food and beverages packages (Rayner & Vandevijvere, 2015). The INFORMAS taxonomy divides claims into three major categories: nutrition claims, health claims, and other claims, which includes other health-related claims and environment-related claims. All the information listed above, as well as further information related to the origin of the food products, geographical indications, special target group and fortification, is entered at the claims' file and described at the following table (Table 3).

***Table 3**. Categorization, content of the claims and other information entered at the claims' file of the HELth BFCD.*

Categories of claims	Subcategories of claims	Content of claims
Health claims		Nutrient and function claims, reduction of disease risk claims.
Nutrition claims		Nutrient comparative or nutrient content claims
Other claims	Claims for special diets	Claims related with allergies/intolerance (e.g. gluten free, dairy free), vegetarian/vegan
	Claims for 'Natural'	Claims related to natural/pure products, and absence of additives, pesticides, and hormones.

	Others	Claims related to general beneficial effects of the consumption (e.g. healthy, fit, nutritious) or other comments mentioned at the Front-of-Pack (e.g. excellent quality, better taste etc.)
	Environment-related claims	Organic, biodiversity, genetically modified organism free
	Health-related ingredients	Wholegrains
Other information entered at the claims file		
Greek products	Whether the products indicate their Greek origin	
Quality schemes	Whether the products carry geographical indications such as PDO, PGI, GI, TSG	
For kids	Whether the products are destinated to kids	
Fortified	Whether the products have been fortified	

iv. Photobook

Every food product has its own PDF file that contains at least one photograph of the FoP and one of the package's side that indicates the product's nutritional declaration. Photographs from the rest sides of packaging may also be included, if available. Besides, the accuracy of each labelled indication entered in the database can be checked at any time thanks to the compiled photographs of the food products.

***Figure 8**. Example of a pdf file of the HELth BFCD.*

Categorization

The categorization is based on EuroFIR's categorization at LanguaL, which means that every food product carries the 5-digital category code of LanguaL. This code constitutes the first of the twenty LanguaL' s descriptors. However, the id code of the food products, whose creation's methodology is described at the HELth Manual (Appendix B), allow a further flexibility by letting us distinguish in a more detailed way in some cases and in a more general in others, the food products, so that the categorization can be adapted to the needs of the research, and the data obtained can be used in a more functional way.

***Table 4**. The 13 EuroFIR' s Food Categories used by the HELth BFCD.*

	FOOD CATEGORIES (EUROFIR)
1.	MILK, MILK PRODUCT OR MILK SUBSTITUTE
2.	EGG OR EGG PRODUCT
3.	MEAT OR MEAT PRODUCT
4.	SEAFOOD OR RELATED PRODUCT
5.	FAT OR OIL
6.	GRAIN OR GRAIN PRODUCT
7.	NUT, SEED OR KERNEL
8.	VEGETABLE OR VEGETABLE PRODUCT
9.	FRUIT OR FRUIT PRODUCT
10.	SUGAR OR SUGAR PRODUCT
11.	BEVERAGE (NON-MILK)
12.	MISCELLANEOUS FOOD PRODUCT
13.	PRODUCT FOR SPECIAL NUTRITIONAL USE OR DIETARY SUPPLEMENT

Therefore, food products are classified in a hierarchical structure to food 'categories' and 'subcategories', according to the EuroFIR's LanguaL Thesaurus, while food 'groups', and in some cases even 'subgroups', are also used. Specifically, the HELth BFCD contains 13 food categories (Table 4), while the food products already entered at the database belong to 23 sub-categories (Table 5) and 66 food groups.

Data Source and data entry

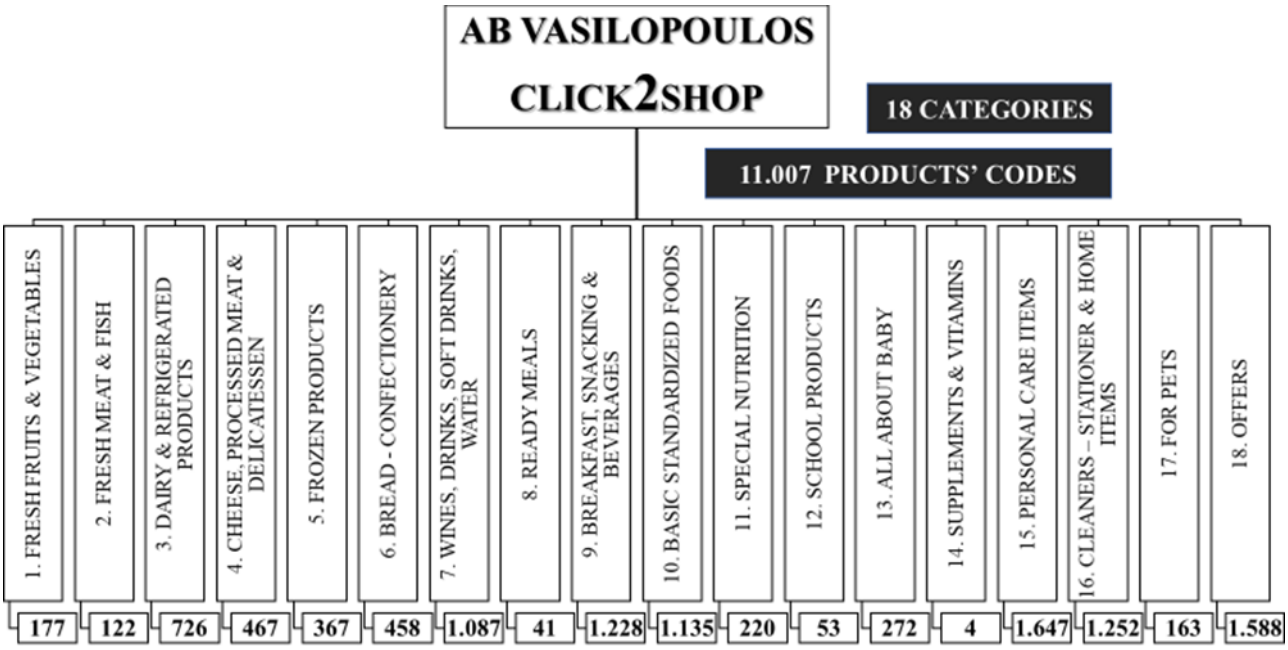


Figure 9. *AB Vassilopoulos Click2Shop products' categorization.*

HELth BFCD' s source of data is exclusively the products' packaging. The retailer selected for the data compilation was the online sales' platform of AB Vassilopoulos, click2shop, where available pictures of all the sides of the products' packaging could be found. AB Vassilopoulos is a major retail outlet and possesses the 23% of the market shares (comes after the first one, Sklavenitis, that possesses the 27.5% of the market shares).

The online platform of AB Vassilopoulos disposes 11,007 products' codes, separated into 18 products' categories. The names of the categories and the respective number of products are presented at Figure 8. From these, if we remove the 'special diet' and the 'offers' categories, that are duplicates, there are left 16 products' categories with 9,199 products' codes. Food products appear in 11 categories and their total number is 5,924.

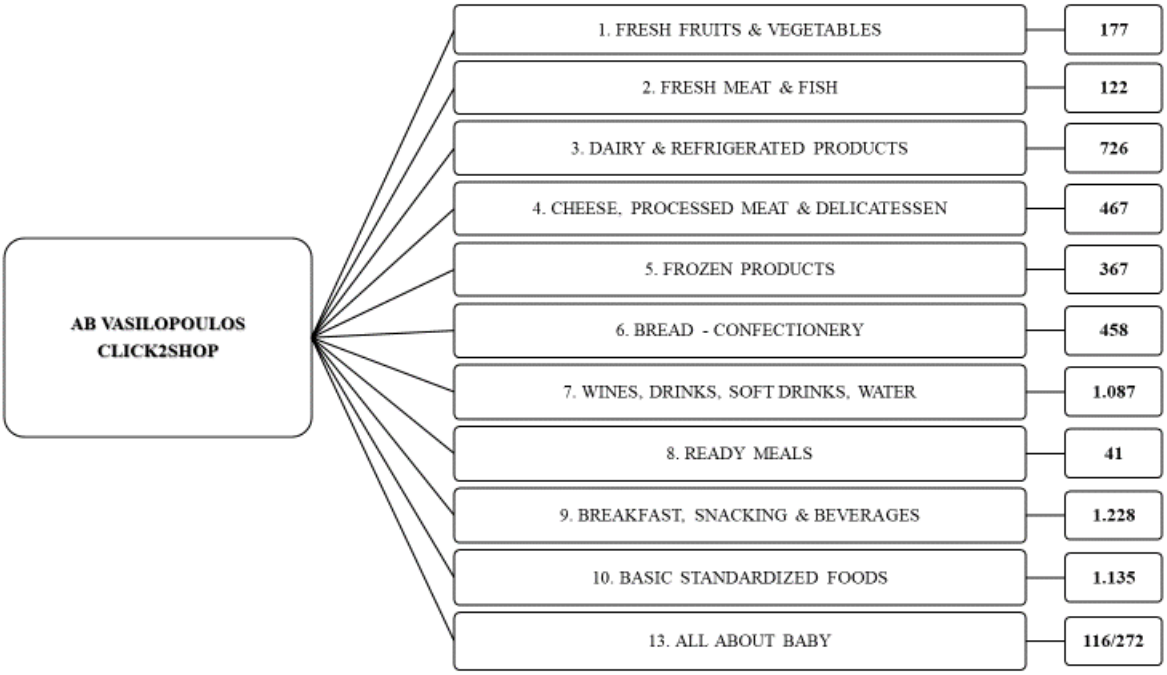


Figure 10. *Categories of AB Vassilopoulos Click2shop that contain food products and their numbers.*

From the 5,924 food products in total, excluded from the data entry process, are the following foods; fresh fruits and vegetables, fresh meat, fish and seafood, alcoholic beverages with alcohol level >1.2%, chewing gums, honey, coffee, tea, water, processing aids and gelatin, sugar and substitutes, vinegar and lemon, salt and spices, as products not obliged to carry a nutrition declaration (Table 5)., according to the Regulation (EU) No 1169/2011 of the European Parliament and of the council of 25 October 2011, Annex V, on the provision of food information to consumers (E.U. FIC). In addition, excluded from the data entry process, are candies, olive and seeds' oil and baby foods, considered as out of scope for now. (Candies for their little contribution to the energy intake, olive and seeds' oils as products with no perspective of improvement nor in scope of reformulation and baby foods as special nutrition' s products).

Table 5*. Foods exempted from the requirement of mandatory nutrition declaration, according to the Regulation (EU) 1169/2011.*

Foods exempted from the requirement of the mandatory nutrition declaration	
1. Unprocessed products that comprise a single ingredient or category of ingredients;	11. Food additives;
2. Processed products which the only processing they have been subjected to is maturing and that comprise a single ingredient or category of ingredients;	12. Processing aids;
3. Waters intended for human consumption, including those where the only added ingredients are carbon dioxide and/or flavorings;	13. Food enzymes;

4. A herb, a spice or mixtures thereof;
5. Salt and salt substitutes;
6. Table top sweeteners;
7. Products covered by Directive 1999/4/EC of the European Parliament and of the Council of 22 February 1999 relating to coffee extracts and chicory extracts (1), whole or milled coffee beans and whole or milled decaffeinated coffee beans;
8. Herbal and fruit infusions, tea, decaffeinated tea, instant or soluble tea or tea extract, decaffeinated instant or soluble tea or tea extract, which do not contain other added ingredients than flavorings which do not modify the nutritional value of the tea;
9. Fermented vinegars and substitutes for vinegar, including those where the only added ingredients are flavorings;
10. Flavorings;
14. Gelatin;
15. Jam setting compounds;
16. Yeast;
17. Chewing-gums;
18. Food in packaging or containers the largest surface of which has an area of less than 25 cm2;
19. Food, including handcrafted food, directly supplied by the manufacturer of small quantities of products to the final consumer or to local retail establishments directly supplying the final consumer.
20. Alcoholic drinks (alcohol>1.2%)
21. Not pre-packaged food

Due to the nature of the methodology followed and the way the data was obtained, a small but not insignificant percentage of about 7.5% of the products' codes of the online sales' platform of the food groups entered was lost. Some products' codes were duplicates because of an offer or discount existence during the data entry process, others were lost after frequent updates of the web page, some food products had no or not all their pictures available, a fact that drived to incomplete or no data entry of the product, while the sharpness of other photographs did not allow the honest copy of all the products' information needed. The ids of these products were entered at the database, followed by the reason of the data absence.

The HELth BFCD now contains 2,008 food products, a number that exceeds the 50% coverage of the online sales' platform of AB Vassilopoulos Click2shop (for the calculations, the percentage of loses is taken into account). Food sub-categories with their respective number of products entered at the database are shown at the following table (Table 5).

Table 6. *Food sub-categories of the food products already entered at the HELth BFCD and respective number of products.*

FOOD SUB-CATEGORY	NUMBER OF PRODUCTS
Breakfast cereals & cereal bars	151
Cocoa & chocolate powder	20
Cubes, Broths & Soups	50
Dressings & Sauces	165
Dried Fruits	27
Eggs & egg products	34
Fine bakery wares	281
Frozen & Mashed Potatoes	23
Frozen fish sticks	7
Frozen pizzas	27
Frozen savoury pies	59
Frozen semi-ready	39
Frozen vegetables	87
Fruit Jelly	10
Juices & nectars	162
Milk	158
Nuts	69
Plant-based imitations of dairy products	38
Ready-to-eat meals	40
Savoury snacks (breadsticks & crackers included)	130
Soft drinks	231
Wheat Creams	15
Yogurts	185
Total	**2008**

Preliminary findings of the HELth BFCD

Distribution of the content of salt, total and saturated fat and total sugars per specific food groups

Statistical analysis was carried out to calculate the distribution of some macronutrients at specific food groups. The macronutrients studied are salt, total and saturated fatty acids and total sugars.

The content of salt was calculated at the following food groups and sub-categories; pizza, savoury pie, ready-to-eat meals and frozen semi-ready meals (main meals), chips and other savoury snacks and bread products (savoury snacks).

Salt

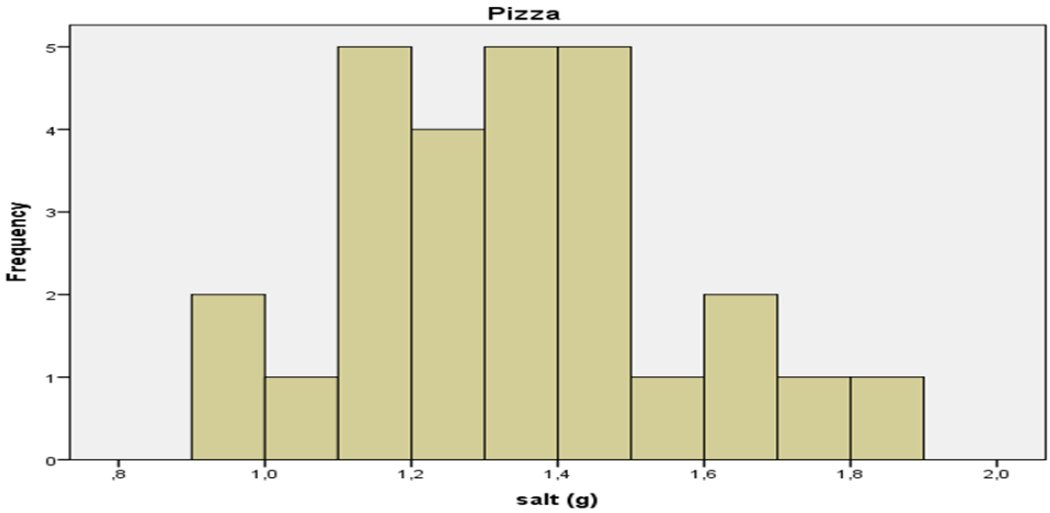


Figure 11. *Histogram of the salt content of the pizzas' food group.*

For the 27 pizza's products found at the online sales' platform, the mean value of salt was 1.3g per 100g edible portion, the standard deviation 0.2, the minimum value 0.9g and the maximum value was 1.8g salt per 100g.

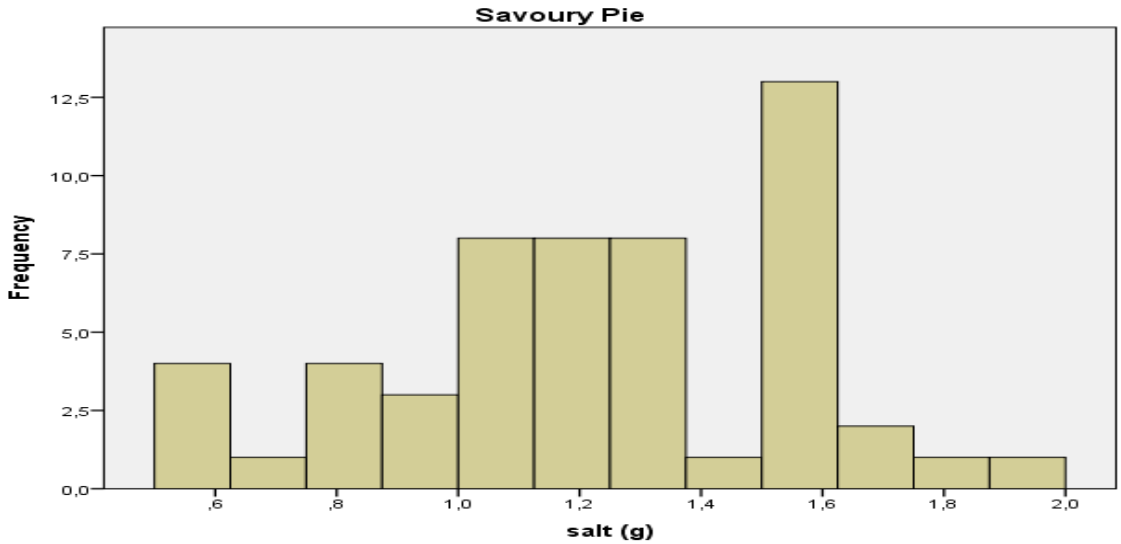


Figure 12. *Histogram of the salt content of the savoury pies' food group.*

For the 54 savoury pies' food products found, the mean value of salt content was 1.2g per 100g edible portion, the standard deviation 0.3, the minimum value was 0.5 and the maximum was 1.9g salt per 100g.

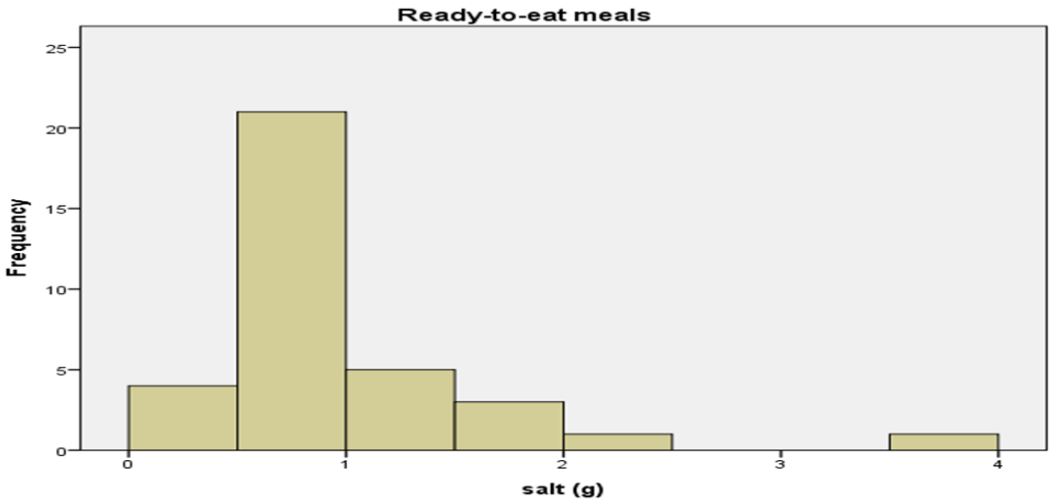


Figure 13. *Histogram of the salt content of the ready-to-eat meals' food group.*

The mean value of the salt content of the 35 ready-to-eat meals was 0.9g per 100g, the standard deviation 0.62g, the minimum value 0.01g and the maximum value was 3.6g salt per 100g edible portion.

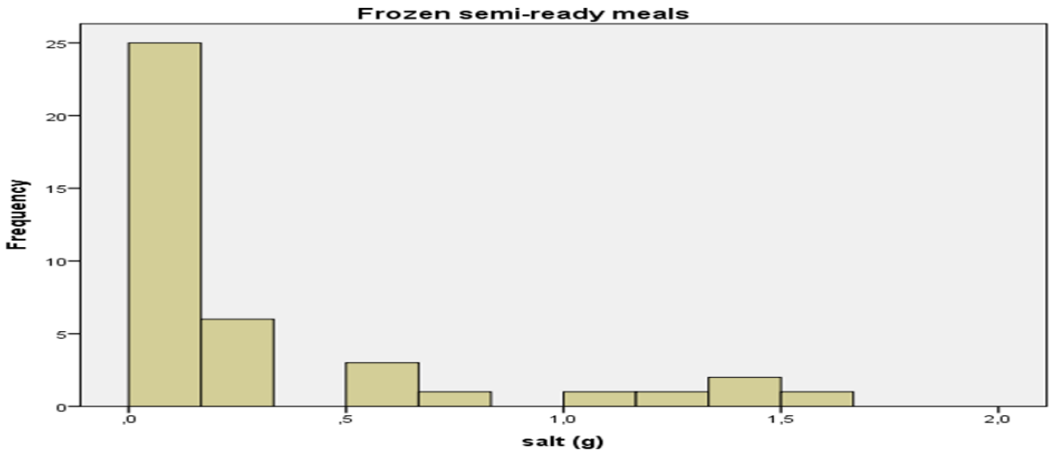


Figure 14. *Histogram of the salt content of the frozen, semi-ready meals' food group.*

For the 40 frozen, semi-ready meals entered at the database, the mean value of salt was 0.3g, the standard deviation 0.5, the minimum value 0 and the maximum 1.6g salt per 100g edible portion.

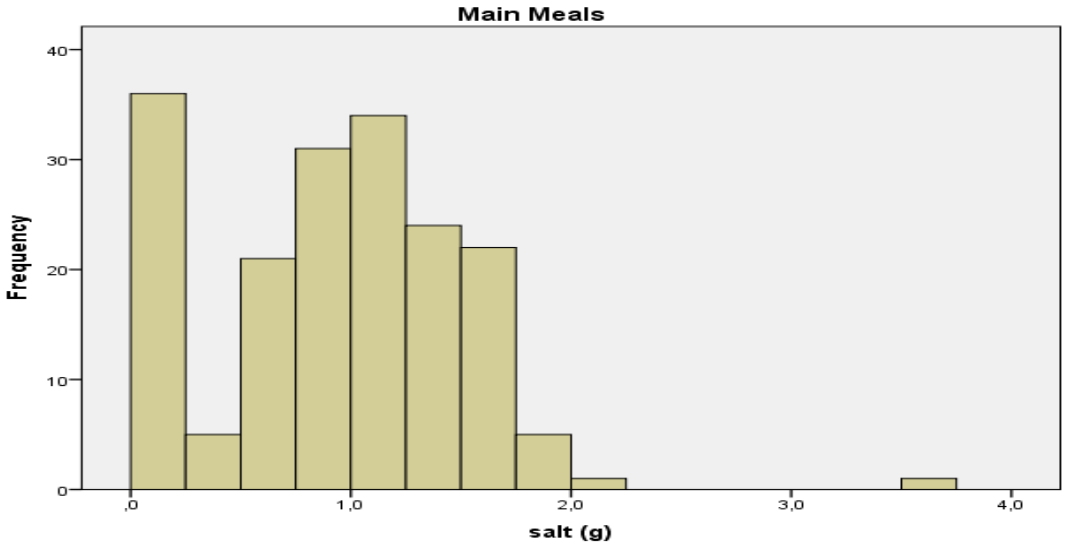


Figure 15. Histogram of the salt content of the main meals' sub-category.

For the 180 food products considered as main meals (all the previous food groups are included), the mean value of salt content is 0.9g per 100g edible portion, the standard deviation 0.6g, and the range of the values is 3.6g, with a minimum value of 0 and a maximum of 3.6g salt per 100g edible portion.

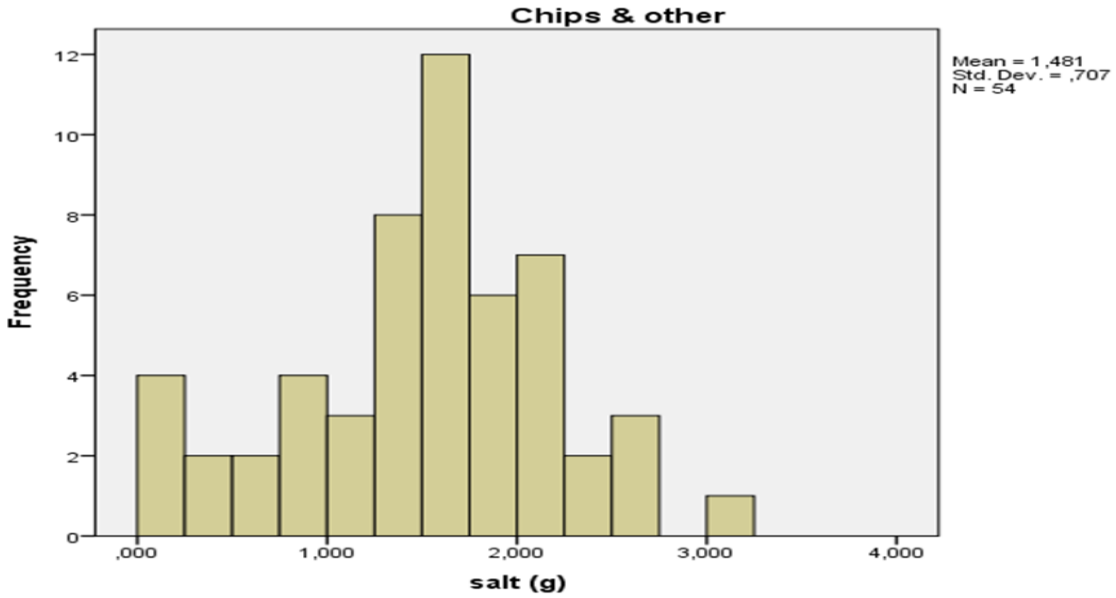


Figure 16. Histogram of the salt content of the chips & other' s food group.

For the 54 food products included at the food group chips & other (potato chips, popcorn and other savoury snacks), the mean value of salt was 1.5g per 100g edible

portion, the standard deviation was 0.7g, the minimum value was 0 and the maximum 3.3g of salt.

Figure 17. *Histogram of the salt content of the bread products' food group.*

The mean value of the salt content for the bread products' food group (crackers, breadsticks and savoury buns) was 1.4g, the standard deviation 0.7g, the minimum value was 0 and the maximum was 3.5g salt per 100g edible portion.

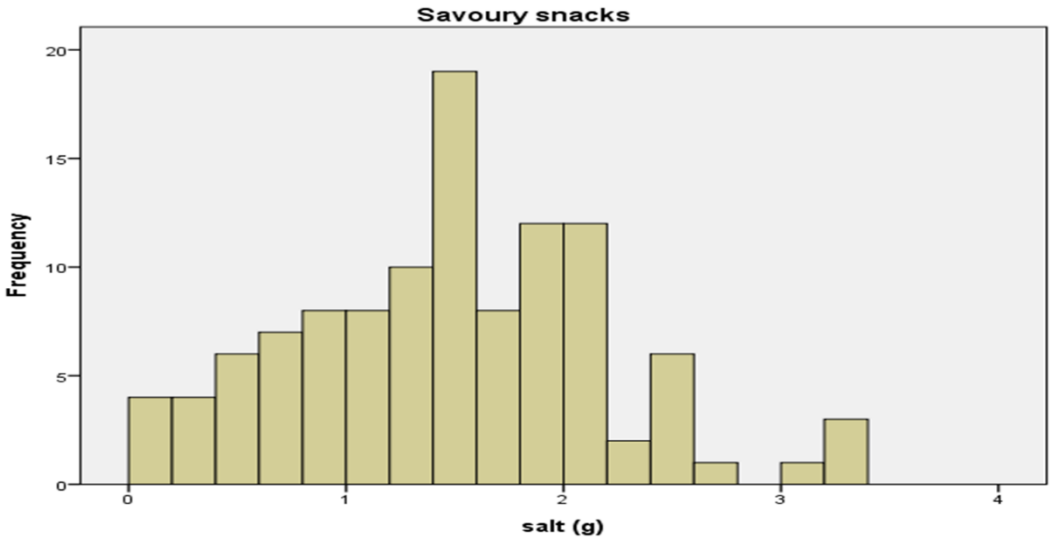


Figure 18. *Histogram of the salt content of the savoury snacks' sub-category.*

The 111 savoury snacks in total (the 2 previous food groups included) presented a mean value of 1.5g salt per 100g edible portion, the standard deviation was 0.7g, the range of the values was 3.3g per 100g, the minimum value was 0 and the maximum 3.3g.

Total fat

Figure 19. *Histogram of the total fats' content of the pizzas' food group.*

The mean value of content of total fats for the 27 pizza's food products entered at the database was 11.4g per 100g edible portion, the standard deviation was 4.1g, the minimum value was 5g and the maximum was 25g total fats.

Figure 20. *Histogram of the total fats' content of the savoury pies' food groups.*

For the 56 food products of savoury pies, the mean value was 11.6g total fats per 100g edible portion, the standard deviation 9.3g, the minimum value was 0 and the maximum was 25g.

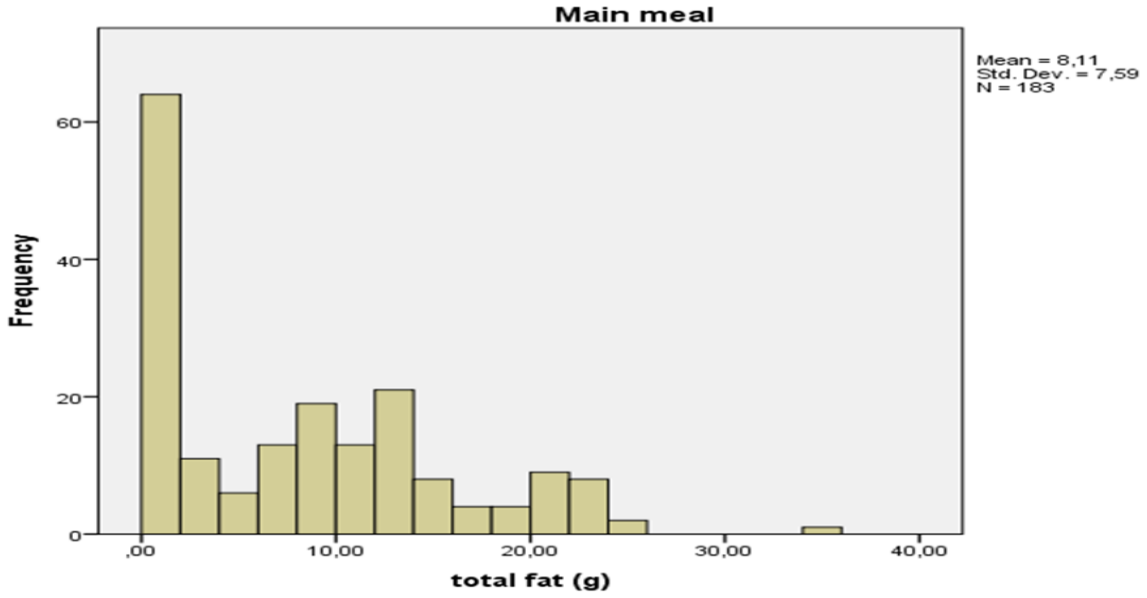


Figure 21*. Histogram of the total fats' content of the main meals' sub-category.*

For the 183 food products considered as main meals, the mean value of total fats' content was 8.1g, the standard deviation 7.6g, the range of the values was 36g, the minimum value was 0 and the maximum 36g of total fats per 100g edible portion.

Figure 22. Histogram of the total fats' content of the savoury snacks' sub-category.

The mean value of total fats' content for the 114 savoury snacks (crackers and breadsticks included) was 22g per 100g edible portion, the standard deviation was 9.8g, the range of the values was 51.4g, the minimum value was 2.5g and the maximum 53.9g of total fats.

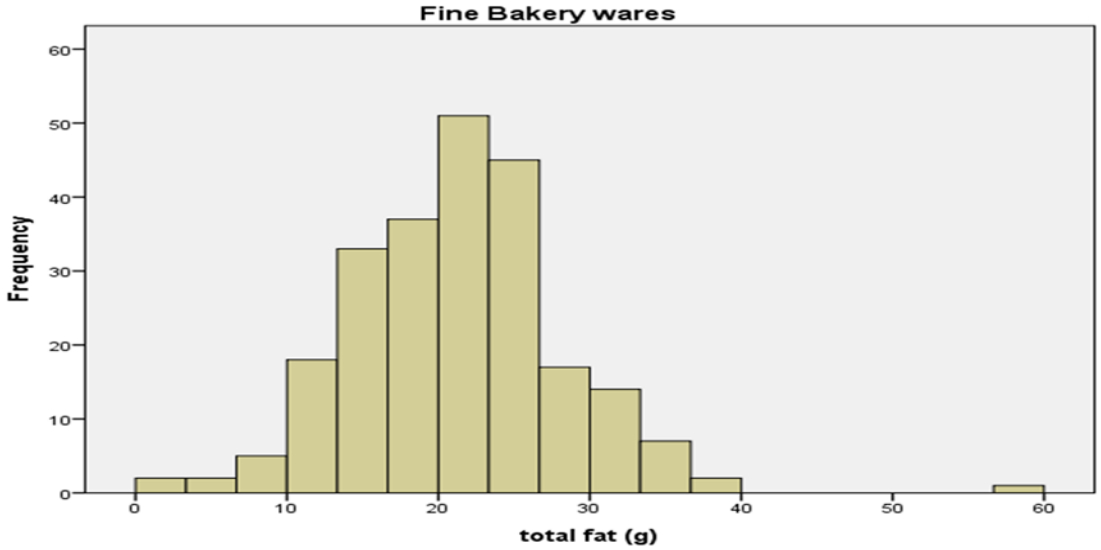


Figure 23. Histogram of the fats' content of the fine bakery wares' sub-category.

For the 234 food products considered as fine bakery wares (biscuits, cookies, wafers, cakes, croissants, brioche, sweet buns etc.), the mean value of total fats' content was 21.2g, the standard deviation 7.1g, the range of the values was 56.2g, the minimum value was 2.6g and the maximum 58.8g of total fats per 100g edible portion

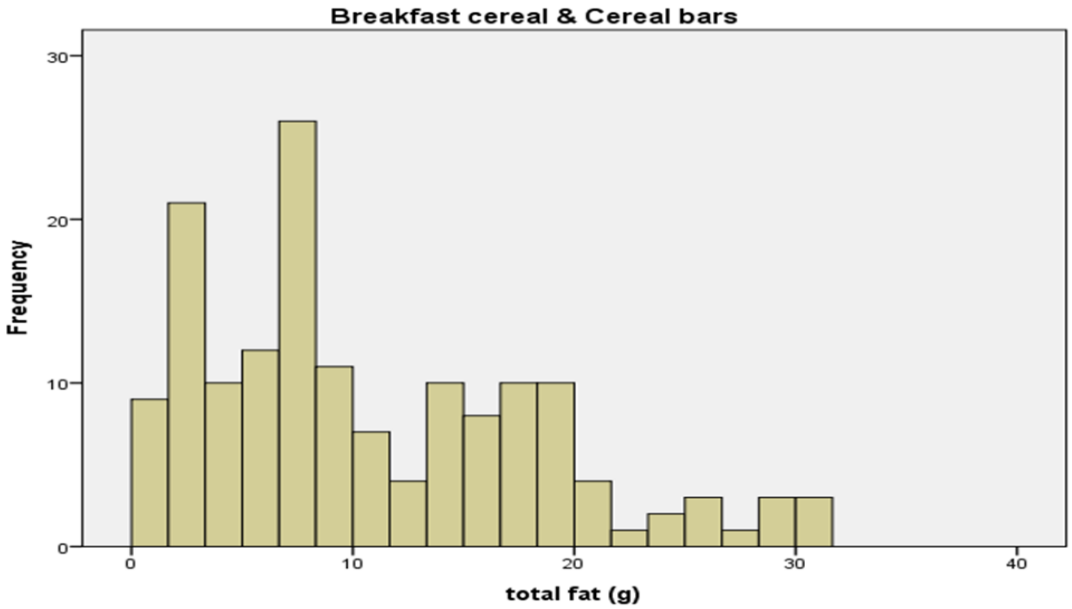


***Figure 24**. Histogram of the total fats' content of breakfast cereals & cereal bars' sub-category.*

The mean value of total fats' content for the 155 breakfast cereals and cereal bars was 10.9g per 100g edible portion, the standard deviation was 7.7g, the range of the values was 30.2g, the minimum value was 0.6g and the maximum 30.8g of total fats.

Saturated fatty acids

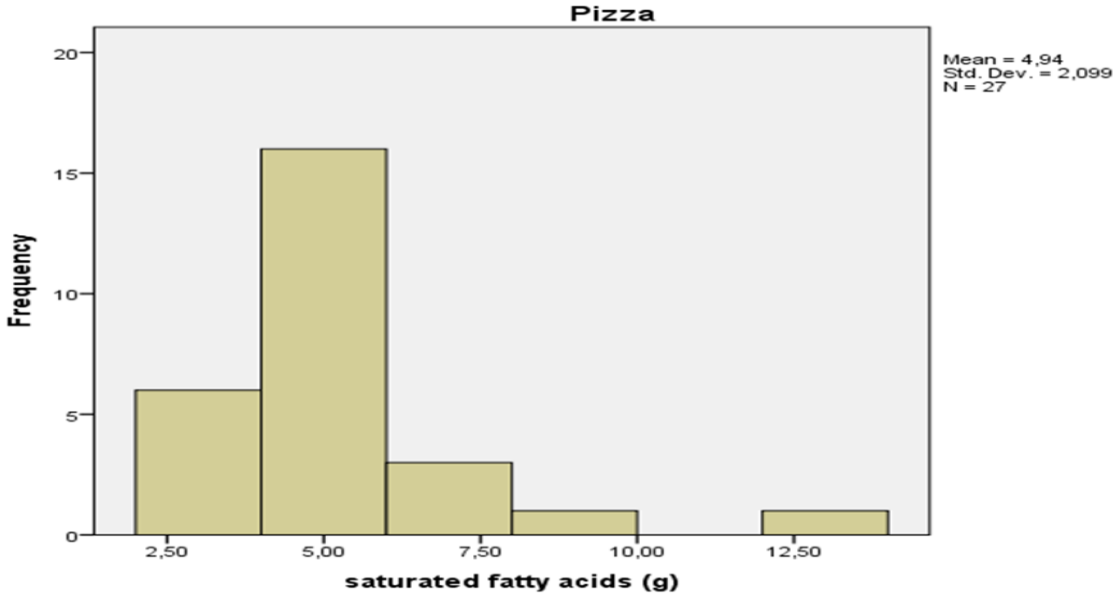


***Figure 25.** Histogram of the saturated fatty acids' content of the pizzas' food group.*

The mean value of content of saturated fatty acids for the 27 pizza's food products entered at the database was 4.9g per 100g edible portion, the standard deviation was 2.1g, the minimum value was 2.4g and the maximum was 14.2g saturated fats.

Figure 26. *Histogram of the saturated fatty acids' content of the savoury pies' food group.*

For the 56 food products of savoury pies, the mean value was 4.4g saturated fats per 100g edible portion, the standard deviation 4g, the minimum value was 0 and the maximum was 14g.

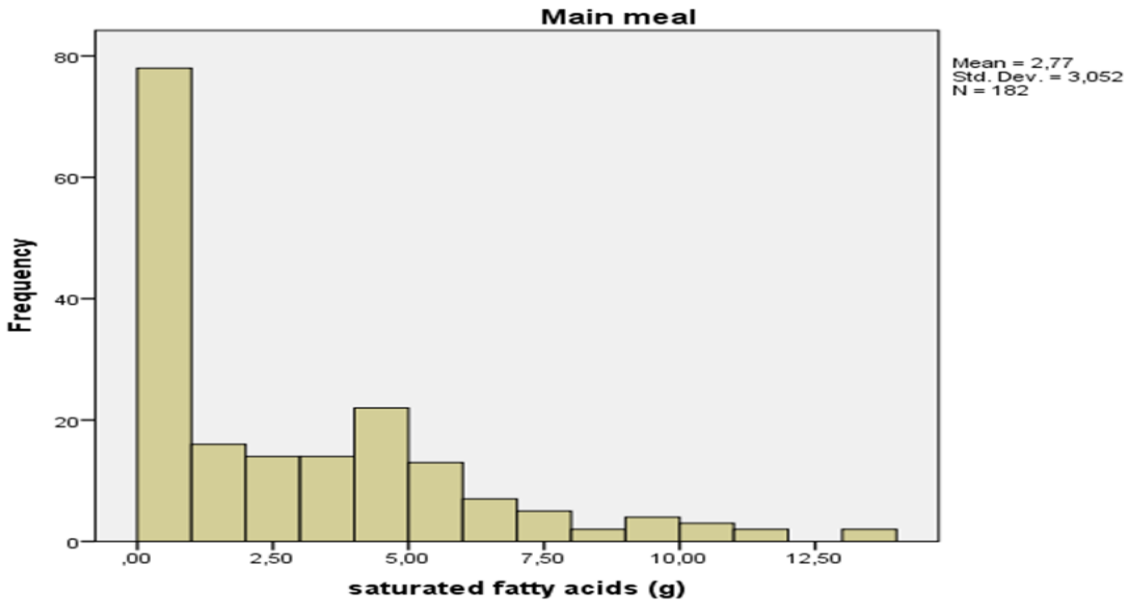


Figure 27*. Histogram of the saturated fatty acids' content of the main meals sub-category.*

For the 183 food products considered as main meals, the mean value of saturated fatty acids' content was 2.8g, the standard deviation 3.1g, the range of the values was 14g, the minimum value was 0 and the maximum 14g of saturated fatty acids per 100g edible portion.

***Figure 28**. Histogram of the saturated fatty acids' content of the savoury snacks' sab-category.*

The mean value of saturated fats' content for the 109 savoury snacks' (crackers and breadsticks included) available data was 7.3g per 100g edible portion, the standard deviation was 5.3g, the range of the values was 19.7g, the minimum value was 0.3g and the maximum, 20g of saturated fatty acids.

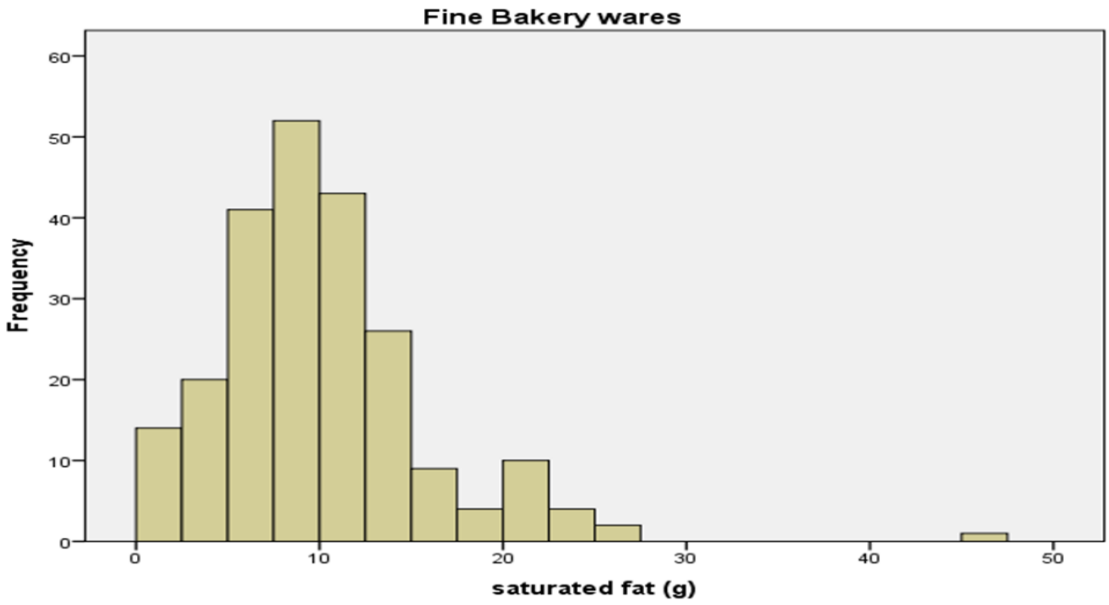


Figure 29. *Histogram of the saturated fatty acids' content of the fine bakery wares' sub-category.*

For the 226 fine bakery wares' products that mentioned the saturated fatty acids' content, the mean value was 10g, the standard deviation 5.6g, the range of the values was 46g, the minimum value was 0.6g and the maximum 46.6g of total fats per 100g edible portion

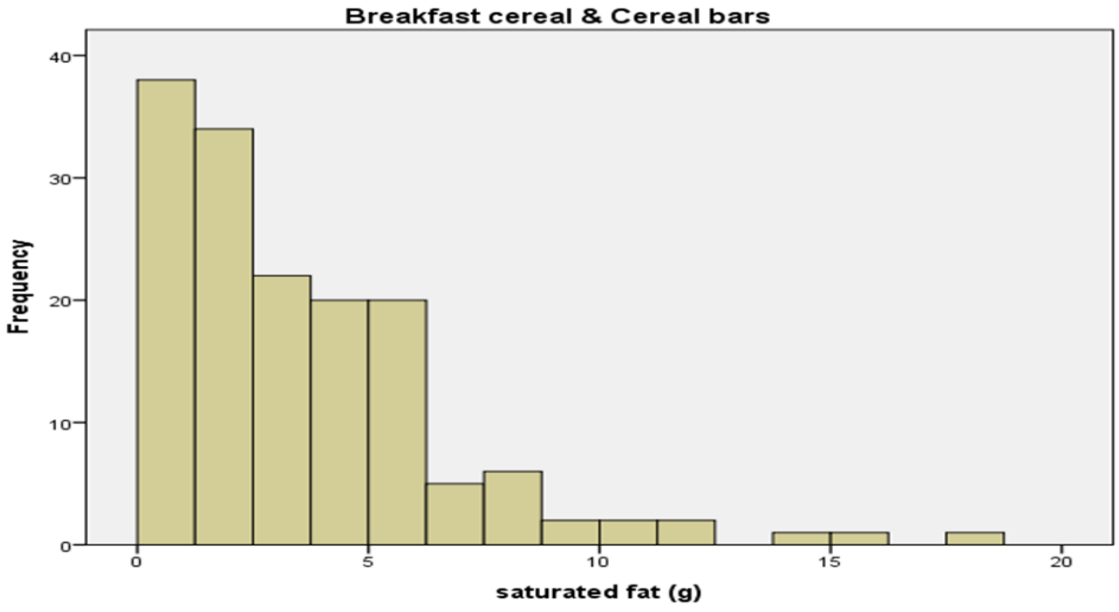


Figure 30*. Histogram of the saturated fatty acids' content of the breakfast cereal & cereal bars' sub-category.*

The mean value of saturated fats' content for the 154 breakfast cereals and cereal bars, was 3.5g per 100g edible portion, the standard deviation was 3.1g, the range of the

values was 17.6g, the minimum value was 0.1g and the maximum 17.7g of saturated fatty acids.

Total sugars

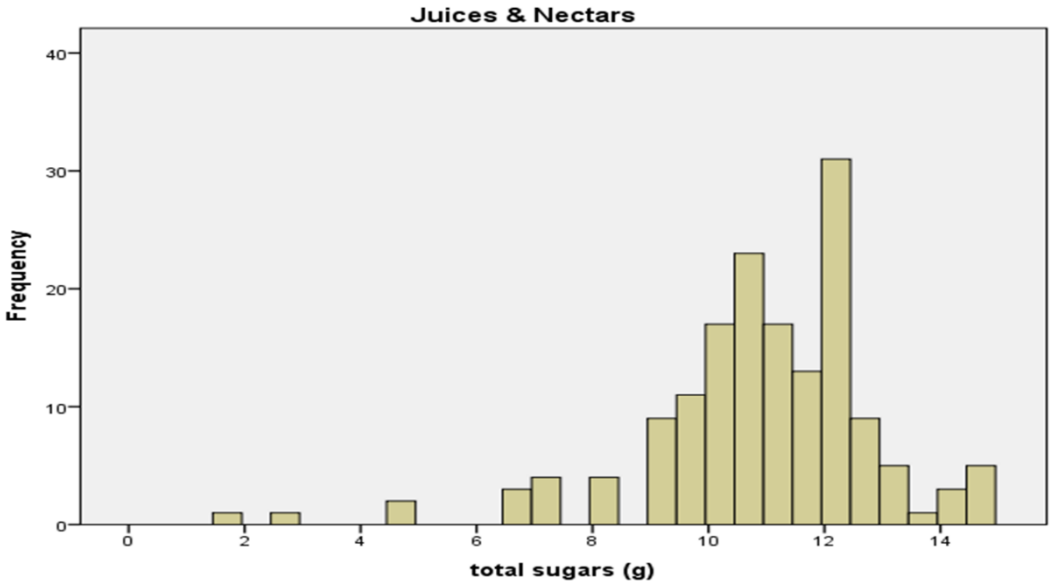


***Figure 31**. Histogram of the total sugars' content of the Juices & Nectars' sub-category.*

For the 159 juices and nectars entered at the database, the mean value of the content of total sugars was 10.9g, the standard deviation was 2, the range of the values was 13.2 g, the minimum value was 1.7g and the maximum was 14.9g of total sugars per 100mL edible portion.

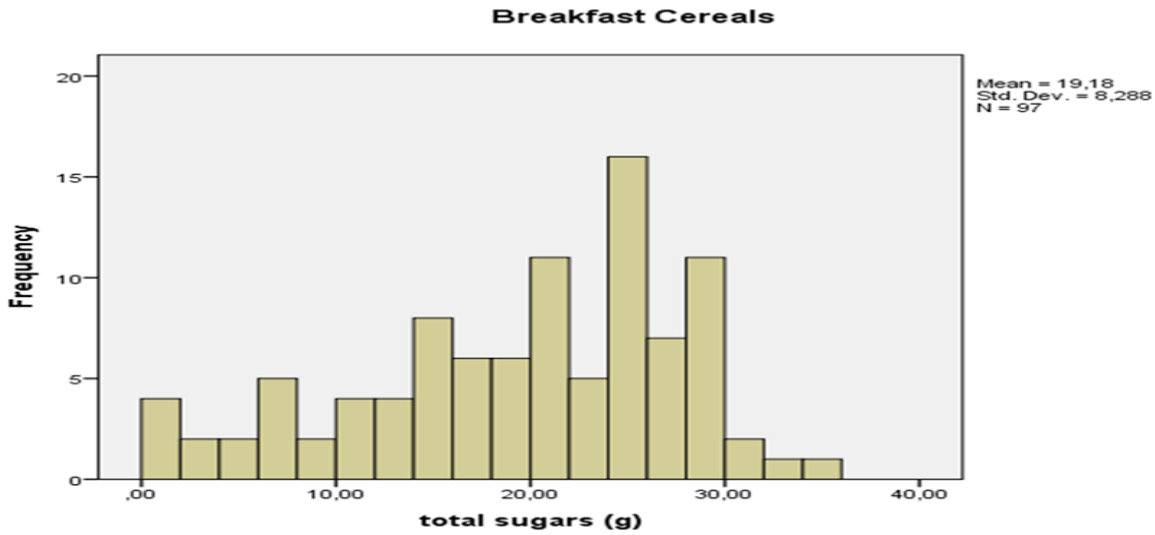


***Figure 32.** Histogram of the total sugars' content of the breakfast cereals' food group.*

For the 97 breakfast cereal products, the mean value of the total sugars' content was 19.2g per 100g edible portion, the standard deviation 8.3g, the minimum value was 0 and the maximum was 36g total sugars.

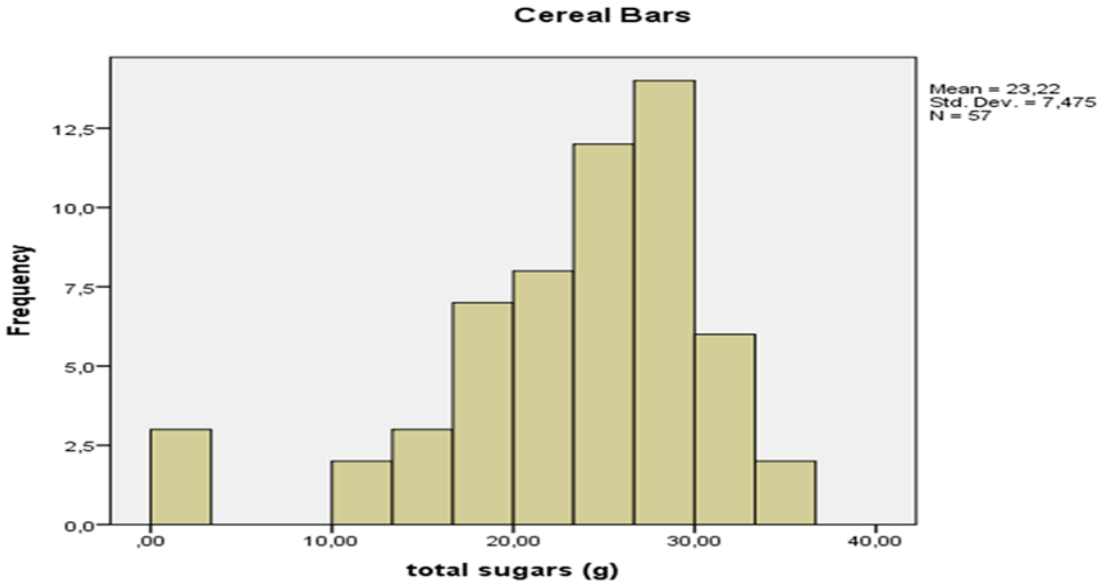


Figure 33. *Histogram of total sugars' content of the cereal bars' food group.*

For the 57 cereal bars entered at the database, the mean value was 23.2g of total sugars per 100g edible portion, the standard deviation was 7.5g, the minimum value 0 and the maximum 36.7g of total sugars.

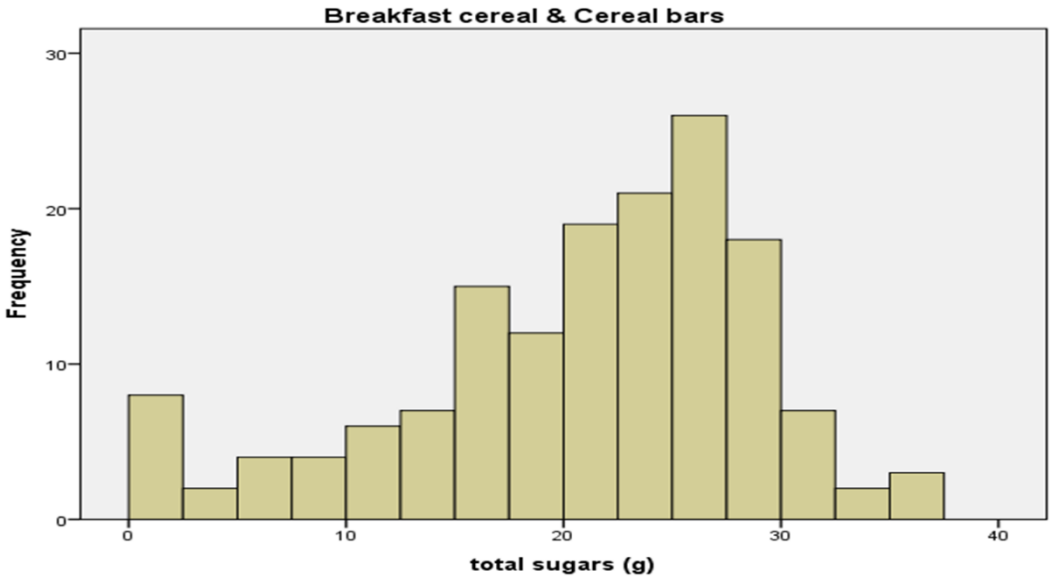


Figure 34. *Histogram of the total sugars' content of the breakfast cereal & cereal bars' sub-category.*

The mean value of total sugars' content for the 154 breakfast cereals and cereal bars, was 20.7g per 100g edible portion, the standard deviation was 8.2g, the range of the values was 35.1g, the minimum value was 0.3g and the maximum 35.4g of total sugars.

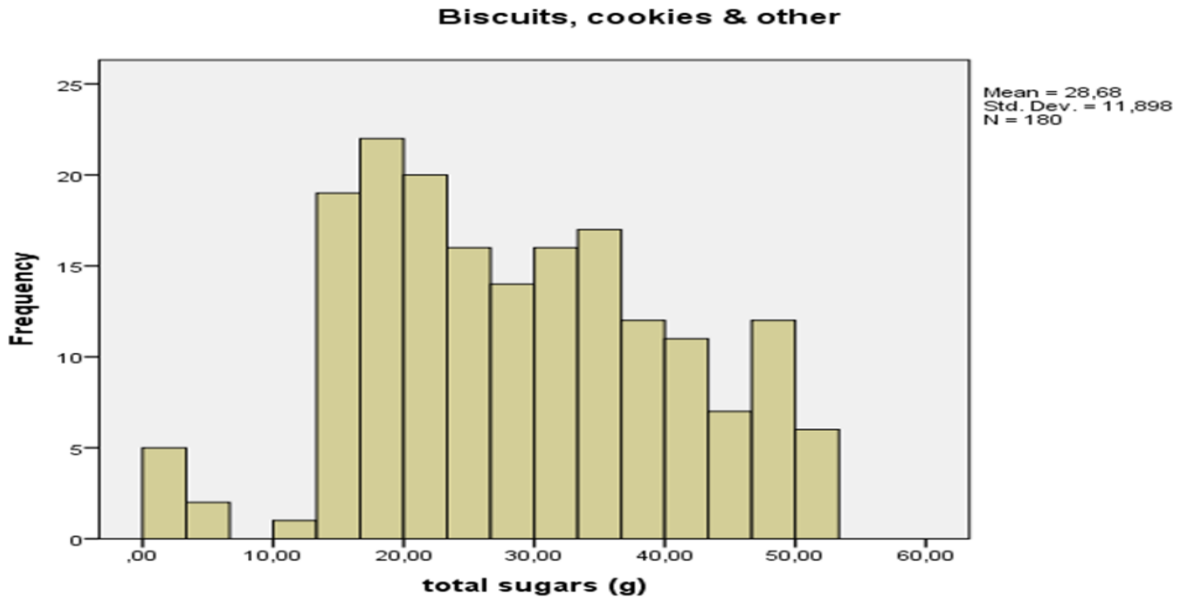


Figure 35*. Histogram of the total sugars' content of the biscuits, cookies & others' food group.*

For the 180 products of the food group biscuits, cookies & other (includes sweet buns and wafers), the mean value of total sugars was 28.7g, the standard deviation 11.9, the minimum value 0 and the maximum 53.3g of total sugars per 100g edible portion.

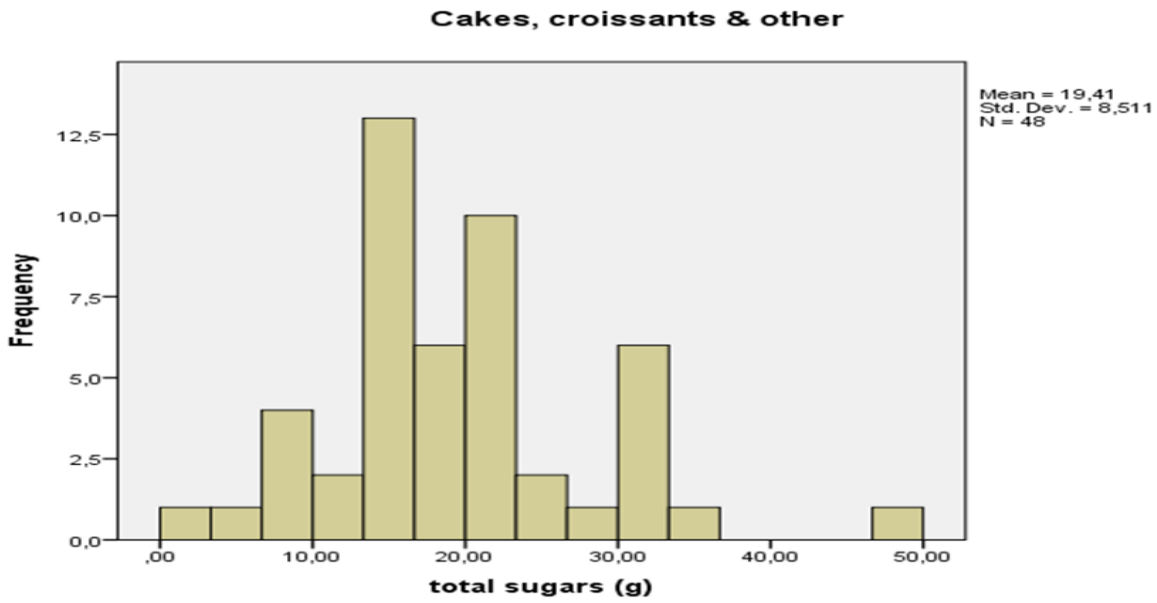


Figure 36. *Histogram of the total sugars' content of the cakes, croissants & others' food group.*

For the 49 products of the food group cakes, croissants & other (includes brioche, doughnuts, waffles and sweet pies) the mean value of total sugars was 19.4g per 100g edible portion, the standard deviation 8.5g, the minimum value 0 and the maximum 50g of total sugars.

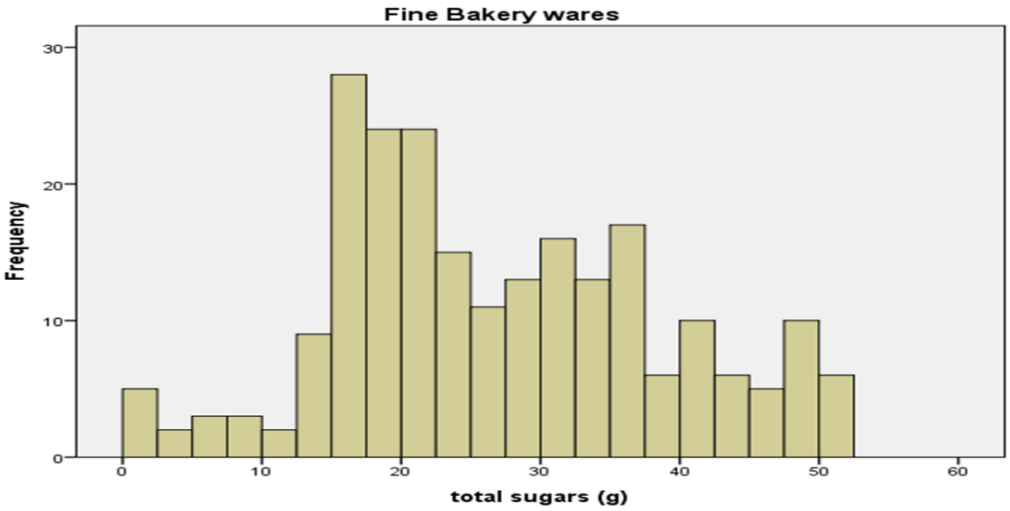


Figure 37*. Histogram of the total sugars' content of the fine bakery wares' sub-category.*

For the 228 fine bakery wares' products the mean value of total sugars' content was 26.7g, the standard deviation 11.9g, the range of the values was 51.5g, with a minimum value of sugars 0.5g and a maximum, 52g of total sugars per 100g edible portion

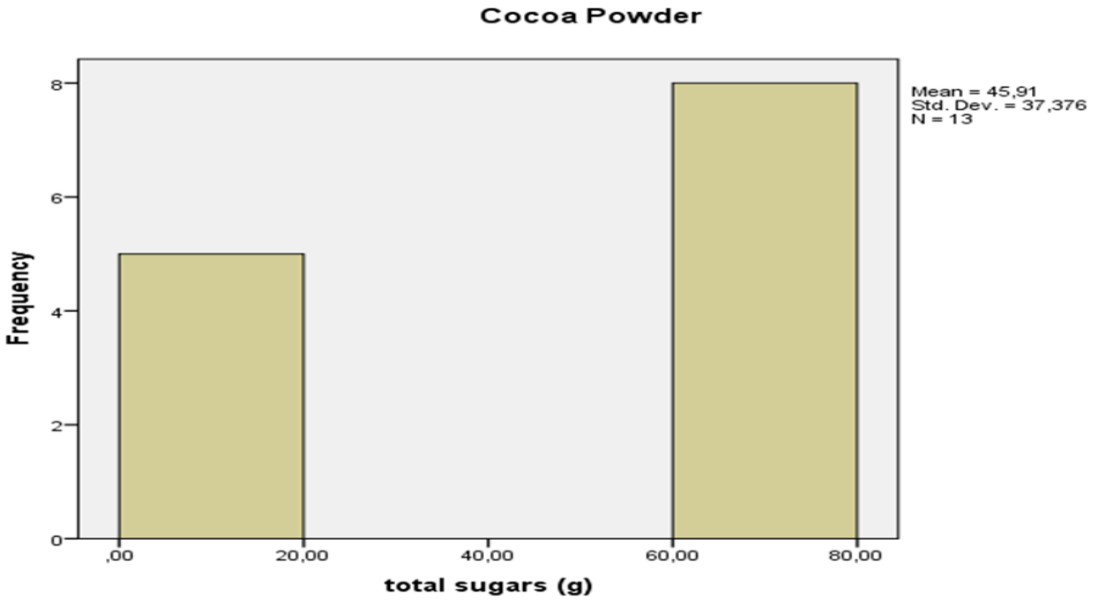


Figure 38. *Histogram of the total sugars' content of the cocoa powder' s food group.*

For the 13products of cocoa powder the mean sugars' value was 45.9g, the standard deviation 37.4g, the minimum value 0 and the maximum, was 80g of total sugars per 100g.

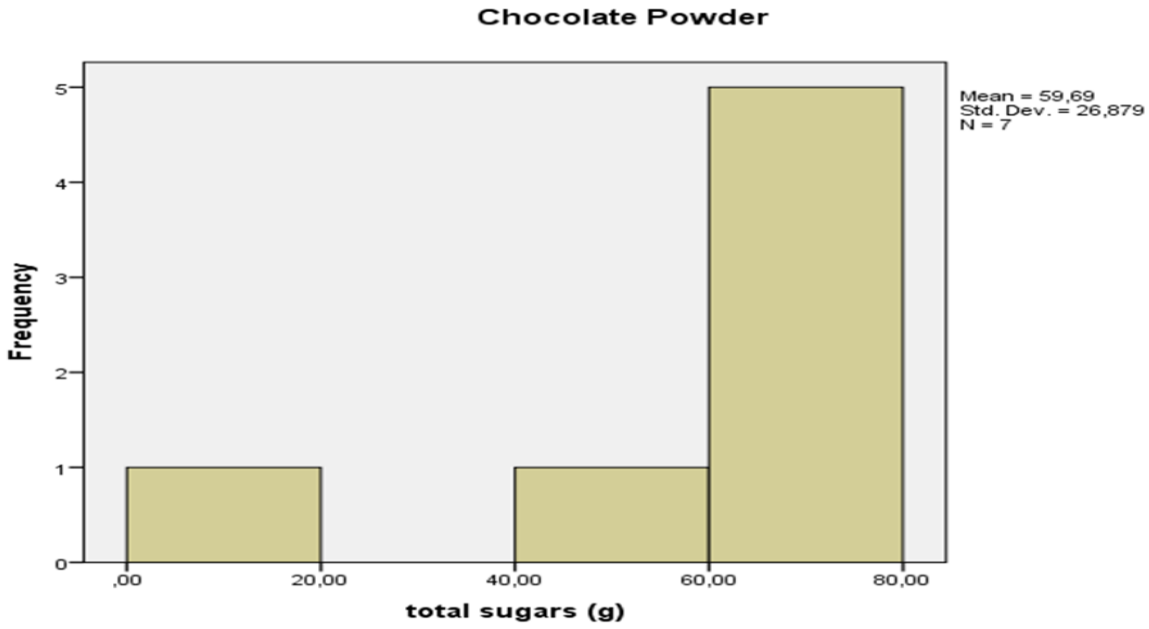


Figure 39. *Histogram of the total sugars' content of the chocolate powder' s food group.*

For the 7 chocolate powder products found at the online sales' platform, the mean value of total sugars was 59.7g, the standard deviation 26.9g, the minimum value was 0 and the maximum 80g of total sugars.

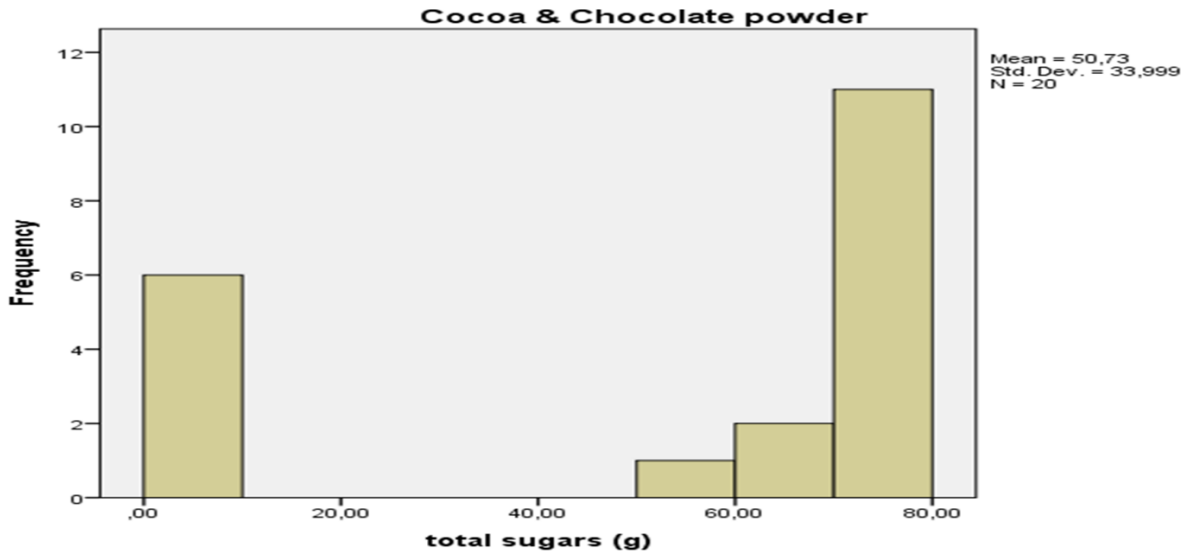


***Figure 40**. Histogram of the total sugars' content of the cocoa & chocolate powder's sub-category.*

For the 20 products of cocoa and chocolate powder in total, the mean sugars' value was 50.7g, the standard deviation 34g, the range of the values was 80g per 100g edible portion, the minimum value was 0 and the maximum was 80g.

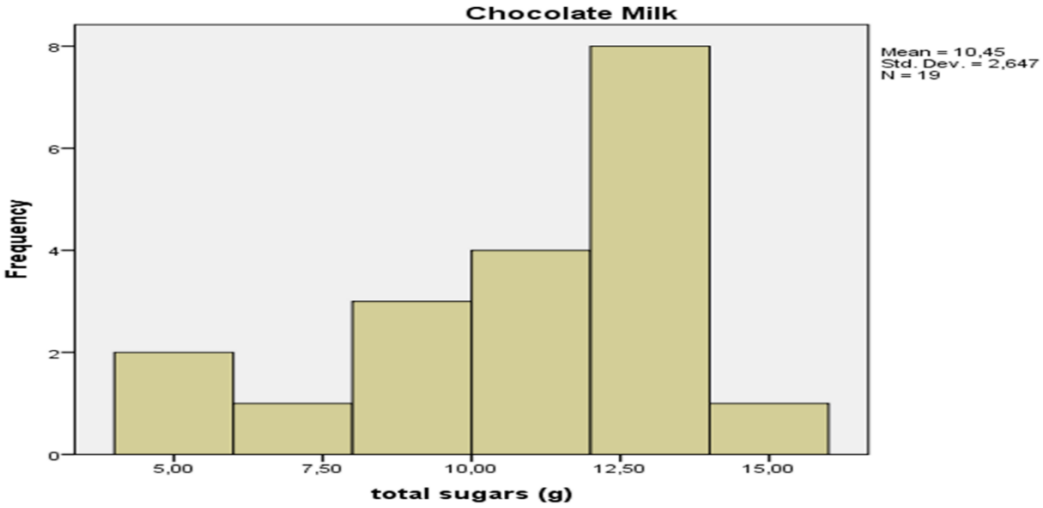


***Figure 41.** Histogram of the total sugars' content of the chocolate milks' food group.*

The mean value of the total sugars' content of the 19 chocolate milk products was 10.5g per 100mL edible portion, the standard deviation was 2.7g, the minimum value was 4g and the maximum 16g of total sugars per 100mL.

Completeness of data

The completeness of data provided by the food labels was calculated per macronutrient, per food group. Percentages of completeness were calculated too. Except from the macronutrients, energy content was also included at the calculations. (Tables 7, 8)

The number of missing values per nutrient is not necessarily equal to the number of products that do not mention the specific macronutrient to their nutrition declaration. Due to the methodology followed for the data entrance and the use of uploaded photographs, a small percentage of data has been lost at first place, due to problems such as the sharpness of the available photographs or lack of available photographs of all the sides of the packaging.

The percentages of the completeness of data have been calculated after removing the minimum number of products that have a missing value for all the macronutrients mentioned at the table (Table 8).

The completeness of data for energy, protein and total fat, for the majority of cases is 100% and at every case is over 90% at all food groups, for saturated fatty acids and total sugars the percentage of completeness goes beyond 85%, while for carbohydrates and salt is over 78%, with the exception of the potato products' group, where the percentage of carbohydrates mentioned at the nutrition declaration is 0. In contrast, except from the bread products' food group (crackers, breadsticks, savoury buns) that mention trans fatty acids at their nutrition declaration at a percentage 10.53% and breakfast cereals and cereal bars at a percentage 0.65%, at no other food groups trans fats are mentioned. Last but not least, the completeness of data for fiber depends, probably, on the food group, as its percentages range from 0 to 100%

It is worth mentioning that, according to the legislation about food labelling in Europe and particularly, according to the directive 90/496/EEC (Nutrition labelling for foodstuffs) of the Regulation (EU) No 1169/2011 on the provision of food information to consumers entered into application on 13 December 2014, the mandatory nutrition declaration shall include the following; energy value; and the amounts of fat, saturates, carbohydrate, sugars, protein and salt, which means that it excludes the mandatory declaration of fiber and also replaces sodium with salt.

Table 7. *Completeness of data of the online sales' platform per macronutrient, per food group.*

Food Group	Products' number	Energy	Protein	Total Fat	Saturated Fat	Trans	Carbohydrates	Sugars	Fiber	Salt
Milk	valid values	200	195	197	186	0	197	186	41	184
	missing values	9	14	12	23	209	12	23	168	25
Yogurt	valid values	116	116	117	110	0	116	109	16	110
	missing values	11	11	10	17	127	11	18	111	17
Juice	valid values	162	162	162	157	0	162	159	86	159
	missing values	3	3	3	8	165	3	6	79	6
Breakfast cereal & cereal bars	valid values	155	154	155	154	1	155	154	147	153
	missing values	1	2	1	2	155	1	2	9	3
Frozen Vegetables	valid values	64	64	64	62	0	64	62	62	62
	missing values	7	7	7	9	71	7	9	9	9
Pizza	valid values	28	26	27	27	0	26	27	14	27
	missing values	1	3	2	2	29	3	2	15	2
Savoury Pie	valid values	56	55	56	56	0	57	56	32	54
	missing values	1	2	1	1	57	0	1	25	3
Cocoa & Chocolate Powder	valid values	20	20	20	20	0	20	20	0	20
	missing values	0	0	0	0	20	0	0	20	0
Soups, Cubes & Broths	valid values	55	55	55	55	0	55	55	52	55
	missing values	0	0	0	0	55	0	0	3	0
Sauces & Dressings	valid values									
	missing values									
Potato Products	valid values	18	19	19	19	0	0	18	19	19
	missing values	3	2	2	2	21	21	3	2	2
Soft Drinks	valid values									
	missing values									
Chips & Others	valid values	57	57	57	53	0	45	53	51	54
	missing values	9	9	9	13	66	21	13	15	12
Bread Products (crackers & breadsticks)	valid values	56	57	57	57	6	50	56	55	57
	missing values	7	6	6	6	57	13	7	8	6
Ready-to-eat meals	valid values	35	35	35	35	0	35	35	35	35

	missing values	6	6	6	6	41	6	6	6	6
Fish & Seafood	valid values	7	7	7	7	0	7	7	7	7
	missing values	0	0	0	0	7	0	0	0	0
Biscuits, Cookies & Others	valid values	185	183	183	179	0	182	180	154	181
	missing values	14	16	16	20	199	17	19	45	18
Cakes, Croissants & Others	valid values	55	52	51	47	0	51	48	33	46
	missing values	28	31	32	36	83	32	35	50	37
Frozen Ready-to-eat dish	valid values	41	39	41	40	0	39	40	38	40
	missing values	0	2	0	1	41	2	1	3	1
Fruits	valid values									
	missing values									
Nuts	valid values									
	missing values									
Eggs	valid values									
	missing values									

Table 8. *Percentages of the completeness of data per macronutrient, per food group.*

Food Group	Energy	Protein	Total Fat	Saturated Fat	Trans	Carbohydrates	Sugars	Fiber	Salt
Milk	100%	97,50%	98,50%	93%	0%	98,50%	93%	20,50%	92%
Yogurt	99,15%	99,15%	100%	94,02%	0%	99,15%	93,16%	13,68%	94,02%
Juice	100%	100%	100%	96,91%	0%	100%	98,15%	53,09%	98,15%
Breakfast cereal & cereal bars	100%	99,36%	100%	99,36%	0,65%	100%	99,36%	94,84%	98,71%
Frozen Vegetables	100%	100%	100%	96,88%	0%	100%	96,88%	96,88%	96,88%
Pizza	100%	92,86%	96,43%	96,43%	0%	92,86%	96,43%	50%	96,43%
Savoury Pie	98,25%	96,49%	98,25%	98,25%	0%	100%	98,25%	56,14%	94,74%
Cocoa & Chocolate Powder	100%	100%	100%	100%	0%	100%	100%	0%	100%
Soups, Cubes & Broths	100%	100%	100%	100%	0%	100%	100%	94,55%	100%
Sauces & Dressings									
Potato Products	94,74%	100%	100%	100%	0%	0%	94,74%	100%	100%
Soft Drinks									
Chips & Others	100%	100%	100%	92,98%	0%	78,95%	92,98%	89,47%	94,74%
Bread Products (crackers & breadsticks)	98,25%	100%	100%	100%	10,53%	87,72%	98,25%	96,49%	100%
Ready-to-eat meals	100%	100%	100%	100%	0%	100%	100%	100%	100%

Fish & Seafood	100%	100%	100%	100%	0%	100%	100%	100%	100%
Biscuits, Cookies & Others	100%	98,92%	98,92%	96,76%	0%	98,38%	97,30%	83,24%	97,84%
Cakes, Croissants & Others	100%	94,55%	92,73%	85,46%	0%	92,73%	87,27%	60%	83,64%
Frozen Ready-to-eat dish	100%	95,12%	100%	97,56%	0%	95,12%	97,56%	92,68%	97,56%
Fruits									
Nuts									
Eggs									

Claim Existence

Preliminary statistical analysis was carried out to assess the prevalence of claims in the Greek packaged food supply.

The term claim includes the nutrition and the health claims, as well as health-related claims (special diet claims, natural claims), environmental claims (include claims for organic/ biological products and other environment-related claims) and other claims, which include every other comment mentioned at the front of package that did not fit to anyone of the previous categories of claims.

Other labelling indicators collected at the claims excel file are quality schemes, the Greek origin of the products, whether the products are wholegrain, for kids or are mentioned as fortified. An example of the findings of the preliminary statistical analysis carried out to assess the prevalence of claims at the food group 'plant-based beverages' (n=35), is shown at the following figure (Figure 41).

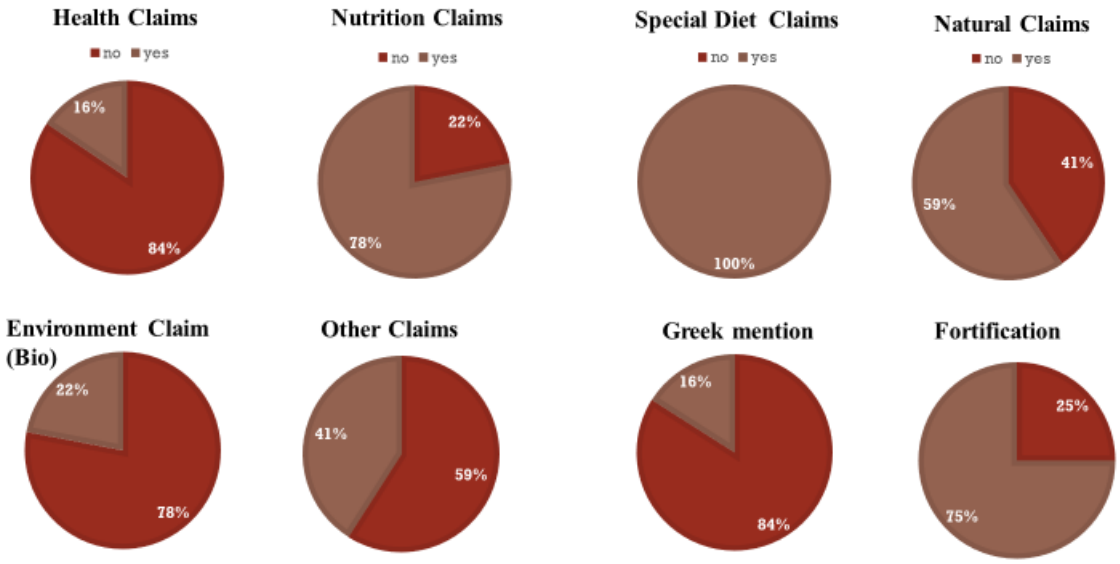


Figure 42. *Chart pies representing the percentages of the prevalence of claims and labelling indications referring to the Greek origin and fortification of the food products composing the plant-based beverages' food group.*

Chart pies demonstrate the percentage of the products bearing a claim or other labelling indicators against the products that do not. 16% of the plant-based beverages bear at least one health claim, while the percentage of the plant-based beverages bearing at least one nutrition claim is almost 80%. All products carry a special diet claim, 59% of these, carry a natural claim, 22% is characterized as an organic product, while 41% of the food products carry another claim that did not fit to anyone of the previous claims' categories. 16% are mentioned or indicate their Greek origin, while 75% of the plant-based beverages are fortified.

Pilot utility testing of the HELth BFCD

In this section, the utility of the HELth BFCD will be tested. Three examples of the potential uses of this database will be shorty presented.

Food Reformulation

Obesity and overweight prevalence are high in Europe. Although individuals have some responsibility in making healthier food choices, the food environment plays a determinant role in influencing these choices (Brinsden, et al., 2013), (Vandevijvere & Swinburn, 2014). Many countries are now making efforts towards improving the nutritional quality of the food supply chain. To align with these principles, the Greek government has also published an action plan for the food reformulation. The concept of reformulation is not new, as in Europe, reformulation has already been used to successfully reduce the amount of salt and industrially-produced trans-fatty acids in widely consumed processed foods (He, et al., 2014), (Hyseni, et al., 2017).

Reformulation models highlight relevant improvements in diets and population health (Federici, et al., 2019). Investing in prevention and improved control of NCDs will reduce premature death and preventable morbidity and disability, and improve the quality of life and well-being of people and societies. No less than 86% of deaths and 77% of the disease burden in the WHO European Region are caused by this broad group of disorders, which show an epidemiological distribution with great inequalities reflecting a social gradient, while they are linked by common risk factors, underlying determinants and opportunities for intervention. (WHO, 2012).

Greece's National Action Plan on Food Reformulation was drawn up by the 'Working Group for the configuration of an Action Plan on Food Reformulation', established by the General Secretary of Public Health of the Greek Ministry of Health. The Action Plan on Food Reformulation was approved by the National Nutrition Policy Committee at 4th October 2017.

The first pillar of the Action Plan (Figure 42) is the evaluation of current situation by retrieving data from population studies, as well as by establishing a database of the nutrient content of processed food (from chemical analysis and food labelling), mainly in relation to; total sugars, total lipids, saturated fatty acids, trans fatty acids, salt, energy, portion/size (whenever possible).

The previous description mentioned at the Greek National Action Plan on Food Reformulation perfectly fits in the HELth BFCD, which is a database of the nutrient content of processed food (from food labelling), mainly in relation to the majority of the nutrients and indicators mentioned previously.

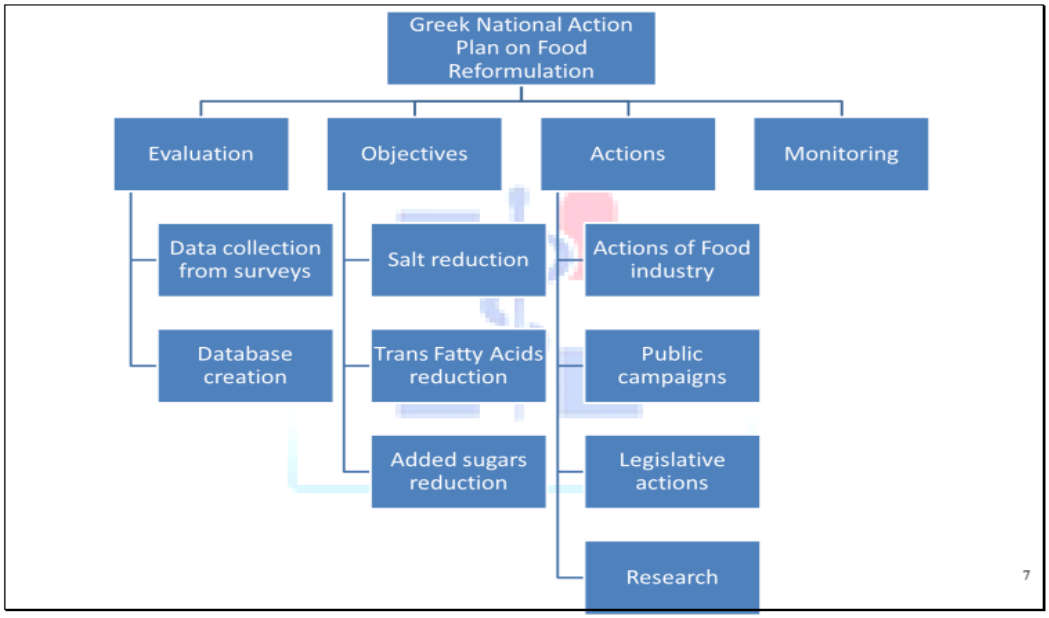


***Figure 43**. The four pillars of the Greek National Action Plan on Food Reformulation.*

What is more, the second pillar of the Action Plan is composed by its objectives and the goal setting. Its primary aim is the reduction of salt, industrially produced fatty acids and added sugars. The first objective would be to lower the content of these nutrients in specific food categories, and then to set upper limits.

However, as the HELth BFCD uses exclusively food labelling as data source, no sufficient data are available for trans fatty acids, neither for added sugars. On the other hand, the completeness of data is satisfying for saturated fatty acids and total sugars, which could be respective goals to the ones mentioned at the Action Plan, for food reformulation.

Indeed, the preliminary findings of the HELth BFCD for the content of salt, saturated fat and total sugars show a wide range of values at all the food groups studied. At the same time, not only the outliers, but also in some cases, the mean values of the content of these disqualifying components can be considered as high, according to the Food Standards Agency (Figure 43). The combination of these two facts, indicates not only the ability, but even the necessity for food reformulation.

Food Standards Agency

	Sugars	Fat	Saturates	Salt
What is high per 100g	Over 15g	Over 20g	Over 5g	Over 1.5g
What is medium per 100g	Between 5g and 15g	Between 3g and 20g	Between 1.5g and 5g	Between 0.3g and 1.5g
What is low per 100g	5g and below	3g and below	1.5g and below	0.3g and below

***Figure 44**. The limits of the grams of sugars, total and saturated fats and salt for the characterization of the product's content as high, medium or low, for the Traffic Lights FoP Labelling, according to the Food Standards Agency.*

The evidence mentioned above indicate that the HELth BFCD could guide on the food reformulation by providing the baseline and the capacity of choosing the best food reformulation scenario according to the Greek current food supply status.

FoP Labelling

FOP nutrition labels are designed to simplify nutritional information presented on-pack to help consumers make healthier food choices, and stimulate healthy product reformulation. WHO recommends FOP labelling as a policy tool to tackle the global epidemic of obesity and diet-related NCDs (Kanter, et al., 2018), (WHO Regional Office for Europe, 2014). Many different FOP nutrition labels have been introduced worldwide, while across Europe, many food manufacturers and retailers have started to use these different FOP labels on their products (van der Bend & Lissner, 2019).

Nutrient profiling (NP), defined as the science of classifying foods according to their nutritional composition for the purpose of promoting health and preventing disease, is a relatively new term in the field of nutrition research (WHO, 2010), (WHO, 2018). The term NP gained ground following the development of the Ofcom model by the UK Food Standards Agency in 2004 to 2005 (Rayner, et al., 2004), (Rayner, et al., 2005) and the mention of nutrient profiles in Regulation (EC) No 1924/2006 on nutrition and health claims by the European Commission in 2006 (European Commission , 2012). In 2010, NP became even more widely known when the WHO provided its Member States with a set of recommendations on the marketing of foods and beverages to children, one of which advocated the use of NP models for defining the products to be covered by the marketing restrictions (WHO, 2010). Globally, NP is now recognized as a transparent and reproducible method of evaluating the healthfulness of foods (Poon, et al., 2018), and for its use in numerous applications in government and industry (e.g. FOP food labelling, food taxes, reformulation) (Rayner, 2017), (Rayner, et al., 2013).

Table 9. *Methodology and expression of the characteristics of the FoP Labelling/NP Systems.*

	Methodology						Expression			
FoP Labelling/ NP Systems	Components	Reference unit	Measurement/ method	Coverage	Methodological approach	Purpose	Driver	Directivity	Tone of voice	Utilization
Keyhole	Qualifying, disqualifying	100g/ml, 100kcal/kJ, per serving, energy%	Threshold	Differs per label	Category specific	Help consumer, Reformulation	Governmental, NGO	Directive	Positive	Voluntary
Choices Programme	Qualifying, disqualifying	100g/ml, 100kcal/kJ, per serving, energy%	Threshold	Differs per label	Category specific	Help consumer, Reformulation	Governmental, NGO	Directive	Positive	Voluntary
Nutriscore	Qualifying, disqualifying	100g/ml	Threshold, scoring	Not all products	Across-the-board	Help consumer, Reformulation	Governmental	Directive	Mixed	Voluntary
Multiple Traffic Light	Disqualifying	100g/ml, per serving	Threshold	All products	Across-the-board	Help consumer	Governmental	Semi-Directive	Mixed	Voluntary
Israeli Warning Label	Disqualifying	100g/ml	Threshold	Not all products	Across-the-board	Help consumer, Reformulation	Governmental	Directive	Negative	Mandatory

Chile's	Disqualifying		Threshold		Across-the-board	Help consumer, Reformulation	Governmental	Directive	Negative	Mandatory
Ofcom	Qualifying, disqualifying	100g/ml	Threshold, scoring	Not all products	Across-the-board	Help consumer, Marketing to children	Governmental	Directive	Mixed	Voluntary
NNPS	Qualifying, disqualifying	per serving	Threshold,		Category specific	Reformulation	Governmental	Directive	Mixed	Voluntary

The Keyhole label is the longest-standing FOP label in Europe. It is a positive and directive label, aiming to help consumers to choose healthier food products within a product category, i.e., by using food-category-specific criteria, but also to stimulate healthy product reformulation. The Keyhole criteria do not apply to all products; hedonic products, such as sweets or snacks, have been excluded The Keyhole criteria are based on threshold values and expressed per 100 g/100 ml, per serving and in energy%, and they include both qualifying and disqualifying components. Energy is included as both a disqualifying and qualifying component. Food additives or novel food with sweetening properties are specifically mentioned as disqualifying components (van der Bend & Lissner, 2019).

The Choices International Foundation was founded in 2007, originally as an industry initiative, and has since then developed into a global platform for collaboration with industry, independent scientists, non-governmental organisations (NGOs) and health authorities, aiming to stimulate healthier food choices, and product reformulation. The Choices criteria are food-category specific. In contrast to Keyhole, the Choices criteria have been developed for all types of foods, including hedonic products, such as snacks, sweets and soft drinks. Furthermore, they include both qualifying and disqualifying components, for which specific thresholds have been developed, i.e., minimum values for fiber, and maximum values for energy SFA, TFA, sodium, total sugars and added sugars, respectively. Nutrient thresholds are expressed per100g/100mL or per serving (i.e., only for meals and snacks). Total sugar criteria have recently been added to provide a guideline for countries that do not have sufficient data on added sugar levels available (van der Bend & Lissner, 2019).

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 main purposes of the Nutriscore label are to help consumers make healthier choices and to stimulate product reformulation towards healthier product compositions. It conveys a mixed message as it displays five boxes with colors ranging from dark green to dark red,with letters to grade foods according to their overall nutritional quality; from A for products with the ‘best nutritional quality’ to E for the products with the ‘least good nutritional quality’. Because Nutriscore provides a summary indicator for each food along the continuum from healthy to unhealthy, it is considered neither positive nor negative. Therefore,it is rather viewed as a mixed scheme. As only colors and letters are used to indicate the healthfulness of a food product and no factual information is presented, such as specific nutrient levels or percentages of daily intake, Nutriscore is considered a directive FOP label. The criteria are based on a scoring as well as a threshol dmethod, covering both qualifying and disqualifying components. and they are expressed per 100 g/100 mL. First, a total score, ranging from −15 to +40, is calculated, consisting of two dimensions: positive points (0–10) are assigned to disqualifying components, such as SFA or sodium, and negative points (0–5) are assigned to each qualifying component, such as protein or fiber. Which box (A–E) will be magnified depends on specific lower and upper bounds that are defined for each of the five boxes. The Nutriscore is based on one set of criteria for all pre-packaged foods with a mandatory nutritional declaration in accordance with Regulation (E.U.) No. 1169/2011, although criteria modifications have been made

specifically for cheeses, fats and non-alcoholic drinks, because the score of these products would not be in line with dietary recommendations (van der Bend & Lissner, 2019).

. The voluntary, mixed Multiple Traffic Light (MTL) scheme was launched in 2013 by the U.K. Department of Health (DH), primarily aiming to help consumers make healthier food choices (see Figure 5 for the MTL Funnel Model). The MTL scheme complies with the U.K. Health Ministers' Recommendation on the use of color coding and with the E.U. Regulation (No. 1169/2011) on the provision of food information to consumers (E.U. FIC). In contrast to all other FOP labels in this comparison, the MTL is a semi-directive FOP label, as it combines green, amber and red color-coding with percentage Reference Intakes (RIs, formerly known as Guideline Daily Amounts) to display the amount of energy, TF, SFA, TS and salt in foods and drinks. In line with the E.U. FIC, the MTL should be provided in either one of the following two formats: energy alone or energy plus TF, SFA, TS and salt ('energy + 4'). On-pack, reference bases are provided per100 g/mL only, per100 g/mL and per portion, or per portion only (applies only for 'energy + 4'). When the latter is applied, energy must be provided per 100 g/mL in addition to per portion. The nutrients (i.e., not energy) in the MTL are colored based on specified upper and lower bounds per 100g /mL, which are developed for green, amber and red colors and are different for food and drink products. If portion/serving sizes of foods or drinks are larger than 100 g or 150 mL, respectively, portion size criteria apply for the color red specifically. The MTL is considered to be an across-the-board system as it applies generic criteria to foods and drinks and does not apply criteria for specific food or drink categories (van der Bend & Lissner, 2019).

The Israeli Warning Label, approved by the Israeli parliament's Labor, Welfare and Health Committee in 2017, is a mandatory FOP label with a negative tone of voice and a directive message. The Israeli Ministry of Health aims to allow consumers to have an informed choice of foods, and promote product reformulation. In contrast to the Keyhole, Choices, Nutriscore and MTL label, the Israeli Warning Label is mandatory, and it will be displayed on all products exceeding certain threshold levels of disqualifying nutrients, i.e., SFA, sodium and TS, indicated by 'High saturated fat level','High sodium level' and'High sugar level', respectively. Different criteria for solid and liquid products have been developed, but no criteria have been specified for solid or liquid subcategories. Food products that are not impacted by the new Israeli labelling regulation include all products not considered to be pre-packaged (i.e.,fruits,vegetables, meats, fresh eggs and prepared foods purchased at food service establishments), and products such as tea, coffee, yeast, spices and tabletop sweeteners. It is expected that the first phase of the Israeli Warning Label will go into force in January 2020. From then, the 12-month transition phase will start, which will include a first set of requirements for the disqualifying components mentioned above. In the second (permanent) phase, starting from January 2021, the threshold levels defined in the first phase will become stricter. Additionally, the Israeli government is developing a positive counterpart of the Warning label, which will have a green color (van der Bend & Lissner, 2019).

Chile approved the law of food labelling and advertising in 2012; this law aims to address the obesity epidemic, particularly in children. The implementation details

were published in 2015, and the law was implemented finally in 2016, as described in the current article. Regulated foods were defined based on a specially developed nutrient profiling, which considered natural foods as gold standard. For liquid foods, amounts of energy, sugars, saturated fats, and sodium in 100 mL of cow's milk were used as cut-offs. For solid foods, values within the 90th - 99th percentile range for energy and critical nutrients were selected as cut-off within a list of natural foods. A stop sign stating "High in <nutrient>" was chosen as warning label for packaged regulated foods. Regulated foods were also forbidden to be sold or offered for free at kiosks, cafeterias, and feeding programme at schools and nurseries. Besides, regulated foods cannot be promoted to children under 14 years. A staggered implementation of the regulation was decided, with nutrients cut-offs becoming increasingly stricter over a3 -year period. These regulatory efforts are in the right direction but will have to be sustained and complemented with other actions to achieve their ultimate impact of halting the obesity epidemic (Corvalán , et al., 2018 obesity reviews).

The Ofcom model was developed for the regulation of television advertising to children in the UK(22). The model consists of two food categories: (1) beverages and (2) foods. It takes into consideration a total of seven nutrients to limit and nutrients/ food components to encourage, the latter including fruit, vegetable, nut and legume (FVNL) content. To estimate the FVNL content of a food without quantitative declarations in the ingredient list, which are not required in Canada, the presence and positions of the FVNL ingredients within the ingredient list were used (online Supplementary Table S2). On the basis of the level of nutrients/components present per 100g of the food, the model generates a summary score in which a lower score represents a food with a more favourable nutritional profile. The model also classifies the food as 'permitted' or 'not permitted' for advertising to children based on pre-determined cutoff scores for foods and beverages (Poon, et al., 2018).

The NNPS is a category-specific system that calculates nutrient targets per serving as consumed, based on age-adjusted dietary guidelines. Products are aggregated into 32 food categories. The NNPS ensures that excessive amounts of nutrients to limit cannot be compensated for by adding nutrients to encourage. A study was conducted to measure changes in nutrient profiles of the most widely purchased Nestlé products from eight food categories (n = 99) in the USA and France. A comparison was made between the 2009–2010 and 2014–2015 products (Vlassopoulos, et al., 2017)

Table 10*. The qualifying and disqualifying components of the FoP Labelling/NP Systems.*

FoP Labelling/	**Qualifying Components**	**Disqualifying Components**

NP System	Energy	Protein	Fruits & Vegetables	Whole Grain	Dietary Fiber	Nuts	Legumes	Calcium	Energy	Total Fat	Saturated Fat	Trans Fat	Added Fats	Artificial Sweeteners	Total Sodium/	Total Sugars	Added Sugars	Plant Sterols/ Stanols
Keyhole	√		√	√	√		√		√	√	√	√	√	√	√	√	√	√
Choices Program					√				√		√	√			√	√	√	
Nutriscore		√			√	√	√		√		√				√	√		
Multiple Traffic Light									√	√	√				√	√		
Israeli Warning Label											√				√	√		
Chile's Warning Label									√		√				√	√		
Ofcom		√			√	√	√		√		√				√	√		
NNPS		√			√			√	√	√	√					√	√	

From the eighr FoP Labelling and NP systems previously presented, the ones that could, theoretically be applicated, based on the data collected by the HELth BFCD are; Choices Programme, Multiple Traffic Lights, Israeli and Chile's Warning labels (Table 9). However, practically the Choices programme can not be applicated, because of the zero completeness of data for the trans fatty acids. Furthermore, the Keyhole and the NNPS System can not be applicated due to the lack of data for added sugars. The lack of the HELth BFCD reflects the absence of added sugars from the products' nutrition declaration. This incompleteness of data of Helth, a BFCD whose data source

are exclusively labels, indicate the need of collaboration with manufacturers and retailers, willing to provide all the information needed about their food products.

The application of Keyhole, Nutriscore and Ofcom also requires the ammounts of fruits, vegetables and nuts, data not entered, at least by now, at the HELth BFCD.

In conclusion, the FoP and NP systems that can practically be applicated now by the HELth BFCD are; the Multiple Traffic Lights, the Israeli Warning Label and the Chile's Labelling System. A common characteristic of these three FoP labelling system is the fact that are composed only by disqualifying components, while the application of the two last has a negative tone of language and is mandatory for the respective countries.

At the following figures, there are two examples of the pilot application of the multiple Traffic Lights FoP Labelling Systems, at the breakfast cereals' (Figure 44) and the cereal bars' (Figure 44) food groups.

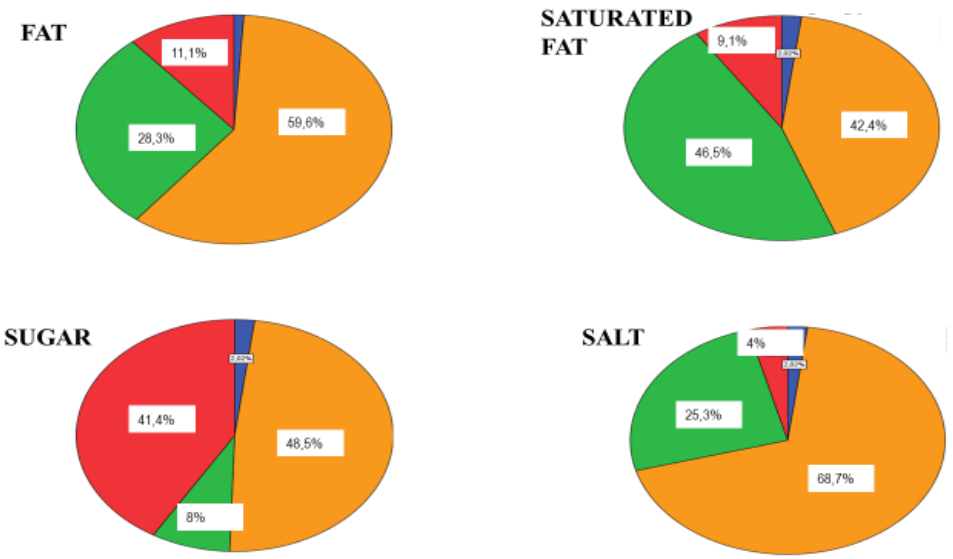


Figure 45. *Percentage of the food products barring a red, amber or green traffic light labelling indication for fat, saturated fat, sugar and salt for the breakfast cereals' food group.*

For TF, the traffic lights would be colorized amber for the 59.6% of the breakfast cereals' products (n=99), indicating a medium content of TF. The indication for TF would be colorized green and red for the 28.3% and 11.1%, respectively. The blue color at the chart pie indicates the absence of data. For STF, amber would be the 42.4% of the cases, green the 46.5% and red, the 9.1% of the breakfast cereals. For TS, the traffic lights would be colorized red for the 41.4% of the breakfast cereals' products, indicating a high content of TS (>25g TS per 100g edible portion (Emrich , et al., 2017)). The salt content is considered medium for the 68.7% of the products, low for the 25.3% and high for the 4% of the breakfast cereals entered at the HELth BFCD.

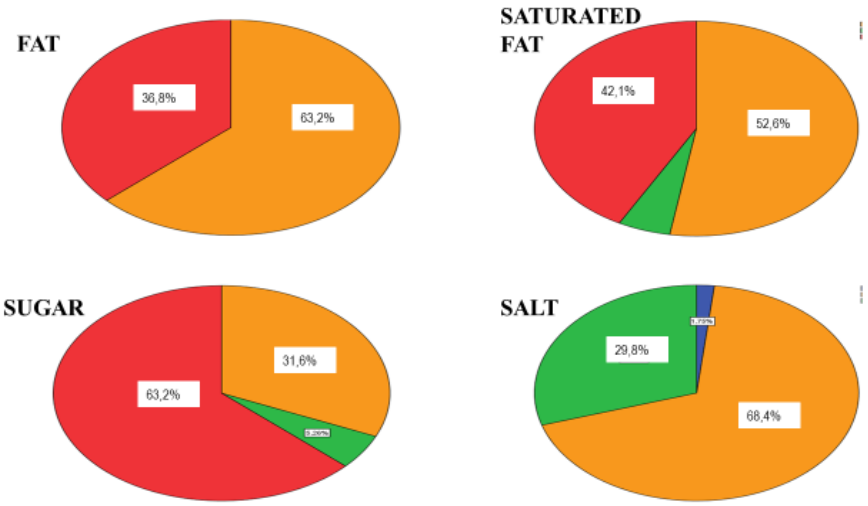


***Figure 46**. Percentage of the food products barring a red, amber or green traffic light labelling indication for fat, saturated fat, sugar and salt for the cereal bars' food group.*

Similarly, for TF, the traffic lights would be colorized amber for the 63.2% of the cereal bars' products (n=57), and red for the rest 36.8%. No product with a low content of TF was found. For STF, amber would be the 52.6% of the products, green the 5.3% and red, the 42.1% of the breakfast cereals. For TS, the traffic lights would be colorized red for the 63.2%, indicating the high content of TS at the majority of this food groups' products. The salt content is considered medium for the 68.4% of the products and low for the 29.8% of the cereal bars entered at the HELth BFCD.

Nutritional evaluation

One of the most well-known uses of FCD is in the assessment of nutrient intake at the individual, regional, national or international level. Dietitians and other health practitioners use FCD to assess the diets of their patients, while epidemiologists need to assess diet in order to study the role of food components and their interactions in health and disease.

National government agencies often assess diets at the population level, through national food consumption surveys, in order to monitor trends in nutritional status and to evaluate the impact of nutrition policy. FCD are also widely used in the development of recipes, meals and menus for therapeutic diets, institutional catering and the commercial food service industry. Dietitians and clinicians need to design therapeutic diets for patients with specific nutritional requirements associated with their condition (e.g. metabolic disorders, diabetes). FCDBs help them to identify foods that are good sources of nutrients of interest.

Moreover, as mentioned earlier, the first edition of the Greek official FCD was published in the form of a booklet circulated to hospitals and other institutions and was based on a study of recipes used in a large hospital and the boarding house of a Visiting Nurses' School in Athens.

However, ''can a generic FCD be a reliable or sufficient tool for the dietary assessment nowadays?''. And when it comes to the personalized nutrition, ''can all products that belong to a food group be faced as the same?''. ''If every person needs a separate nutrition treatment, adapted to his special characteristics, then how cannot every food product be considered as unique and not respect its special characteristics?

The following tables (Tables 11,12) show the amounts of energy, protein total and saturated fats, carbohydrates and total sugars, fiber and salt according to the official GCD, as well as the mean, the minimum and the maximum values of energy and the respective macronutrients as existing at the HELth BFCD, for brioche, cake and sweet buns (Table 11) and mayonnaise, bechamel and smashed potatoes (Table 12).

Differences and similarities can be found across the values of energy and macronutrients between the two databases. Although it would be expected that the values of the Greek FCD would be, if not identical, at least quite close to the mean values of the HELth BFCD, this does not happen at all the cases. Deviations can be observed to the majority of these cases, while in others the Greek FCD value approaches more the minimum or the maximum ones of the HELth BFCD.

Two worthwhile examples indicating the differences between these two databases, and also proving that the distribution of the nutrient values inside the food groups have a very wide range and that the data obtained by a generic FCD may, in some cases, differ importantly from the reality, guiding to a wrong dietary assessment, are the following; the energy value of the Greek FCD approaches the maximum one of the HELth BFCD and is about ten times bigger than the minimum. The carbohydrates' value of the bechamel referred at the Greek FCD is 13,1g, quite close to the minimum value of the HELth BFCD (10.5g), but far away from the maximum (82.3g) or even the mean value (54.8g).

Table 11. *The amounts of macronutrients according to the official Greek Composition Dataset and the HELth BFCD (mean, minimum and maximum value) for brioche, cake and sweet buns.*

Macro-nutrients	Brioche				cake				sweet buns			
	Greek Composition Dataset	HELth			Greek Composition Dataset	HELth			Greek Composition Dataset	HELth		
		mean	min	max		mean	min	max		mean	min	max
energy (kcal)	386	360	320	409	376	395	333	453	374	482	397	541
protein (g)	7,4	11	8,8	12,9	6,1	5,5	3,1	9,4	10,1	7,7	4	10,8
total fat (g)	12,4	11,7	8,1	16,8	17,8	17,5	9,2	30	7,7	22,9	12,8	31,5
saturated (g)	3,9	5,1	1,9	8,5	5,7	7,5	3,6	11	3,7	7,2	2	11,6
carbo (g)	63,2	52,7	50	56,9	49,6	53,4	41	60	68,8	59,1	6,5	73,6
sugars (g)	22,6	15,2	6,9	22,6	23,1	27,5	14,1	47,3	11,4	19,4	5,9	35
fiber (g)	2	1,8	1,5	2,4	1,5	1,5	0,4	2,3	27	3,3	0,2	9
salt (g)	0,26	0,5	0,32	0,8	0,77	0,56	0,16	0,75	0,33	0,31	0	2,4

Table 12. *The amounts of macronutrients, according to the official Greek Composition Dataset and the HELth BFCD (mean, minimum and maximum value) for mayonnaise, bechamel and mashed potatoes.*

Macro-nutrients	Mayonnaise				bechamel				mashed potato			
	Greek Composition Dataset	HELth			Greek Composition Dataset	HELth			Greek Composition Dataset	HELth		
		mean	min	max		Mean	min	max		mean	min	
energy (kcal)	778	594	72	790	239	310	133	416	103	281	70	363
protein (g)	1,9	1	0	1,4	4,7	2,5	2	3,3	2,1	6,3	2,1	9,2
total fat (g)	87	64,7	2,9	87	19,2	9	4,9	13,5	4,9	1,3	0,5	3,8
saturated (g)	12,6	6,6	0,7	12	6,9	5,1	2,5	7	1,8	0,8	0,4	2,2
carbo (g)	0,2	2,6	0,2	9,3	13,1	54,8	10,5	82,3	13,3			
sugars (g)		1,8	0,3	4,2	3,9	5,4	3,6	6,7	1,7	2,9	1	7,3
fiber (g)	0	0,05	0	0,1	0,4	0,4	0,4	0,4	1	5,9	1,1	8
salt (g)	0,02	1,3	0,4	1,7	0,5	2,5	0,75	5	0,14	0,25	0,06	0,8

DISCUSSION

HELth is the first systematic attempt of creating a Greek branded products' database. The short utility test exported, proves the importance of the existence of a BFCD in Greece, as well as the need of continuing, completing and possibly updating this ambitious project, implemented in 2019 at the Agricultural University of Athens.

In the HELth BFCD, the collection of nutritional data is based on labelling. In the context of the completeness of nutritional data (declaration of fiber, trans, added sugars etc.), tight collaborations with professionals are fundamental (Weiss, 2001). The necessity of collaborations with other stakeholders is also highlighted by the quick turn over of some products and the parallel need of updating the database at a regular time basis. Only professionals can know which evolutions occurred on their products, which products were removed or which ones were launched on the Greek market. This regular collection of data provided on the packaging of foodstuffs is also needed to monitor evolutions of the processed food composition (Menard, et al., 2011).

The presentation of nutrients in the nutrition labelling is standardized as it is regulated at the European level and labelled nutrient values refer to food 'as purchased' (European Community, 2008; Southgate and Greenfield, 1992). This standardization is essential to monitor possible changes in the nutritional composition over years. This standardization also enables comparisons of nutrient values among food sectors or types of brand or even among countries. It is well known that comparison of food composition tables among countries are very difficult (Egan et al., 2007; Merchant and Dehghan, 2006; Slimani et al., 2007) due to a lack of harmonization of nutrient and food classifications (Ireland et al., 2002), food sampling, analytical methods (Eck et al., 1988), units and mode of expression, and of the quantity and quality of data documentation. However, efforts to harmonize FCDB at the European levels are currently under way. (Kapsokefalou, et al., 2019), (Castanheira, et al., 2009), (Schlotke, et al., 2000).

A fundamental problem for FCDBs is to complete missing values (Rand, 1985). Although nutritional labelling of foodstuffs is more and more frequent (96.3% in the FLAPS survey; (Brandt, et al., 2009)), it is currently not mandatory in the EU except when foodstuffs bear nutrition or health claims (European Community, 2006), (European Community, 2008). Using the labelling as the main source of information implies that missing values are observed for products without nutrition labelling. Nutritional analyses are therefore needed for these products (Menard, et al., 2011).

Another problem of FCDBs is data accuracy. Nutrition labelling, which are defined as average estimations in the EU labelling regulation, have a variable accuracy (Marcoe & Haytowitz, 1993), (Pennington , 2008), (Rand, et al., 1991). Indeed, nutrition labelling can be determined by three possible methods. The most precise method is the

analysis of the food (Menard, et al., 2011). However, the most frequently used methods are calculations from the average values of the ingredients included in the recipes (Hamilton, et al., 2007), or estimations from reference FCDB. According to a study that compared the calculated and analytical values of five Greek composite foods for macronutrients and energy content, no statistically significant differences were observed between analyzed and calculated values (Vasilopoulou, et al., 2003). In other words, nutrition labelling obtained by calculation could be as reliable as the analytical results, even though higher differences between labelling and analytical values can be observed for micronutrients (Whittaker, et al., 2001). Besides, analytical results may also have to be considered with caution when no confirmation is provided with duplicate determinations, due to costs of analyses (Cooke, 1983). What is more, analytical results can vary with the quality of the samples homogenization or when several analytical methods, not all standardized, may be available for some nutrients (fiber, starch and sugars) (Cooke, 1983).

Last but not least, another problem that the HELth BFCD confronts, is the lack of sources, such as time and human resources. All the existing BFCDs are results of collaborations, where hard work and much time is devoted. In addition, it must be considered that AB Vassilopoulos Click2shop, the source selected for the first data entry process, is dynamic. This means that products are continuously added or removed from the online platform. This fact is linked with a small, but still not insignificant data loss of about 7,5%. This percentage also includes data losses, at least at first point, due to lack of available photograph/s of a product, or due to the sharpness of some photographs that does not allow data to be copied.

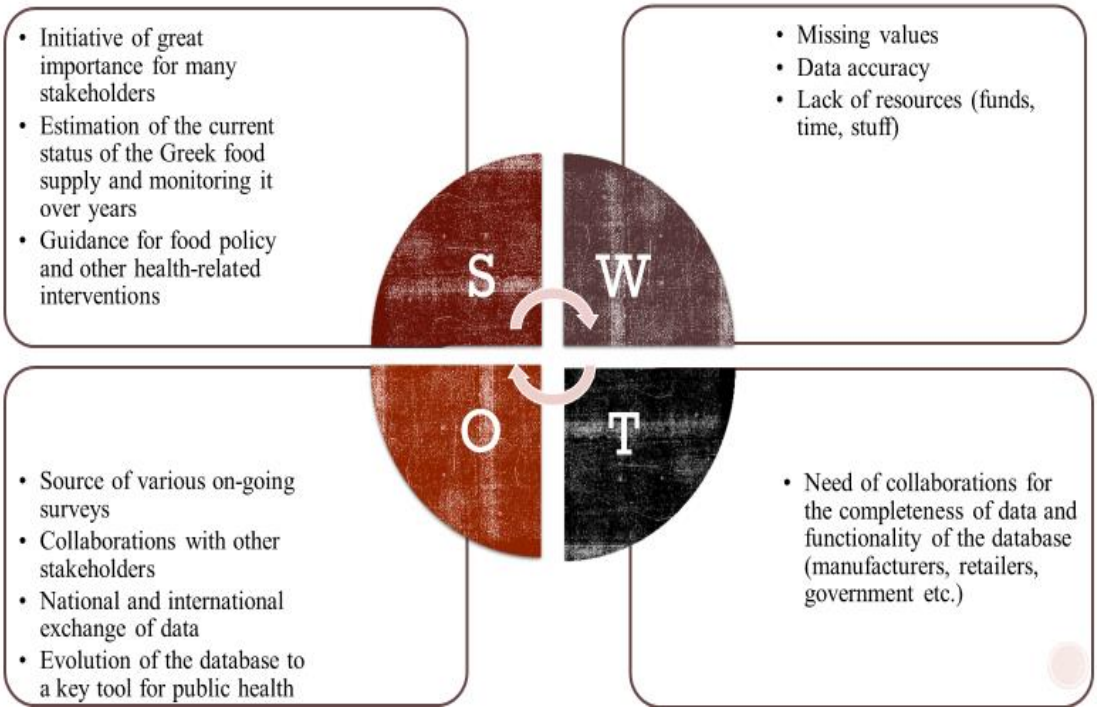


***Figure 47**. SWOT analysis of the HELth BFCD.*

On the other hand, FCD on branded processed products such as the HELth database is essential to show the great nutritional variability of these products that are increasingly consumed. Indeed, commercial products have a more and more complex composition (Pennington & Stumbo, 2008), according to strategies of manufacturers for reformulations and the improvement of nutritional quality (Nijman, et al., 2007), or recent regulations or public health policies (Mancino, et al., 2008), (Ratnayake, et al., 2009), (Young & Swinburn, 2002).

The HELth FCDB does not only prove the need of food policy interventions, but can also give guidance for their implementation. Specifically, the HELth BFCD can guide the food reformulation by providing the baseline and the capacity of choosing the best food reformulation scenario according to the Greek current food supply status, the application of specific FoP and NP systems to help consumers and check food advertising, while after collaborations with manufacturers and retailers, who will provide data for their products, are succeeded, and the completeness of data is satisfying, the application of the most cost-effective and/or suitable for the Greek data would be feasible.

HELth can also be used for the amelioration of the process of nutritional evaluation, particularly in personalized nutrition. In the future, economic data and market shares could also be aggregated to the database, allowing the calculations of useful indicators such as the frequency of consumption and the food products mainly consumed in Greece and making it a powerful for the nutritional assessment of the population and consequently for epidemiology. On a longer term, the monitoring of nutritional changes in foodstuffs may contribute to the evaluation of health impacts, as observed in Finland after wide efforts on salt reduction in food (Karppanen & Mervaala, 2006). In a public health perspective, the monitoring of evolutions in serving sizes and number of servings per container could also be of interest (Lioret, et al., 2009), (Walker, et al., 2008).

The HELth BFCD will be the source for numerous ongoing studies and provide evidence to subjects, such as whether biological products and/or products bearing health, nutrition or other claims have indeed a better nutritional quality than conventional foods, whether price and quality are linked with each other, indicators about kids' and fortified food products etc. The study of the nutritional variability at the branded level is also crucial in order to detect statistically significant evolutions over years and to estimate the minimum number of products required in the monitoring or the sampling plans (Dwyer, et al., 2008), (Roseland, et al., 2008)

As a conclusion, the HELth BFCD project has the very ambitious aim to cover all food categories and progressively the whole diet. In the future, small-scale or regional production of foodstuffs could be integrated in HELth studies. Through collaborations with other stakeholders this database could be evolved into a key centralized source of information for its users and by encouraging the food industry and policy makers to move the production of processed food towards healthier formulations (Dunford, et al., 2011), a key tool for public health.

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Appendix I; EuroFIR

EuroFIR AISBL, an international, member-based, non-profit Association under Belgian law (www.eurofir.org), was set up in 2009 to ensure sustained advocacy for food information in Europe. Its purpose is to develop, publish and exploit food composition information, and promote international cooperation and harmonization of standards to improve data quality, storage and access. EuroFIR AISBL draws together the best available food information globally from 26 compiler organizations in Europe, USA and Canada (FoodEXplorer) as well as validated information about bioactive compounds (eBASIS).

EuroFIR' s mission is to be the best and only independent broker of validated food composition data and supporting information in Europe and beyond, facilitate improved data quality, storage and access, and encourage wider applications and exploitation of food composition data for both research and commercial purposes.

The vision of EuroFIR AISBL is delivery of high quality, validated national food composition data and supporting information in a number of different formats, which are essential for research and policy in the areas of food quality, nutrition and public health challenges in Europe. We aim to enhance the awareness and understanding of the value of food composition data, and its importance for consumers in making healthier dietary choices.

EuroFIR has established a common standard for the identification and description of foods in European FCDBs that allows for application of state-of-the-art concepts in database linking and management and their comparability as well as the comparison and interchange of food composition data. The food description system chosen was LanguaL. EuroFIR has supported new versions of the LanguaL thesaurus, including the 2008 version.

Appendix II; LanguaL

LanguaL™ stands for "Langua aLimentaria" or "language of food". It is an automated method for describing, capturing and retrieving data about food. The work on LanguaL™ was started in the late 1970's by the Center for Food Safety and Applied Nutrition (CFSAN) of the United States Food and Drug Administration as an ongoing co-operative effort of specialists in food technology, information science and nutrition.

Since then, LanguaL™ has been developed in collaboration with the US National Cancer Institute (NCI), and, more recently, its European partners, notably in France, Denmark, Switzerland and Hungary. Since 1996, the European LanguaL™ Technical Committee has administered the thesaurus.

LanguaL™ is a multilingual thesaural system using facetted classification. Each food is described by a set of standard, controlled terms chosen from facets characteristic of the nutritional and/or hygienic quality of a food, as for example the biological origin, the methods of cooking and conservation, and technological treatments.

More than 27000 foods in European FCDs are now LanguaL™ indexed to facilitate search and retrieval in the context of the EuroFIR eSearch Prototype facility, and currently the EuroFIR FoodExplorer. In addition, foods from USA, Canada, New Zealand and Australia have been indexed. The USDA National Nutrient Database for Standard Reference is now fully LanguaL™ indexed. The indexing files are available from the USDA ARS Nutrient Data site or the download pages of the LanguaL™ site. The New Zealand FOODfiles 2014 Version 01 as well as the Canadian Nutrient File 2015 have also been fully indexed.

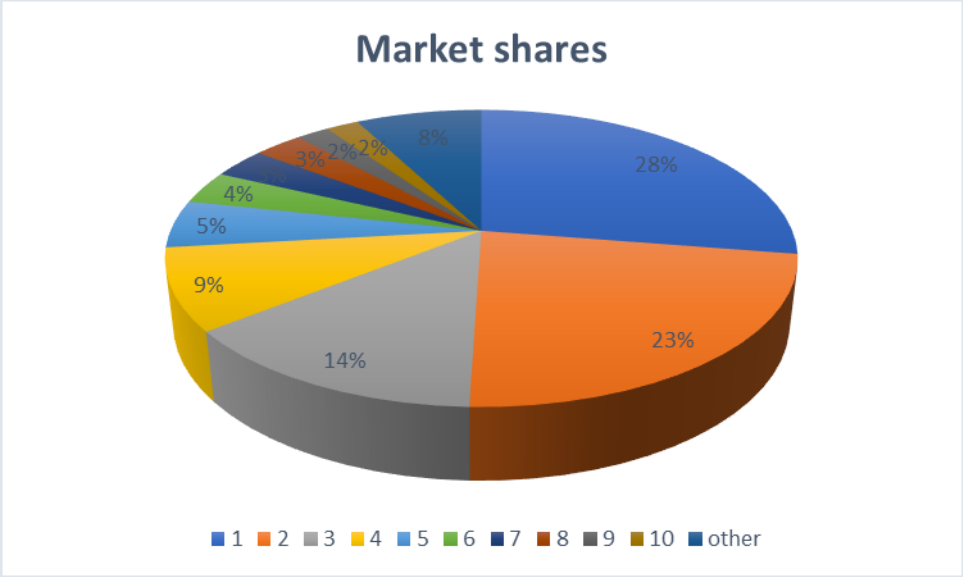
In total, more than 40000 European, North American foods and foods from other countries are now LanguaL™ indexed

Appendix III; AB Vassilopoulos; Market shares

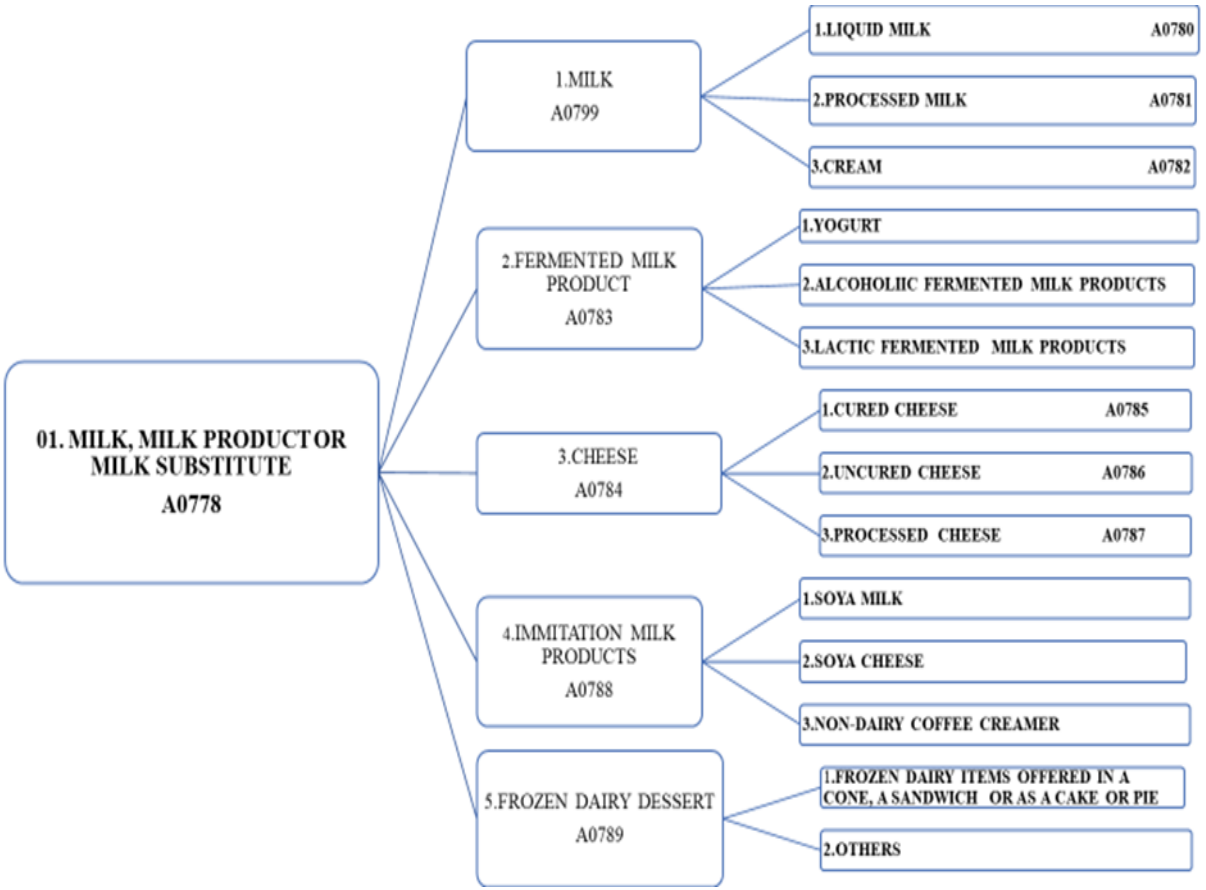
ΜΕΓΕΘΗ - ΜΕΤΑΒΟΛΕΣ ΙΣΟΛΟΓΙΣΜΩΝ ΣΟΥΠΕΡ ΜΑΡΚΕΤ - ΛΟΓΑΡΙΑΣΜΟΣ ΑΠΟΤΕΛΕΣΜΑΤΩΝ (οι αξίες σε χιλ. ευρώ) /

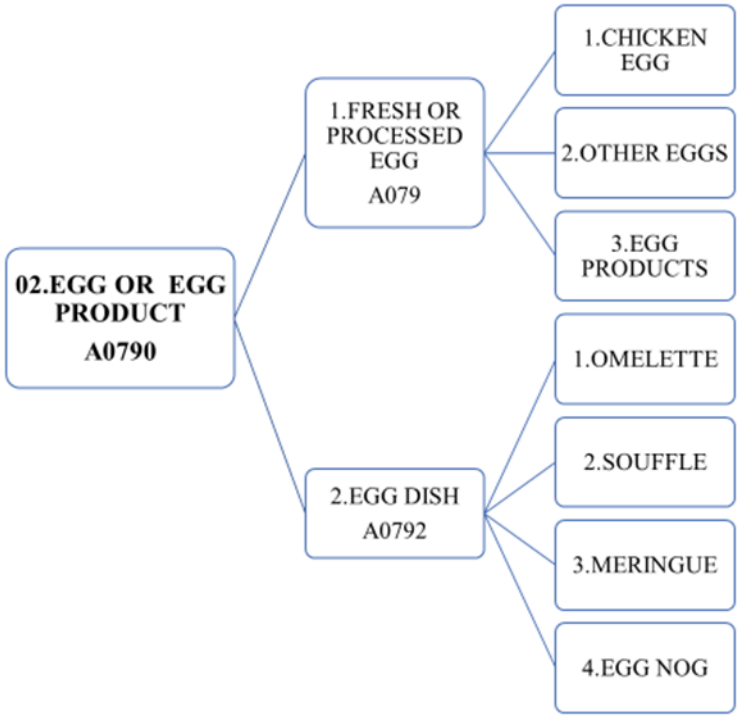
Α/Α	ΕΠΩΝΥΜΙΑ	Κύκλος Εργασιών / Πωλήσεις (Net sales revenue / Turnover)			Οργανικά και έκτακτα ("καθαρά") αποτελέσματα εκμετάλλευσης (Net income before taxes)		
		2017	2018	Μεταβολή	2017	2018	Μεταβολή
1	Ελληνικές Υπεραγορές Σκλαβενίτης ΑΕΕ	2.037.863	2.370.789	16,34%	-103.984	-54.372	-47,71%
2	Άλφα Βήτα Βασιλόπουλος ΑΕ	2.100.319	1.986.336	-5,43%	88.508	54.006	-38,98%
3	ΜΕΤΡΟ ΑΕΒΕ	1.172.126	1.190.626	1,58%	10.401	10.703	2,90%
4	Δ. Μασούτης ΑΕ	761.589	770.349	1,15%	25.798	14.033	-45,60%
5	Πέντε ΑΕ	482.772	449.970	-6,79%	18.264	12.802	-29,91%
6	ΜΑΡΤ Κας & Κάρυ ΑΕΕ	312.450	310.683	-0,57%	131	165	25,44%
7	Market In ΑΕ	251.013	284.110	13,19%	1.364	1.857	36,21%
8	ΑΝΕΔΗΚ Κρητικός ΑΕ	217.308	256.416	18,00%	2.094	3.066	46,40%
9	ΣΥΝ.ΚΑ. Προμηθ. & Καταναλ. Συν/σμός ΠΕ	175.732	175.625	-0,06%	2.482	1.522	-38,68%
10	Bazaar ΑΕ	162.628	168.955	3,89%	3.312	3.421	3,29%
11	Χαλκιαδάκης ΑΕ	154.966	155.276	0,20%	10.917	10.446	-4,32%
12	Γουντσίδης ΑΕ	48.765	46.903	-3,82%	638	816	27,87%
13	ΟΚ Anytime Market ΑΕ	43.344	45.832	5,74%	336	663	97,44%
14	Δ. Θανόπουλος ΑΕ	44.376	45.161	1,77%	2.118	2.265	6,96%
15	Γαλαξίας ΑΕ	39.963	37.495	-6,17%	538	351	-34,84%
16	Σκόντο ΕΠΕ	25.048	29.665	18,43%	-109	111	-202,03%
17	ΝΤΙΕΛΛΑΣ ΕΠΕ	29.859	28.859	-3,35%	1.751	1.607	-8,19%
18	Β. Παναγιωτάς ΑΕ	25.563	24.819	-2,91%	1.572	1.586	0,93%
19	Αφροδίτη Σούπερ Μάρκετ ΑΕΕ	21.862	22.289	1,95%	16	-226	-1.551,64%
20	Φαιστός ΑΕΒΕ	22.403	21.984	-1,87%	69	143	106,49%
Τ1	Σύνολο Εταιρειών θέσεις 1-10	7.673.800	7.963.859	3,78%	48.371	47.204	-2,41%
Τ2	Γενικό Σύνολο 42 Εταιρείες	8.327.727	8.624.403	3,56%	67.736	65.559	-3,21%
	Πηγή: Πανόραμα των Ελληνικών Σούπερ Μάρκετ 2019						

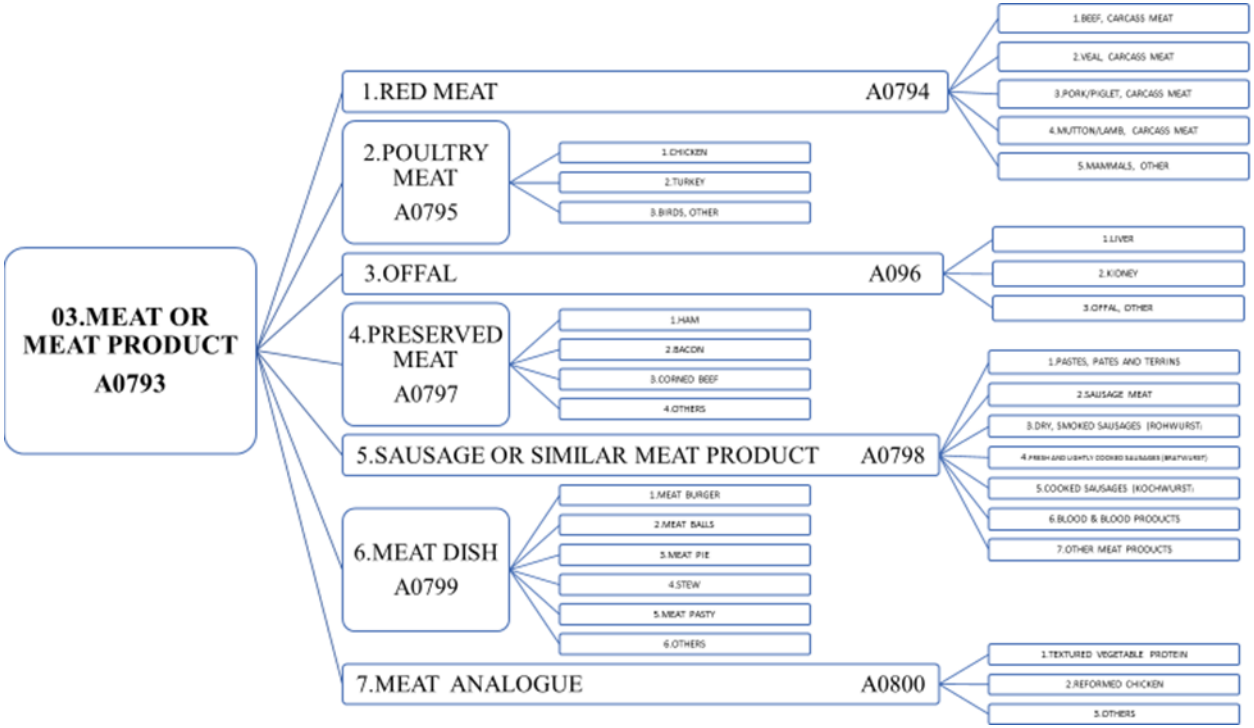
	BRAND	PERCENTAGE OF MARKET SHARES FOR 2018
1	Sklavenitis	27,50%
2	AB Vasilopoulos	23%
3	Metro	13,80%
4	Masoutis	8,90%
5	Pente	5,20%
6	Mart	3,60%
7	Market in	3,30%
8	ANEDIK Kritikos	3%
9	SYN.KA	2%
10	Bazaar	2%
OTHER		7,70%

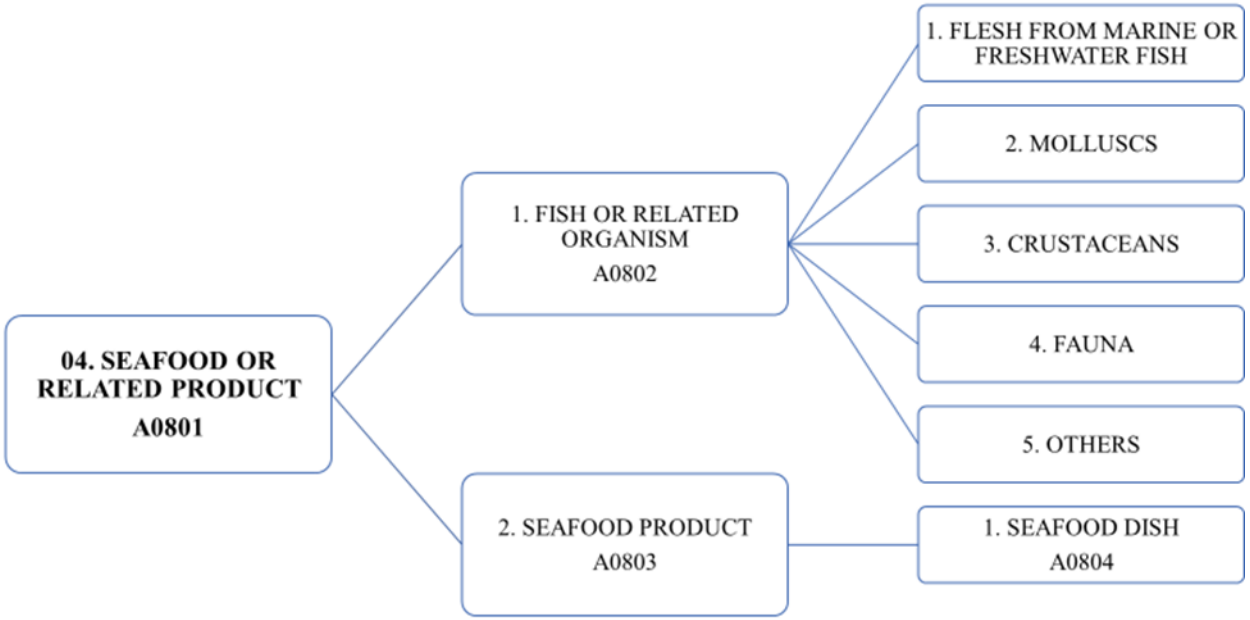

Market shares
28%
23%
14%
9%
5%
4%
3%
2%
2%
8%
1
2
3
4
5
6
7
8
9
10
other

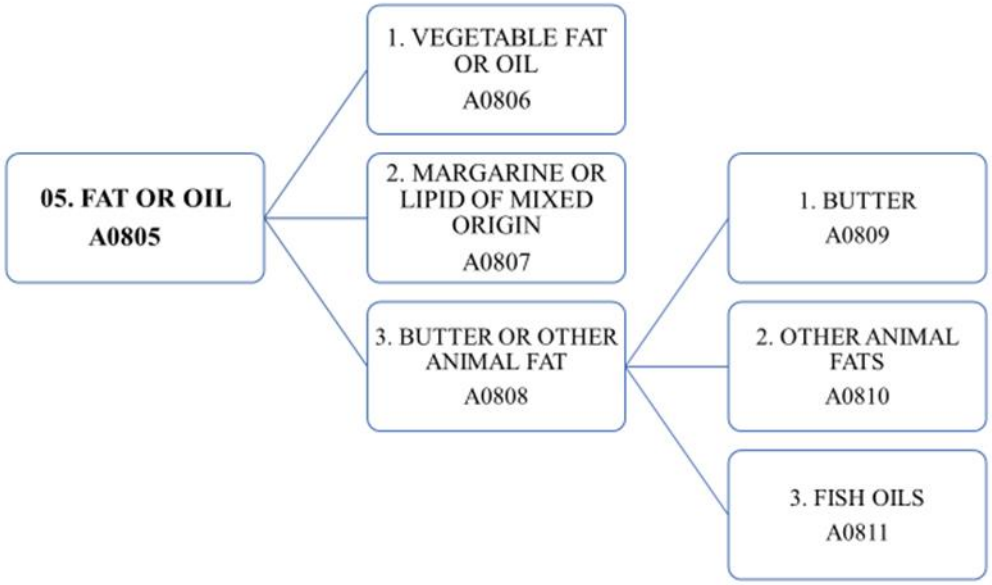
Appendix IV; EuroFIR's Categorization

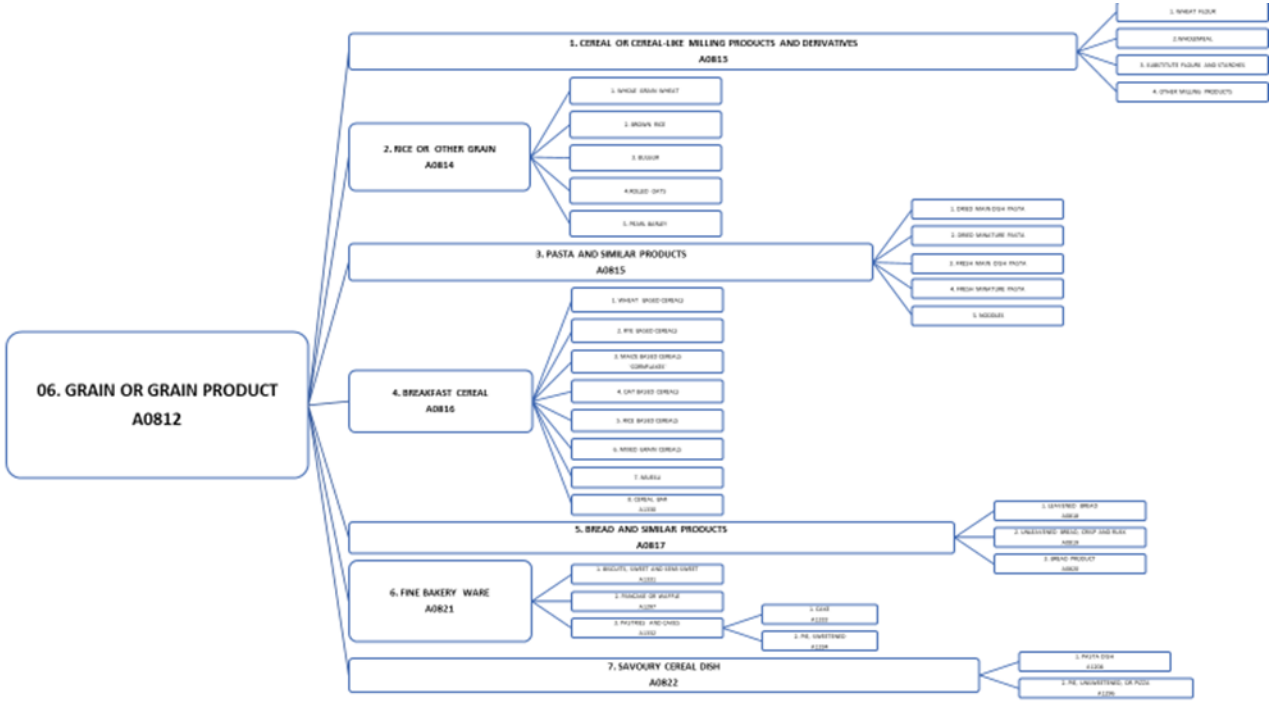


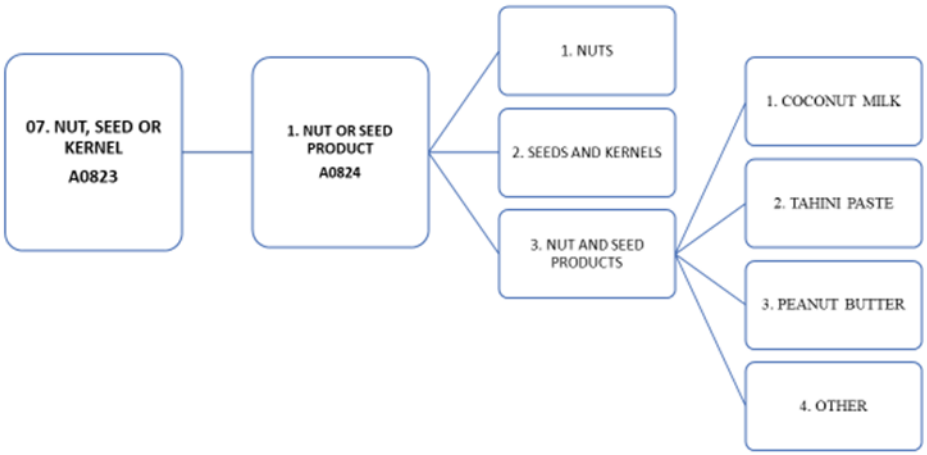

02.EGG OR EGG PRODUCT
A0790
1.FRESH OR PROCESSED EGG
A079
2.EGG DISH
A0792
1.CHICKEN EGG
2.OTHER EGGS
3.EGG PRODUCTS
1.OMELETTE
2.SOUFFLE
3.MERINGUE
4.EGG NOG

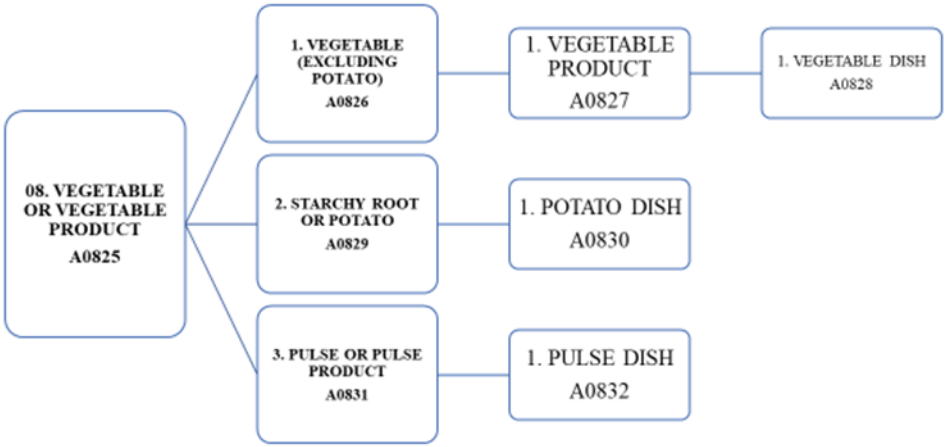

03.MEAT OR MEAT PRODUCT
A0793
1.RED MEAT
A0794
1.BEEF, CARCASS MEAT
2.VEAL, CARCASS MEAT
3.PORK/PIGLET, CARCASS MEAT
4.MUTTON/LAMB, CARCASS MEAT
5.MAMMALS, OTHER
2.POULTRY MEAT
A0795
1.CHICKEN
2.TURKEY
3.BIRDS, OTHER
3.OFFAL
A096
1.LIVER
2.KIDNEY
3.OFFAL, OTHER
4.PRESERVED MEAT
A0797
1.HAM
2.BACON
3.CORNED BEEF
4.OTHERS
5.SAUSAGE OR SIMILAR MEAT PRODUCT
A0798
1.PASTES, PATES AND TERRINS
2.SAUSAGE MEAT
3.DRY, SMOKED SAUSAGES (ROHWURST)
4.FRESH AND LIGHTLY COOKED SAUSAGES (BRATWURST)
5.COOKED SAUSAGES (KOCHWURST)
6.BLOOD & BLOOD PRODUCTS
7.OTHER MEAT PRODUCTS
6.MEAT DISH
A0799
1.MEAT BURGER
2.MEAT BALLS
3.MEAT PIE
4.STEW
5.MEAT PASTY
6.OTHERS
7.MEAT ANALOGUE
A0800
1.TEXTURED VEGETABLE PROTEIN
2.REFORMED CHICKEN
3.OTHERS

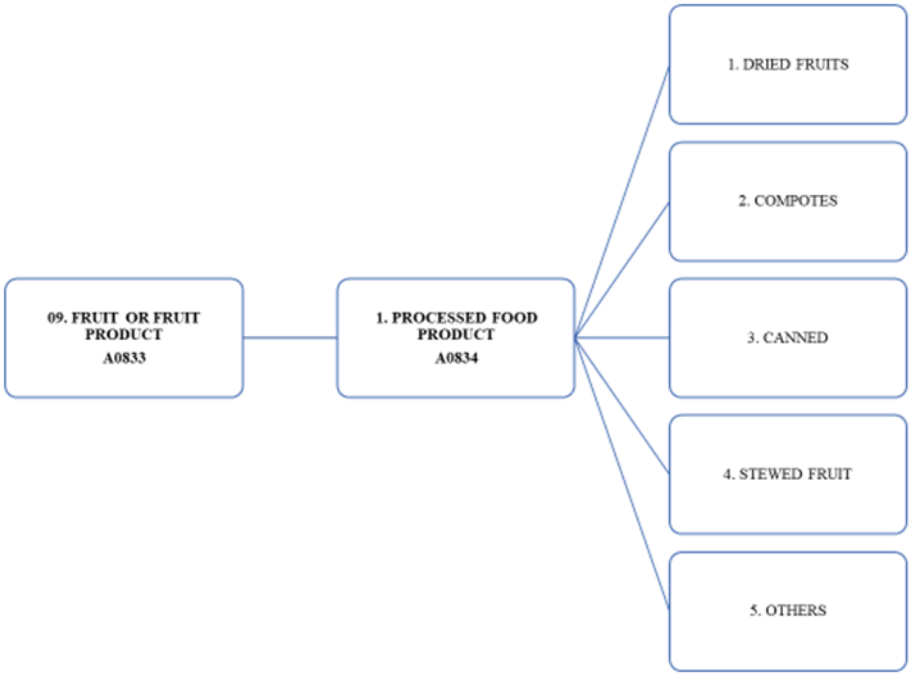

04. SEAFOOD OR RELATED PRODUCT
A0801
1. FISH OR RELATED ORGANISM
A0802
2. SEAFOOD PRODUCT
A0803
1. FLESH FROM MARINE OR FRESHWATER FISH
2. MOLLUSCS
3. CRUSTACEANS
4. FAUNA
5. OTHERS
1. SEAFOOD DISH
A0804

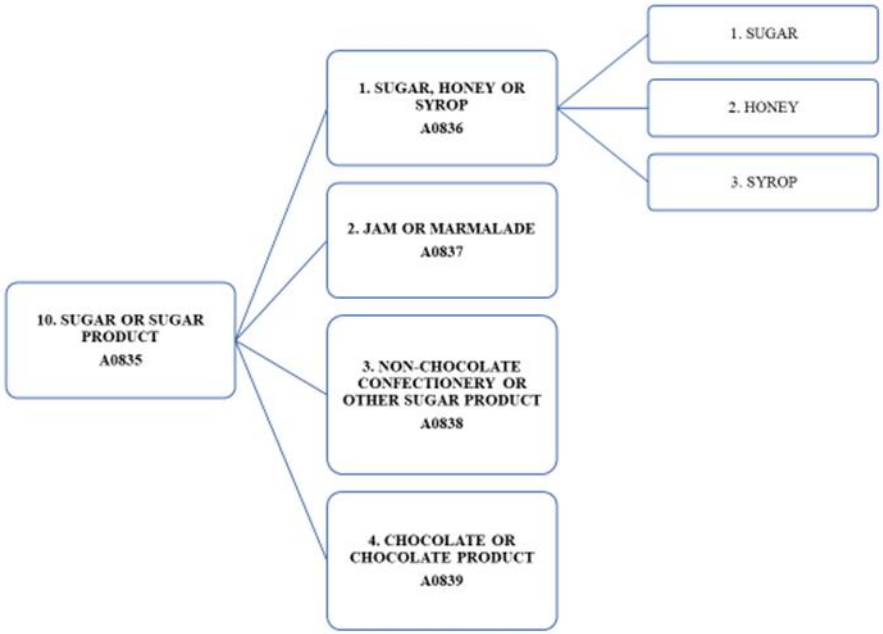

05. FAT OR OIL
A0805
1. VEGETABLE FAT OR OIL
A0806
2. MARGARINE OR LIPID OF MIXED ORIGIN
A0807
3. BUTTER OR OTHER ANIMAL FAT
A0808
1. BUTTER
A0809
2. OTHER ANIMAL FATS
A0810
3. FISH OILS
A0811

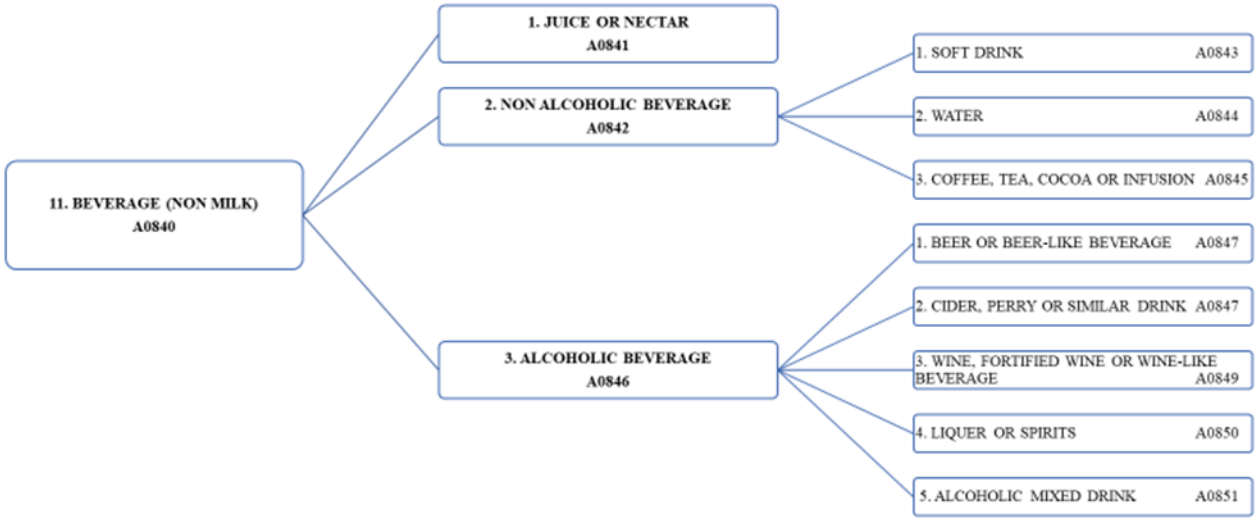

06. GRAIN OR GRAIN PRODUCT
A0812
1. CEREAL OR CEREAL-LIKE MILLING PRODUCTS AND DERIVATIVES
A0813
2. RICE OR OTHER GRAIN
A0814
3. PASTA AND SIMILAR PRODUCTS
A0815
4. BREAKFAST CEREAL
A0816
5. BREAD AND SIMILAR PRODUCTS
A0817
6. FINE BAKERY WARE
A0821
7. SAVOURY CEREAL DISH
A0822

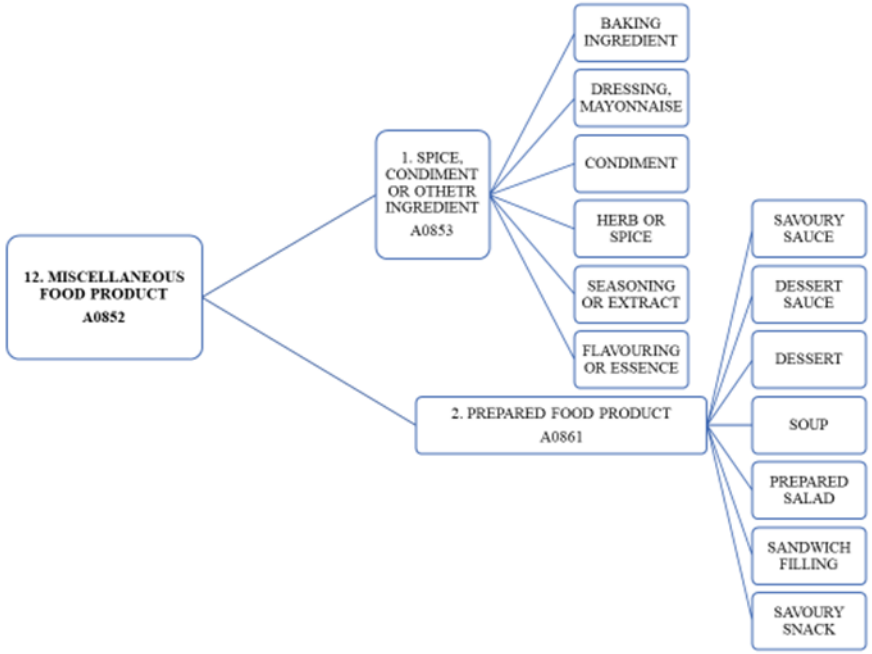

07. NUT, SEED OR KERNEL
A0823
1. NUT OR SEED PRODUCT
A0824
1. NUTS
2. SEEDS AND KERNELS
3. NUT AND SEED PRODUCTS
1. COCONUT MILK
2. TAHINI PASTE
3. PEANUT BUTTER
4. OTHER

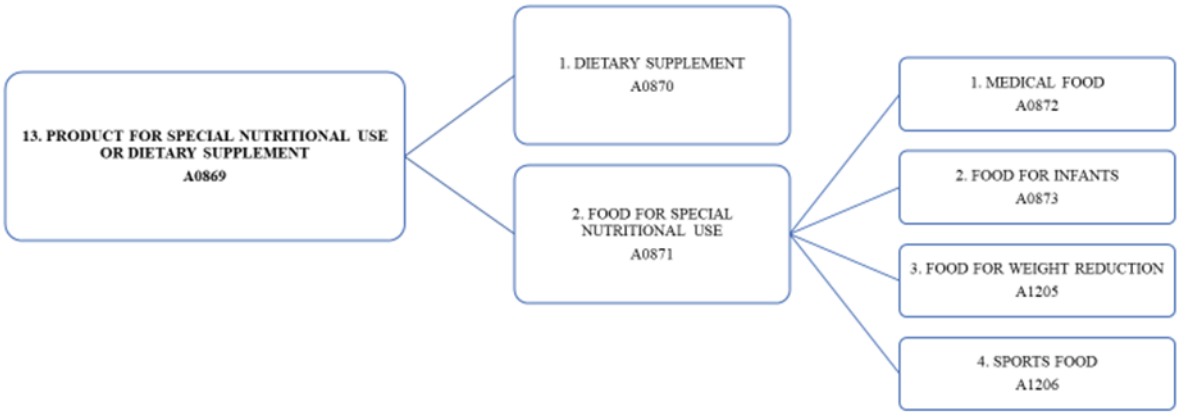

08. VEGETABLE OR VEGETABLE PRODUCT
A0825
1. VEGETABLE (EXCLUDING POTATO)
A0826
2. STARCHY ROOT OR POTATO
A0829
3. PULSE OR PULSE PRODUCT
A0831
1. VEGETABLE PRODUCT
A0827
1. POTATO DISH
A0830
1. PULSE DISH
A0832
1. VEGETABLE DISH
A0828


09. FRUIT OR FRUIT PRODUCT
A0833
1. PROCESSED FOOD PRODUCT
A0834
1. DRIED FRUITS
2. COMPOTES
3. CANNED
4. STEWED FRUIT
5. OTHERS

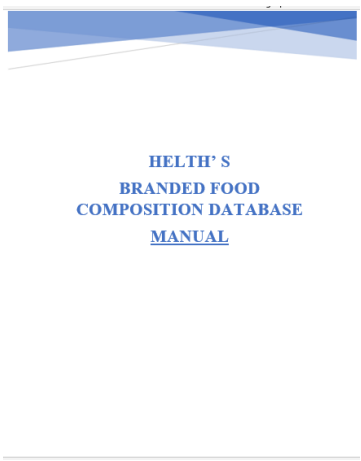

10. SUGAR OR SUGAR PRODUCT
A0835
1. SUGAR, HONEY OR SYROP
A0836
1. SUGAR
2. HONEY
3. SYROP
2. JAM OR MARMALADE
A0837
3. NON-CHOCOLATE CONFECTIONERY OR OTHER SUGAR PRODUCT
A0838
4. CHOCOLATE OR CHOCOLATE PRODUCT
A0839


11. BEVERAGE (NON MILK)
A0840
1. JUICE OR NECTAR
A0841
2. NON ALCOHOLIC BEVERAGE
A0842
3. ALCOHOLIC BEVERAGE
A0846
1. SOFT DRINK A0843
2. WATER A0844
3. COFFEE, TEA, COCOA OR INFUSION A0845
1. BEER OR BEER-LIKE BEVERAGE A0847
2. CIDER, PERRY OR SIMILAR DRINK A0847
3. WINE, FORTIFIED WINE OR WINE-LIKE BEVERAGE A0849
4. LIQUER OR SPIRITS A0850
5. ALCOHOLIC MIXED DRINK A0851


12. MISCELLANEOUS FOOD PRODUCT
A0852
1. SPICE, CONDIMENT OR OTHETR INGREDIENT
A0853
BAKING INGREDIENT
DRESSING, MAYONNAISE
CONDIMENT
HERB OR SPICE
SEASONING OR EXTRACT
FLAVOURING OR ESSENCE
2. PREPARED FOOD PRODUCT
A0861
SAVOURY SAUCE
DESSERT SAUCE
DESSERT
SOUP
PREPARED SALAD
SANDWICH FILLING
SAVOURY SNACK


13. PRODUCT FOR SPECIAL NUTRITIONAL USE OR DIETARY SUPPLEMENT
A0869
1. DIETARY SUPPLEMENT
A0870
2. FOOD FOR SPECIAL NUTRITIONAL USE
A0871
1. MEDICAL FOOD
A0872
2. FOOD FOR INFANTS
A0873
3. FOOD FOR WEIGHT REDUCTION
A1205
4. SPORTS FOOD
A1206

Appendix V; HELth' s MANUAL



Brief Introduction

The HELth Branded Food Database is a project being implemented with the aim to assess the quality of the Greek food supply, and develop indicators on nutritional variability and on the quantity and quality of labelling parameters. Therefore, all labelling parameters provided on the products packaging are being collected at the branded products level. The objective is to progressively cover all food categories and to be representative of the Greek food market.

The HELth BFCD consists of four files;

1. Description File
2. Nutrient File
3. Claim File
4. Photobook

Product Description File

Id

An 8-digit id number that uniquely identifies a food item. Links to all files (See Appendix A)

Product Name

The name of the product exactly as mentioned at the retailer's web page (ab Vassilopoulos click2shop), from where food data was acquired.

Long name

Short description of the product translated in English that begins with the manufacture's name (in capital letters), the product name which may contain characteristics of the product (like 'wholegrain', 'light' etc.), the food group (e.g. 'breakfast cereal', 'evaporated milk' etc.), the flavor (e.g. with chocolate, vanilla etc.). This information is usually given in bigger font. It may also contain the target group if mentioned at the front of pack e.g. 'for kids. The long name of the product ends with the package size.

Food Group

The food group that the product belongs to (See Appendix A).

Food Category

The food category that the product belongs to. It is based on the EuroFIR' s categorization and constitutes the first LanguaL descriptor. (See Appendix B)

Manufacturer

The company that manufactured the product.

Data Source

The way that the data was acquired e.g. labelling, analytical methods etc.

Date Available

Date when the food record was first made available for inclusion in the database.

Date Modified

Date when the food record was last updated in the database.

Barcode

The number of the barcode. Barcode is a machine-readable code in the form of numbers and a pattern of parallel lines of varying widths, printed on a commodity and used especially for stock control.

Food Source

Whether the food product or its major ingredient is derived by animal, plant, liquid(alcohol) or chemical (food supplements, vitamin and mineral substances or food additives) food sources. Food source constitutes the second LanguaL descriptor.

Physical State

Whether the physical state of food product is solid, liquid, semisolid or semiliquid.

A solid product is a hard or soft product capable of retaining its own shape at room temperature (20 degrees C). A soft product that is spreadable or formable is considered semisolid.

Liquid is a state of matter between a solid and a gas, in which a substance has a capacity to flow and conforms to the shape of container. Liquids range from water to honey, corresponding to a range of viscosity (or apparent viscosity) from 1 to 500 centipoise (viscosity is a measure of liquid's resistance to flow). Products that are pourable but have a higher viscosity are semiliquid.

Physical state constitutes the fourth LanguaL descriptor.

Package Size

Weight of the product. It includes the size unit.

Serving Size

The serving/portion size mentioned at the package. Weight of the specified serving/portion. It includes the serving size unit.

Servings/package mentioned

The servings/portions that the package contains. Only included if mentioned.

Retailer

The company that shelled the specific product from which the data was acquired. If it is an e-shop, it should be mentioned.

Price per 100g or per 100mL

The price of the product at the retailer mentioned at the previous cell at the date of data entering per 100g or 100mL.

Discount

Whether the product is on discount or not.

Nutrients File

Id

An 8-digit id number that uniquely identifies a food item. Links to all files.

Product Name

The name of the product exactly as mentioned at the retailer's web page (ab Vassilopoulos click2shop), from where food data was acquired.

Long name

Short description of the product translated in English that begins with the manufacture's name (in capital letters), the product name which may contain characteristics of the product (like 'wholegrain', 'light' etc.), the food group (e.g. 'breakfast cereal', 'evaporated milk' etc.), the flavor (e.g. with chocolate, vanilla etc.). This information is usually given in bigger font. It may also contain the target group if mentioned at the front of pack e.g. 'for kids. The long name of the product ends with the package size.

Nutrients

The values of the macro- and micro- nutrients listed, at the unit size mentioned near every nutrient, per 100g or 100mL edible portion. The values of the nutrients missing of the food label are not filled out with a zero value. The zero value is used only when the label mentions it so. The list of nutrients can be found at the appendix.

Claims File

Id

An 8-digit id number that uniquely identifies a food item. Links to all files.

Product Name

The name of the product exactly as mentioned at the retailer's web page (ab Vassilopoulos click2shop), from where food data was acquired.

Long name

Short description of the product translated in English that begins with the manufacture's name (in capital letters), the product name which may contain characteristics of the product (like 'wholegrain', 'light' etc.), the food group (e.g. 'breakfast cereal', 'evaporated milk' etc.), the flavor (e.g. with chocolate, vanilla etc.). This information is usually given in bigger font. It may also contain the target group if mentioned at the front of pack e.g. 'for kids. The long name of the product ends with the package size.

Claims existence

Whether there is or there is not a claim on the package. Every comment mentioned at the front of pack may be considered as a claim.

Health Claim

Whether there is or there is not a health claim mentioned on the package. As health claims are considered only the regulated. (See Appendix C).

Health Claim mentioned

The health claim as mentioned on the package translated in English.

Health Claim Category

Whether the health claim mentioned belongs to article 13, 13/5 or 14.

Special Diet Claim

Whether there is or there is not a claim related to the product being suitable for vegetarian/vegan, related to allergies/intolerance e.g. gluten free, dairy free etc.

Vegetarian/Vegan

Whether the food product is mentioned to be suitable for vegetarian or vegan. There is a particular logo used for vegan products (see Appendix). However, all products that mention being suitable for vegetarian or vegan are included.

Comment

Whether the food product mentions at its label being fasting.

Allergies/Intolerance

Any claim related to special diet, except from vegetarian/vegan, as mentioned on the package e.g. gluten free, dairy free, lactose free etc.

Natural Claim Existence

Whether there is or there is not a claim related to natural/pure products, absence of additives, pesticides, and hormones.

Natural Claim Mentioned

The natural claim as mentioned on the package translated in English.

Wholegrain/Multi-seed

Whether the food product is wholegrain or multi-seed.

Nutrition Claim Existence

Whether there is or there is not a nutritional claim mentioned on the package. As nutritional claims are considered only the regulated. (See Appendix D).

Nutrition Claim Energy

Whether there is or there is not a nutrition claim for energy mentioned on the package. As nutritional claims for energy are considered only the regulated. See Appendix.

Energy Category

In which of the 3 categories, ('Low Energy', 'Energy-reduced', 'Energy-free') the nutrition claim belongs to. See Appendix

Other Energy Claim

A claim for the energy, except from the regulated, as mentioned on the package.

Nutrition Claim Fat

Whether there is or there is not a nutrition claim for fat mentioned on the package. As nutrition claims for fat are considered only the regulated. See Appendix.

Fat Category

In which of the 4 categories, (‘Low Fat’, ‘Fat-free’, ‘Low Saturated Fat’, ‘Saturated Fat-Free) the nutrition claim belongs to. See Appendix

Other Fat Claim

A claim for fat, except from the regulated, as mentioned on the package.

Nutritional Claim Sugar

Whether there is or there is not a nutritional claim for sugar mentioned on the package. As nutrition claims for sugar are considered only the regulated. See Appendix.

Sugar Category

In which of the 3 categories, (‘Low sugars’, ‘Sugars-free’, ‘with no Added Sugars’) the nutrition claim belongs to. See Appendix

Other Sugar Claim

A claim for sugars, except from the regulated, as mentioned on the package.

Nutrition Claim Salt

Whether there is or there is not a nutrition claim for salt mentioned on the package. As nutrition claims for salt are considered only the regulated. See Appendix.

Salt Category

In which of the 3 categories, (‘Low sodium/salt’, ‘Very low sodium/salt’, ‘Sodium/Salt-free’, ‘with no Added Sodium/Salt’) the nutrition claim belongs to. See Appendix

Other Salt Claim

A claim for salt, except from the regulated, as mentioned on the package.

Nutritional Claim Fiber

Whether there is or there is not a nutrition claim for fiber mentioned on the package. As nutrition claims for fiber are considered only the regulated. See Appendix.

Fiber Category

In which of the 2 categories, (‘Source of fiber’, ‘High fiber’) the nutrition claim belongs to. See Appendix

Other Fiber Claim

A claim for fiber, except from the regulated, as mentioned on the package.

Nutrition Claim Protein

Whether there is or there is not a nutrition claim for protein mentioned on the package. As nutrition claims for protein are considered only the regulated. See Appendix.

Protein Category

In which of the 2 categories, (‘Source of protein’, ‘High protein’) the nutrition claim belongs to. See Appendix

Other Protein Claim

A claim for protein, except from the regulated, as mentioned on the package.

Nutrition Claims Vitamins

Whether there is or there is not a nutrition claim for vitamins mentioned on the package. As nutrition claims for vitamins are considered only the regulated. See Appendix.

Vitamins Mentioned

The name of vitamin(s) mentioned at the Front-of-Pack or generally ‘vitamins’, if mentioned so.

Vitamins Category

In which of the 2 categories, (‘Source of [name of vitamin(s)]/vitamins’, ‘High [name of vitamin(s)]/vitamins’) the nutrition claim belongs to. See Appendix

Other Vitamins Claim

A claim for vitamins, except from the regulated, as mentioned on the package.

Nutrition Claim Minerals

Whether there is or there is not a nutrition claim for minerals mentioned on the package. As nutrition claims for minerals are considered only the regulated. See Appendix.

Minerals mentioned

The name of mineral(s) mentioned at the Front-of-Pack or generally ‘minerals’, if mentioned so.

Minerals Category

In which of the 2 categories, (‘Source of [name of mineral(s)]/minerals’, ‘High [name of mineral(s)]/minerals’) the nutrition claim belongs to. See Appendix

Other Minerals Claim

A claim for minerals, except from the regulated, as mentioned on the package.

Nutrition Claim Nutrients

Whether there is or there is not a nutrition claim for nutrients mentioned on the package. As nutrition claims for nutrients are considered only the regulated. See Appendix.

Nutrients mentioned

The name of nutrient(s) or non-nutrient(s) mentioned at the Front-of-Pack.

Nutrients Category

In which of the 4 categories, (‘contains [name of the nutrient(s) or other substance(s)]’, ‘increased [name of the nutrient(s) or other substance(s)]’, ‘reduced [name of the nutrient(s) or other substance(s)], ‘light/lite’) the nutrition claim belongs to. See Appendix

Other Nutrients Claim

A claim for nutrients, except from the regulated, as mentioned on the package.

Nutrition Claim n3

Whether there is or there is not a nutrition claim for omega-3 fatty acids mentioned on the package. As nutrition claims for omega-3 fatty acids are considered only the regulated. See Appendix.

n3 Category

In which of the 2 categories, (‘Source of omega-3 fatty acids’, ‘high omega-3 fatty acids’) the nutrition claim belongs to. See Appendix

Other n3 Claim

A claim for omega-3 fatty acids, except from the regulated, as mentioned on the package.

Nutrition Claim MUFA

Whether there is or there is not a nutrition claim for mono-unsaturated fatty acids mentioned on the package. As nutrition claim for mono-unsaturated fatty acids is considered only the regulated. See Appendix.

MUFA Category

Mention of the category’s name (‘High mono-unsaturated fatty acids’) that the nutrition claim belongs to. See Appendix

Other MUFA Claim

A claim for mono-unsaturated fatty acids, except from the regulated, as mentioned on the package.

Nutrition Claim PUFA

Whether there is or there is not a nutrition claim for poly-unsaturated fatty acids mentioned on the package. As nutrition claim for poly-unsaturated fatty acids is considered only the regulated. See Appendix.

PUFA Category

Mention of the category's name ('High poly-unsaturated fatty acids') that the nutrition claim belongs to. See Appendix

Other PUFA Claim

A claim for poly-unsaturated fatty acids, except from the regulated, as mentioned on the package.

Nutrition Claim PUFA

Whether there is or there is not a nutrition claim for unsaturated fatty acids mentioned on the package. As nutrition claim for unsaturated fatty acids is considered only the regulated. See Appendix.

Unsaturated Fatty Acids Category

Mention of the category's name ('High unsaturated fatty acids') that the nutrition claim belongs to. See Appendix

Other Unsaturated Fatty Acids Claim

A claim for unsaturated fatty acids, except from the regulated, as mentioned on the package.

Environment Claim

Whether there is or there is not a claim for organic, biodiversity, genetically modified organism free, or any other claim related to environment, mentioned on the package.

Environment Bio

Whether the product is or is not organic. Products considered as organic should carry the official organic logo on their package (See Appendix E).

Environment Other

Environment claims except from organic, as mentioned on the package.

Other Claim Existence

Whether there is or there is not another claim mentioned at the package that does not belong to any of the categories listed before.

Other Claim mentioned

The claim as mentioned on the package translated in English.

Quality Schemes

Whether the product carry or not a quality scheme. As quality schemes are considered geographical indications (PDO, PGI, GI) and Traditional Specialty Guaranteed (TSG). The product should carry the corresponding official logo (See Appendix F).

Quality Schemes Category

In which of the 4 categories (PDO, PGI, GI or TSG) the quality scheme belongs to.

Greek Product

Whether the product is or is not Greek. The products are considered as Greek only if they carry the official logo for Greek products (See Appendix G).

Greek mention

Any other claim indicating that the product comes from Greece, as mentioned at the package, translated in English.

For Kids

Whether the product is mentioned to be for kids or not.

Fortified

Whether the product is fortified or not (See Appendix H).

Photobook

Every food product has its own PDF File that contains at least one photograph of the Front of Pack and one of the package's side that indicates the product's nutritional value. More precisely, the first page of the PDF File contains the product's long name, its id number, its food group, the code of Lingula's food category and the FoP photograph. The second page contains the photograph of the package's side that indicates the product's nutritional value. Next pages contain photographs of the other sides of the package, when available. The PDF File is saved with the product's id number as a name.

Appendix A (id)

The id is an 8-digit number that uniquely identifies a food item. It is based on and linked with the EuroFIR's LanguaL Categorization, while it also allows distinguishing food products according to the way that they are usually being consumed in Greece and for practical research purposes.

The first 2 digits relate to the food category, the third to the subcategory, the fourth to the food group, the fifth to the subgroup while the sixth to one more useful differentiation. The last 2 digits are a serial number with no further mean. Tables below indicate the numbers used for the id composition. When the characteristics that correspond with a number do not fit to a food product description the value '0' should be used instead of the particular number. In addition, when further categorization is absent, the value '0' should be used again to complete these digits, so as to always result in an 8-digit id.

01. Milk, Milk Product or Milk Substitute	1.Milk	1.Liquid (MILK)	1. Fresh	1. Simple	**A0780**
				2. Fortified	**A0780**
			2. UHT	3. Lactose free or less lactose	
				4. For kids	
		2.Processed (MILK)	1. Evaporated	1. Simple	**A0781**
				2. With sugar	
			2. Powder		
			3. Chocolate	1. Liquid	
				2. Powder	**A0845**
		3. Cream (CREAM)			A0782
		4. Fermented (MILK)	1. Kefir		**A0783**
			2. Ariani		
			3. Sour milk		
	2.Fermented milk product	1. Yogurt (YOGURT)	1. Simple (white)		
			2. Dessert	1. Yogurt desset	
				2. Strainned yogurt dessert	
				3. Milk dessert	
			3. Traditional		
			4. Strained		
			5. Beverage		
			6. For Kids		
		2. Kefir (KEFIR)			
		3. Plant based desserts (PLANT-BASED DESSERTS)	1. Plant based desserts except from soya		**A0824**
			2. Soya		**A0788**
	3. Cheese	1. Cured			**A0785**
		2. Uncured			**A0786**
		3. Processed			**A0787**
		4. Soya cheese			**A0788**
	4. Imitation milk products	1. Nut/seed beverage (PLANT-BASED BEVERAGES)	1. Simple	1. Less/no sugar	**A0824**
		2. Soya milk (PLANT-BASED BEVERAGES)	2. Flavored	2. Plus calcium	**A0788**
				3. Plus calcium and less/no sugar	
		3. Non-dairy coffee creamer			
	5. Frozen dairy desserts	1. Frozen yogurt in a cone			**A0789**
		2. Ice cream sandwich			
		3. Other			

06. Grain or Grain Product	1. Cereal or cereal-like milling products and derivatives				**A0813**
	2. Rice or other grain				**A0814**
	3. Pasta and similar products				**A0815**
	4. Breakfast cereal (and cereal bars)	1. Breakfast cereal	1. Corn Flakes		**A0816**
			2. Muesli		
			3. Miscellaneous		
			4. For Kids		
		2. Cereal bars			**A1330**
	5. Bread and similar products	1. Leaved bread			**A0818**
		2. Unleaved bread			**A0819**
		3. Bread Products			**A0820**
	6. Fine bakery ware	1. Biscuits, sweet and semi-sweet	1. Biscuits		**A1331**
			2. Cookies		
			3. Multi-cereal		
			4. Digestive		
			5. Wafers		
			6. Sweet buns		
		2. Pancakes or waffle	1. Pancakes		**A1297**
			2. Waffles		
		3. Pastries and cakes	1. Cake		**A1333**
			2. Pie, sweetened		**A1334**
			3. Croissants		**A1332**
			4. Doughnut		
			5. Brioche		
		4. Savoury buns			**A0821**
	7. Savory cereal dish	1. Pasta dish			**A1204**
		2. Pie, unsweetened or pizza			**A1296**

FOOD GROUP	MAIN INGREDIENT	FOOD CATEGORY (CODE)
• Frozen semi-ready meals • Ready-to-eat meals	Egg	A0792
	Meat	A0799
	Poultry	A0795
	Seafood	A0804
	Pasta	A1204
	Vegetable (εδώ ανήκουν και τα λαδερά)	A0828
	Mushroom	A1335
	Potato	A0830
	Pulse	A0832
	Cheese	A0784
	Traditional, mixed (pastitsio, mousakas)	TRADITIONAL
	Sandwich (tortillas included)	A1203
	Prepared salad	A0866
	Sweet	-
Pizza		A1296
Pie, unsweetened		A1296

FOOD SUBCATEGORY	FOOD GROUP	FOOD CATEGORY (CODE)
Savoury Snack	Potato chips (13)	A0868
	Chips, other (13)	
	Popcorn (13)	
	Crackers (14)	
	Savoury snack, other (15)	
	Rice wafers (15)	
	Savoury buns	A0821
	Breadsticks (14)	A0820

FOOD GROUP	**FOOD CATEGORY (CODE)**
Frozen potatoes	A0829
Mashed potatoes	A0830
Cubes & Broths	A0856
Soups	A0865
Frozen vegetable	A0826
Frozen fishsticks	A0804
Bechamel	A0862
Mayonnaise	A0859
Ketchup	A0858
Soy sauce	
Horseradish sauce	

Appendix B (food categories)

EUROFIR FOOD CLASSIFICATION THESAURUS

LanguaL™

2014-1.0

A0778 MILK, MILK PRODUCT OR MILK SUBSTITUTE (EUROFIR)

This category includes: liquid milks and processed milks; cream; milk products including fermented milk products, yoghurts and cheeses; milk product substitutes (e.g. made from soya); milk beverage powders; dairy ice cream. The category does not include butter and butter spreads (under *FAT OR OIL*); sauces and soups with a milk product as the main ingredient (under *PREPARED FOOD PRODUCT*). Index infant formula under *FOOD FOR SPECIAL NUTRITIONAL USE*.

- **A0779 MILK (EUROFIR)**

Milk in all forms, milk-based beverage, cultured milk product, or milk.

✓ A0780 LIQUID MILK (EUROFIR)

Liquid milks are the secretion of the mammary gland of animals such as cow, sheep, goat, buffalo and camel, and include Human milk. The category includes milks that have only been processed for reasons of food safety (e.g. pasteurization), preservation (e.g. UHT) or skimming to reduce fat content.

✓ A0781 PROCESSED MILK (EUROFIR)

Processed milks are milks that have been subject to processing that modifies their consistency (e.g. evaporated milk) and/or composition other than fat content (e.g. whey). The group also includes milk-based drinks like milkshakes.

✓ A0782 CREAM (EUROFIR)

Includes fresh cream, crème fraîche and sour cream.

- **A0783 FERMENTED MILK PRODUCT (EUROFIR)**

Fermented milk is a milk product obtained by fermentation of milk, which milk may have been manufactured from products obtained from milk with or without compositional modification as limited by the provision in Section 3.3, by the action of suitable microorganisms and resulting in reduction of pH with or without coagulation (CODEX STAN 243-2003). Fermented milk products include a range of foods commonly referred to as yogurt (or yoghurt), plus sour milk drinks produced by fermentation. A few of these are alcoholic as they are made with combined lactic and yeast ferments (e.g. kefir, koumiss); others are lactic fermented milk products (e.g. cieddu, kaeder milk, skyr, taette). In some traditional fermented milk products, such as Stragisto (strained yoghurt), Labneh, Ymer and Ylette, Milk the protein has been increased to minimum 5.6%.

- **A0784 CHEESE (EUROFIR)**

Cheese is the ripened or unripened soft or semi-hard, hard and extra hard product, which may be coated, and in which the whey protein/casein ratio does not exceed that of milk, obtained by : coagulating wholly or partly … through the action of rennet or other suitable coagulating agents, and by partially draining the whey resulting from such coagulation; and/or processing techniques involving coagulation of the protein of milk and/or products obtained from milk which give an end-product with similar physical, chemical and organoleptic characteristics (CODEX STAN A-6-1978, Rev.1-1999, Amended 2003). The group includes goat and sheep cheeses, and cheeses made from sour milk, whey or buttermilk.

✓ A0785 CURED CHEESE (EUROFIR)

Cheeses are classified here according to their consistency (Codex Alimentarius Standard). Ripened cheese is cheese which is not ready for consumption shortly after manufacture but which must be held for such time, at such temperature, and under such other conditions as will result in the necessary biochemical and physical changes characterizing the cheese in question. (CODEX STAN A-6-1978, Rev.1-1999, Amended 2003). The group includes cheeses that are normally consumed cured but may be sold in an uncured or very lightly cured stage.

✓ A0786 UNCURED CHEESE (EUROFIR)

Unripened cheese including fresh cheese is cheese which is ready for consumption shortly after manufacture (CODEX STAN A-6-1978, Rev.1-1999, Amended 2003). It is consumed fresh and has a mild acid flavor, moisture max. 80%. Includes such products as cream cheese and mozzarella cheese.

✓ A0787 PROCESSED CHEESE (EUROFIR)

Process(ed) cheese and spreadable process(ed) cheese are made by grinding, mixing, melting and emulsifying with the aid of heat and emulsifying agents one or more varieties of cheese, with or without the addition of milk components and/or other foodstuffs (CODEX STAN A-8(b)-1978). The result is a homogeneous plastic mass, except for grated cheese product, which is powdered or granular.

- **A0788 IMMITATION MILK PRODUCTS (EUROFIR)**

The group includes soya milk, soya cheese, non-dairy coffee creamer.

- **A0789 FROZEN DAIRY DESSERT (EUROFIR)**

Includes frozen dairy items offered in a cone, a sandwich or as a cake or pie, such as frozen yogurt in a cone or an ice cream sandwich. Non-dairy ices (e.g. Water ices, granitas, sorbets) are classified under *DESSERT (EUROFIR) [A0864] * A frozen dessert prepared from one or more dairy ingredients plus other ingredients.

A0790 EGG OR EGG PRODUCT (EUROFIR)

The group includes bird eggs, food product whose predominant constituent is eggs, recipe dishes whose main ingredient is considered to be eggs. It does not include fish roe (under "Fish").

- **A0791 FRESH OR PROCESSED EGG (EUROFIR)**

e.g. chicken eggs, duck eggs, egg yolk, egg products such as dried eggs

- **A0792 EGG DISH (EUROFIR)**

Dishes whose predominant ingredient is seen to be eggs, e.g. omelet, soufflé, meringue, eggnog.

A0793 MEAT OR MEAT PRODUCT (EUROFIR)

This category includes: carcass meat of mammals and birds; offal of mammals and birds; a food product whose predominant constituent is meat; a recipe dish whose main ingredient is considered to be meat.

- **A0794 RED MEAT (EUROFIR)**

The group includes carcass meat of domestic animals (e.g. beef, veal, pork, mutton / lamb, horse, rabbit) and game (e.g. wild pig, boar, venison, whale).

- **A0795 POULTRY MEAT (EUROFIR)**

The group includes carcass meat of domestic poultry (e.g. chicken, turkey, duck, goose) and game birds (e.g. pheasant, partridge, sea birds)

- **A0796 OFFAL (EUROFIR)**

e.g. liver, kidney, tongue, heart, trotters, giblets.

- **A0797 PRESERVED MEAT (EUROFIR)**

e.g. ham, bacon, corned beef

- **A0798 SAUSAGE OR SIMILAR MEAT PRODUCT (EUROFIR)**

Includes: pastes, pâtés and terrines; sausage meat; dry, smoked sausages (rohwurst); fresh and lightly cooked sausages (bratwurst); cooked sausages (kochwurst); blood & blood products (e.g. haggis, black pudding); other meat products (e.g. galantine, brawn).

- **A0799 MEAT DISH (EUROFIR)**

Dishes whose predominant ingredient is seen to be meat; e.g. stew, meat burger, meat balls, meat pie or pasty

- **A0800 MEAT ANALOGUE (EUROFIR)**

e.g. textured vegetable protein.

A0801 SEAFOOD OR RELATED PRODUCT (EUROFIR)

The group includes marine or freshwater fish, mollusks, crustaceans, and other fauna such as reptiles, insects or frogs not in the “Meats” group. The group also includes seafood product analogs and seafood-based sausage or luncheon meat as well as such products as squid ink and clam juice.

- **A0802 FISH OR RELATED ORGANISM (EUROFIR)**

Flesh from marine or freshwater fish, mollusks, crustaceans, and other fauna such as reptiles, insects or frogs not in the “Meats” group.

- **A0803 SEAFOOD PRODUCT (EUROFIR)**

Includes fish offal; a food product whose predominant constituent is fish (e.g. dried and salted fish, smoked fish, canned fish, pickled fish, restructured fish and fish analogues, surimi; fish paste, pâté).

✓ A0804 SEAFOOD DISH (EUROFIR)

A recipe dish whose main ingredient is considered to be fish

A0805 FAT OR OIL (EUROFIR)

Food substance or component consisting predominantly of mixed glycerol esters of fatty acids and, in far lesser amounts, of fatty acids, sterols and pigments. A fat is solid at room temperature; an oil is liquid at room temperature (20 degrees C). Excludes essential oils.

- **A0806 VEGETABLE FAT OR OIL (EUROFIR)**

In this context, “vegetable fats” are oils that are solid at room temperature (e.g. palm oil, cocoa butter). It may also apply to hydrogenated (hardened) vegetable fats.

- **A0807 MARGARINE OR LIPID OF MIXED ORIGIN (EUROFIR)**

Food product having functional characteristics similar to a butter product; it may be nutritionally equivalent or inferior to the product it purports to resemble.

- **A0808 BUTTER OR OTHER ANIMAL FAT (EUROFIR)**

EFG group 12.

✓ A0809 BUTTER (EUROFIR)

e.g. butter, butter oil, ghee

✓ A0810 OTHER ANIMAL FATS (EUROFIR)

e.g. beef fat, goose fat

✓ A0811 FISH OILS (EUROFIR)

e.g. herring oil, sardine oil

A0812 GRAIN OR GRAIN PRODUCT (EUROFIR)

This group includes: grains and their milled products obtained from members of the grass family; dough products obtained from grain, such as pasta and breads; breakfast

cereals; savoury and sweet products and dishes in which grain products are considered the predominant constituent; substitute flours and other starch products obtained from non-cereal sources. It excludes sweet corn when eaten as a vegetable.

- **A0813 CEREAL OR CEREAL-LIKE MILLING PRODUCTS AND DERIVATIVES (EUROFIR) Renamed from *FLOUR OR STARCH (EUROFIR)* (LanguaL 2010).**

Examples: wheat flour, wholemeal, substitute flours and starches, wheat flour, patent, soya flour, rye flour, whole, potato flour, cornflour, carob flour, rice flour, arrowroot, buckwheat flour, tapioca

- **A0814 RICE OR OTHER GRAIN (EUROFIR)**

Examples are whole grain wheat, brown rice, bulgur, parboiled rice, rolled oats, wild rice, pearl barley, millet, rolled oats, corn grits and similar products.

- **A0815 PASTA AND SIMILAR PRODUCTS (EUROFIR)**

Renamed from *PASTA (EUROFIR)* (LanguaL 2010).
Eurocode-2 group 06.30.
Pasta can be either dried or fresh, and as main-dish (pasta asciutta) or miniature pasta (e.g. to add to soups). Although pasta is usually made from durum wheat flour, it can also be made from wholemeal flour or buckwheat flour. Noodles contain egg unless specifically referred to as plain noodles. Asian transparent noodles can made from a wide range of flours, many of them non-cereal.

- **A0816 BREAKFAST CEREAL (EUROFIR)**

Excludes rolled oats, corn grits and similar products, which are indexed under *RICE OR OTHER GRAIN*.
Prepared grain product ready or nearly ready for consumption and marketed primarily for breakfast use. Includes formulated breakfast cereals such as 'corn flakes' or ‘muesli’ and simple breakfast cereals such as instant oatmeal.

- **A0817 BREAD AND SIMILAR PRODUCTS (EUROFIR)**

Renamed from *BREAD (EUROFIR)* (LanguaL 2010).
Products in the “Bread” categories normally have contents of sugars and fat neither exceeding 5% on a dry weight basis.

- ✓ A0818 LEAVENED BREAD (EUROFIR)

Includes wholemeal wheat bread, soda bread, rye bread.

- ✓ A0819 UNLEAVENED BREAD, CRISP BREAD AND RUSK (EUROFIR)

Renamed from *FLATBREAD (EUROFIR)* (LanguaL 2010).
A flatbread, or unleavened bread, is a simple bread made with flour, water, and salt and then thoroughly rolled into flattened dough. Many flatbreads are unleavened-made without yeast or sourdough culture-although some flatbread is made with yeast, such as pita bread. There are many other optional ingredients that flatbreads may contain, such as curry powder, diced jalapeños, chili powder, or black pepper. Olive oil or sesame oil may be added as well. Flatbreads can range from one millimeter to a few centimeters thick. [Wikipedia]. Includes pitta bread, matzo, tortilla.

- ✓ A0820 BREAD PRODUCT (EUROFIR)

Includes breadcrumbs, bread stuffing

- **A0821 FINE BAKERY WARE (EUROFIR)**

Products in the *BREAD* category normally have contents of sugars and fat neither exceeding 5% on a dry weight basis. Bakery products exceeding either of these limits are termed & quot; Fine bakery ware & quot; Savoury fine bakery wares will tend to be higher in fat and sweet products in sugars. However, some products, for example scones, may be considered savoury or sweet. Therefore, all of these products are categorized as & quot; Fine bakery wares & quot; rather than using separate categories for savoury and sweet products. Some examples are: biscuits, cookies, dry pastry (e.g. savoury biscuits, sweet biscuits and cookies); sweet breads (e.g. croissants, currant bun, dough cakes like muffins or brioche, scone, doughnut); pastry (e.g. Danish pastry, baclava); tart, pie (e.g. custard tart, mince pie); cakes (e.g. fruit cake, cream cake, sponge cake).

- **A0822 SAVOURY CEREAL DISH (EUROFIR)**

includes dumpling, risotto, savoury pancake, pizza, couscous, savoury pie, sandwich.

A0823 NUT, SEED OR KERNEL (EUROFIR)

Nuts, seeds and kernels in all forms, including pastes. Examples: walnut, hazelnut, sweet chestnut, sunflower seed, olive seed, pine nut, apricot kernel, peanuts.

- **A0824 NUT OR SEED PRODUCT (EUROFIR)**

e.g. coconut milk, chestnut purée, tahini paste, peanut butter.

A0825 VEGETABLE OR VEGETABLE PRODUCT (EUROFIR)

Includes: plants and parts of plants eaten as vegetables (i.e. normally consumed as a savoury and usually with other foods as sources of protein and/or grain starch), including immature pulses; edible fungi and seaweed; a food product whose predominant constituent is vegetables; a recipe dish whose main ingredient is considered to be vegetables. The group excludes: fruiting body of a plant when this is consumed as a dessert fruit (under *FRUIT*); seeds, kernels and nuts (under *NUT, SEED OR KERNEL PRODUCT*); oils produced from vegetable plants (under *FAT OR OIL*); herbs, spices, chutney and pickles produced from vegetables (under *SPICE, CONDIMENT OR OTHER INGREDIENT*); food products produced wholly or partially from vegetables but used as a substitute for a food assigned to another main group (for example, potato flour is a substitute flour under *FLOUR OR STARCH*).

- **A0826 VEGETABLE (EXCLUDING POTATO) (EUROFIR)**

In EFG, Potatoes were excluded distinguished from other vegetables because of their high starch content. Herbs have been included where these may be consumed in significant amounts as vegetables, either raw or cooked (e.g. parsley, chives). A vegetable fruit is usually consumed as a vegetable when the starch content is high (e.g. avocado, olive). Some examples of foods classified here would be lettuce, cabbage, rhubarb, asparagus, onion, carrot.

- ✓ A0827 VEGETABLE PRODUCT (EUROFIR)

e.g. tomato purée, sun-dried tomatoes, pickled red cabbage, sauerkraut.

- ○ A0828 VEGETABLE DISH (EUROFIR)

A recipe dish whose main ingredient is considered to be vegetables.

- **A0829 STARCHY ROOT OR POTATO (EUROFIR)**

In EFG, Potatoes were excluded distinguished from other vegetables because of their high starch content. Some examples of foods classified here would be new potato, main-crop potato, Jerusalem artichoke, sweet potato, yam

- ✓ A0830 POTATO DISH (EUROFIR)

- **A0831 PULSE OR PULSE PRODUCT (EUROFIR)**

Use for crops harvested as dry seed. Index green beans and green peas as vegetables.

EFG group 14. Eurocode-2 group 7.10-20

- ✓ A0832 PULSE DISH (EUROFIR)

A0833 FRUIT OR FRUIT PRODUCT (EUROFIR)

The group includes: fruits when consumed as a dessert; food products whose predominant constituent is fruit; recipe dishes whose main ingredient is considered to be fruit. A fruit is usually consumed as a dessert when the starch content has been reduced by conversion during ripening to sugars. The group excludes: vegetable fruits (under “Vegetable”); nuts, seeds and kernels (under *NUT, SEED OR KERNEL PRODUCT*); oils produced from fruits (under *FAT OR OIL*); chutney and pickles (under “Miscellaneous foods”).

- **A0834 PROCESSED FRUIT PRODUCT (EUROFIR)**

Examples are dried fruits (e.g. dried mixed fruit), compotes, canned, stewed fruit (e.g. apple sauce, fruit cocktail).

A0835 SUGAR OR SUGAR PRODUCT (EUROFIR)

This group includes sucrose and other sugars, sugar substitutes, honey and syrups; fruit jams, marmalades and other spreads; dessert jellies and toppings; chocolate and non-

chocolate confectionery; a food product whose predominant constituent is sugar or chocolate; a recipe dish whose main ingredient is considered to be sugar or chocolate.

- **A0836 SUGAR, HONEY OR SYRUP (EUROFIR)**

This group includes sugars (e.g. white sugar, brown sugar, fructose), sugar substitutes (non-nutritive sweeteners like aspartame & saccharine, nutritive sweeteners like sorbitol & mannitol), honey, syrups (e.g. molasses, maple syrup, corn syrup).

- **A0837 JAM OR MARMALADE (EUROFIR)**

Semisolid or jelled food prepared from fruit or fruit juice and other ingredients. The group includes fruit jam, fruit jelly preserve, marmalade.

- **A0838 NON-CHOCOLATE CONFECTIONERY OR OTHER SUGAR PRODUCT (EUROFIR)**

Some examples are boiled sweet, gum sweet, nougat, Turkish delight, chewing gum, marzipan, candied fruit.

- **A0839 CHOCOLATE OR CHOCOLATE PRODUCT (EUROFIR)**

Some examples are chocolate slab or bar (e.g. milk chocolate bar, white chocolate bar), filled chocolate candy, chocolate-coated confectionery bars.

A0840 BEVERAGE (NON-MILK) (EUROFIR)

Alcoholic or non-alcoholic beverage; excludes milk and milk-based beverages.

- **A0841 JUICE OR NECTAR (EUROFIR)**

The members of the work group in Action COST 99/Eurofoods considered it important to be able to separate fruit juices from both *NON-ALCOHOLIC BEVERAGE* and *FRUIT* in the EFG classification, in order to evaluate and compare consumption patterns across countries. Examples are orange juice, apple juice, tomato juice, fruit and vegetable nectars.

- **A0842 NON-ALCOHOLIC BEVERAGE (EUROFIR)**

Beverage containing no more than 0.5% alcohol; it may be flavored, sweetened or carbonated; includes soft drinks and steeped beverages; excludes milk in all forms, fruit juices and vegetable juices.

✓ A0843 SOFT DRINK (EUROFIR)

Includes carbonated soft drinks (e.g. soda water, carbonated lemonade, cola, tonic), non-dilution still drinks (e.g. still lemonade), dilution drinks (concentrates which are diluted with water prior to consumption, e.g. rosehip syrup, fruit squash, lime cordial).

✓ A0844 WATER (EUROFIR)

Includes tap water, carbonated mineral water, still mineral water.

✓ A0845 COFFEE, TEA, COCOA OR INFUSION (EUROFIR)

Renamed from *COFFEE, TEA, COCOA (EUROFIR)* (LanguaL 2010). Beverage prepared by extracting flavor and other components from food sources by percolation and/or immersion in water, usually at near-boiling temperature. The group includes coffee (e.g. instant coffee, coffee and chicory essence), tea, herbal tea (e.g. green tea, black tea, tisane), cocoa beverage and beverage powder.

- **A0846 ALCOHOLIC BEVERAGE (EUROFIR)**

Beverage containing more than 0.5% alcohol; includes distilled spirits, malt beverage, and wine. Alcohol-free varieties are included in the appropriate categories together with their alcohol-containing forms.

✓ A0847 BEER OR BEER-LIKE BEVERAGE (EUROFIR)

Renamed from *BEER OR OTHER MALT BEVERAGE (EUROFIR)* (LanguaL 2010).

Includes beer, barley beer.

✓ A0848 CIDER, PERRY OR SIMILAR DRINK (EUROFIR)

Includes apple cider, perry (made by fermenting pear juice)

✓ A0849 WINE, FORTIFIED WINE OR WINE-LIKE BEVERAGE (EUROFIR)

Alcoholic beverage produced by the normal fermentation of the juice of grapes or other fruits or of the fermentable parts of plants or plant-related products. The group includes table wine, dessert wine, elderberry wine, fortified and liqueur wines (e.g. port, sherry, vermouth).

✓ A0850 LIQUEUR OR SPIRITS (EUROFIR)

Alcoholic beverage prepared by fermentation of grain or plant-related products and subsequent distillation. Includes liqueurs (e.g. calvados, kahlua, advocaat) and spirits (e.g. brandy, whisk(e)y, rum).

✓ A0851 ALCOHOLIC MIXED DRINK (EUROFIR)

Includes cocktails, punch, shandy.

A0852 MISCELLANEOUS FOOD PRODUCT (EUROFIR)

Use for foods and ingredients that could not fit into any of the above classes.EFG group 32, Eurocode-2 group 12.

- **A0853 SPICE, CONDIMENT OR OTHER INGREDIENT (EUROFIR)**

This subgroup includes baking goods and other ingredients such as flavorings, essences, seasonings and extracts which are difficult to assign to other main groups; herbs and spices; dressings, condiments and mixed accompaniments such as chutneys and pickles. The group does not include starches (under *GRAIN OR GRAIN PRODUCT*); plant products that may be used in significant amounts as vegetables as well as herbs, like chives and parsley (under *VEGETABLE*).

✓ A0854 BAKING INGREDIENT (EUROFIR)

Includes yeast, baking powder, pectin, additives.

- ✓ A0855 FLAVOURING OR ESSENCE (EUROFIR)

Includes almond essence, vanilla essence.

- ✓ A0856 SEASONING OR EXTRACT (EUROFIR)

Includes salt, stock cubes, gravy thickener, beef extract, marmite, vinegar.

- ✓ A0857 HERB OR SPICE (EUROFIR)

Aromatic or pungent plant product used whole or ground as a seasoning in food products, e.g. basil, oregano, thyme, allspice, clove, paprika, curry powder. Herbs may be considered to be plants whose non-woody parts are consumed in small amounts for their flavoring properties rather than in amounts significant to the intake of major nutrients. Spices are usually a dried part, or parts, of aromatic plants used either whole or ground to add flavor and for preservative properties. Some such as coriander and fenugreek are the ground seeds of plants whose leaves are used as herbs or vegetables. Others are dried fruits or berries.

- ✓ A0858 CONDIMENT (EUROFIR)

Food product that is usually pungent, tart, salty, or spicy and is used to enhance the flavors of other foods; includes ketchup, tabasco sauce, barbeque sauce, vinegar, soy sauce, prepared mustard, prepared horseradish, mint sauce and tartar sauce.

- ✓ A0859 DRESSING, MAYONNAISE (EUROFIR)

Mixture of edible fats or oils, acidifying agents and optional ingredients such as sweeteners (nutritive or non-nutritive), starch, egg and seasonings. Used in limited amounts to accompany salads and other foods. Includes salad dressings & other vinegar and oil based cold sauces, mayonnaise & other egg and oil based cold sauces.

- o A0860 CHUTNEY OR PICKLE (EUROFIR)

Product prepared by immersing fruits, vegetables, or other ingredients, such as spices and sweeteners, in a brine or an acid solution. Used to enhance the flavor of other food products. Examples are mango chutney, dill pickle, mixed pickle, relish.

- **A0861 PREPARED FOOD PRODUCT (EUROFIR)**

This subgroup includes multicomponent meals, sauces, retail salads, desserts, soups, snacks and other foods where similarity of the product type is more significant than the source of the principal ingredient(s).

- ✓ A0862 SAVOURY SAUCE (EUROFIR)

Sauce is a very general term for a liquid or semiliquid seasoning or other accompaniment for food. When sauces are cooked as part of, or adjuncts to, dishes (including starters, main courses and desserts), they have been assigned to the *SAVOURY SAUCE* or Non-standardized food product used as a meal accompaniment and consisting of a mixture of fats or oils, starch, liquid and other optional ingredients specified by the recipe; excludes condiments. Includes. bolognese sauce, white sauce, brown sauce, butter sauce, tomato sauce.

- ✓ A0863 DESSERT SAUCE (EUROFIR)

Sauce is a very general term for a liquid or semiliquid seasoning or other accompaniment for food. When sauces are cooked as part of, or adjuncts to, dishes (including starters, main courses and desserts), they have been assigned to the *SAVOURY SAUCE (EUROFIR) [A0862] * Sweetened and flavored product that is used as an accompaniment to desserts, e.g. fruit sauce, fudge sauce, brandy sauce.

✓ A0864 DESSERT (EUROFIR)

Sweetened prepared product usually consumed after the main course in a meal. Excludes fruit or fruit products, bakery products and confectionery. Includes sweet puddings (custards, starch puddings), non-dairy ices (e.g. water ices, granitas, sorbets) and gelatin desserts.

✓ A0865 SOUP (EUROFIR)

A liquid food made by simmering meat, poultry, seafood or vegetables, being clear or thickened to the consistency of a thin puree or having milk or cream added, and often containing pieces of solid food such as meat, shellfish, pasta or vegetables. Soup takes precedence over other food products. Examples are egg and lemon soup, oxtail soup, fish soup, rice soup, lentil soup, minestrone, cherry soup.

✓ A0866 PREPARED SALAD (EUROFIR)

A combination of one or more vegetable, fruit, herb, meat, poultry, seafood, egg, cereal or pasta, usually served with some kind of moist dressing; may be moulded with a jellying agent. Salad takes precedence over other product types. Examples are egg salad, tuna salad, mixed vegetable salad, jelled fruit salad, macaroni salad, potato salad, rice salad, mayonnaise salad.

✓ A0867 SANDWICH FILLING (EUROFIR)

Includes cheese-based sandwich filling, fish-based sandwich filling.

✓ A0868 SAVOURY SNACK (EUROFIR)

Unsweetened food product marketed for consumption between meals; excludes nuts, edible seeds, and sweetened products such as cakes, puddings and candies. Examples are potato crisps, maize-based snacks, pretzels, popcorn.

A0869 PRODUCT FOR SPECIAL NUTRITIONAL USE OR DIETARY SUPPLEMENT (EUROFIR)

This group includes products for dietetic use that are not typically regarded as food. It excludes normal foods that are prepared or processed in a special way to suit dietetic purposes; these are indexed as the normal food.

- **A0870 DIETARY SUPPLEMENT (EUROFIR)**

Includes vitamin/mineral products, tonics, supplements. Vitamin and mineral food supplements are sources in concentrated forms of those nutrients alone or in combinations, marketed in forms such as capsules, tablets, powders, solutions etc., that are designed to be taken in measured small-unit quantities but are not in a conventional food form and whose purpose is to supplement the intake of vitamins and/or minerals from the normal diet (Codex CAC/GL 55 - 2005).

- **A0871 FOOD FOR SPECIAL NUTRITIONAL USE (EUROFIR)**

Foods for Special Dietary Uses are those foods that are specially processed or formulated to satisfy particular dietary requirements that exist because of a particular physical or physiological condition and/or specific diseases and disorders and that are presented as such. The composition of these foodstuffs must differ significantly from the composition of ordinary foods of comparable nature, if such ordinary foods exist (CODEX STAN 146-1985). The product may be used as the sole or major source of nourishment. It is frequently offered in a form convenient to use. The group includes infant formula, products designed for weight loss, instant breakfast, energy food stick, interal and parenteral complete nutrition solutions, etc.

- ✓ A0872 MEDICAL FOOD (EUROFIR)

Foods for special medical purposes are a category of foods for special dietary uses that are specially processed or formulated and presented for the dietary management of patients and may be used only under medical supervision. They are intended for the exclusive or partial feeding of patients with limited or impaired capacity to take, digest, absorb or metabolize ordinary foodstuffs or certain nutrients contained therein, or who have other special medically-determined nutrient requirements, whose dietary management cannot be achieved only by modification of the normal diet, by other foods for special dietary uses, or by a combination of the two (CODEX STAN 180-1991).

- ✓ A0873 FOOD FOR INFANTS (EUROFIR)

Use for Infant formulae and follow-on formulae. Index Processed cereal-based foods and baby foods for infants and young children as the corresponding normal food (e.g. soup, fruit product). Eurocode-2 group 13.60.

- ✓ A1203 SANDWICH (EUROFIR)

(Miscellaneous food product→Prepared food product→Sandwich)

A sandwich is a food item made of two or more slices of leavened bread with one or more layers of filling, typically meat or cheese, with the addition of vegetables or salad. The bread can be used as is, or it can be coated with butter, oil, mustard or other condiments to enhance flavor and texture. (Wikipedia)

- ✓ A1204 PASTA DISH (EUROFIR)

(Grain or grain product→Savoury cereal dish→Pasta dish)

- ✓ A1205 FOOD FOR WEIGHT REDUCTION (EUROFIR)

(Product for special nutritional use or dietary supplement→food for special nutritional use→food for weight reduction)

- ✓ A1206 SPORTS FOOD (EUROFIR)

(Product for special nutritional use or dietary supplement→food for special nutritional use→sports food)

✓ A1296 PIE, UNSWEETENED, OR PIZZA (EUROFIR)
(Grain or grain product→Savoury cereal dish→Pie, unsweetened, or pizza)
Used only for unsweetened products; sweetened pies are indexed under *FINE BAKERY WARE (EUROFIR) [A0821] *. Pizza crust should be indexed as *UNLEAVENED BREAD (EUROFIR) [A0819] *

✓ A1297 PANCAKE OR WAFFLE (EUROFIR)
(Grain or grain product→Fine bakery ware→Pancake or waffle)
If filled, use *PREPARED FOOD PRODUCT (EUROFIR) [A0861] * or narrower term.

A thin, bakery product griddled or cooked in a heated mould.

✓ A1330 CEREAL BAR (EUROFIR)
(Grain or grain product→Breakfast cereal→Cereal bar)

✓ A1331 BISCUITS, SWEET AND SEMI-SWEET (EUROFIR)
(Grain or grain product→Fine bakery ware→Biscuits, sweet and semi-sweet)
Sweetened bakery product baked in individual portions that are usually small and flat. [US CFR 21]

✓ A1332 PASTRIES AND CAKES (EUROFIR)
(Grain or grain product→Fine bakery ware→Pastries and cakes)

- A1333 CAKE (EUROFIR)
(Grain or grain product→Fine bakery ware→Pastries and cakes→cake)

- A1334 PIE, SWEETENED (EUROFIR)
(Grain or grain product→Fine bakery ware→Pastries and cakes→Pie, sweetened)

- A1335 MUSHROOM DISH (EUROFIR)
(Vegetable or vegetable product→Vegetable→ Vegetable product→Vegetable dish→ Mushroom dish)

Appendix C (Health Claims)

Health Claims

Regulation: The European Commission (EC) adopted a regulation on the use of nutrition and health claims in December 2006 [Regulation (EC) 1924/2006] (European Parliament and Council, 2006). The aim of this regulation was to harmonize the use of nutrition and health claims on foods throughout the EU.

Health claims are divided into three categories:

- 'general function' claims, defined by article 13 of the regulation, which are based on generally accepted scientific evidence and do not refer to reduction of disease risk or to children's development and health;
- 'new function' claims (article 13/5), which are based on new scientific evidence and do not refer to reduction of disease risk nor to children's development and health; and
- claims regarding disease risk reduction and child development or health, defined by article 14 of the regulation.

Article 13 claims describe or refer to:

- the role of a nutrient or other substance in growth, development and the functions of the body; or
- psychological or behavioural functions; or
- slimming, weight control, reduction in the sense of hunger or increase in the sense of satiety, or reduction of the available energy of the diet (European Parliament and Council, 2006).

Examples of article 13 claims are;

- "Vitamin C is essential for a healthy nervous system"
- "Zinc helps boost the body's immune system"

The list of article 13 claims is available online http://www.efsa.europa.eu/en/ndaclaims/ndaclaims13.htm

Article 13/5 covers the same function claims as presented in Article 13, but are based on newly developed scientific evidence. Authorisation for these claims is assessed on a case-by-case basis following submission of a scientific dossier to EFSA, which delivers its scientific opinion within five months, assuming no supplementary information is required from the applicant. Health claims made under article 13/5, which are based on new data provided by the food business operator, will be authorised for that company only. The same health claim cannot be used by another food business operator for at least five years following original authorisation, unless the applicant can provide their own data to substantiate the claim.

Claims under article 14 of the regulation refer to reduction of disease risk or to children's development or health. As with article 13/5 claims, submissions to the Commission must be accompanied by a dossier of scientific evidence supporting the claim. In addition, all disease risk claims must be accompanied by a statement that the disease referred to has multiple risk factors and that altering one of these risk factors may or may not have a beneficial effect (European Parliament and Council, 2006).

Appendix D (Nutrition Claims)

Nutrition Claims

'Nutrition claim' means any claim which states, suggests or implies that a food has particular beneficial nutritional properties due to:

The energy (calorific value) it: a. provides

b. provides at a reduced or increased rate or

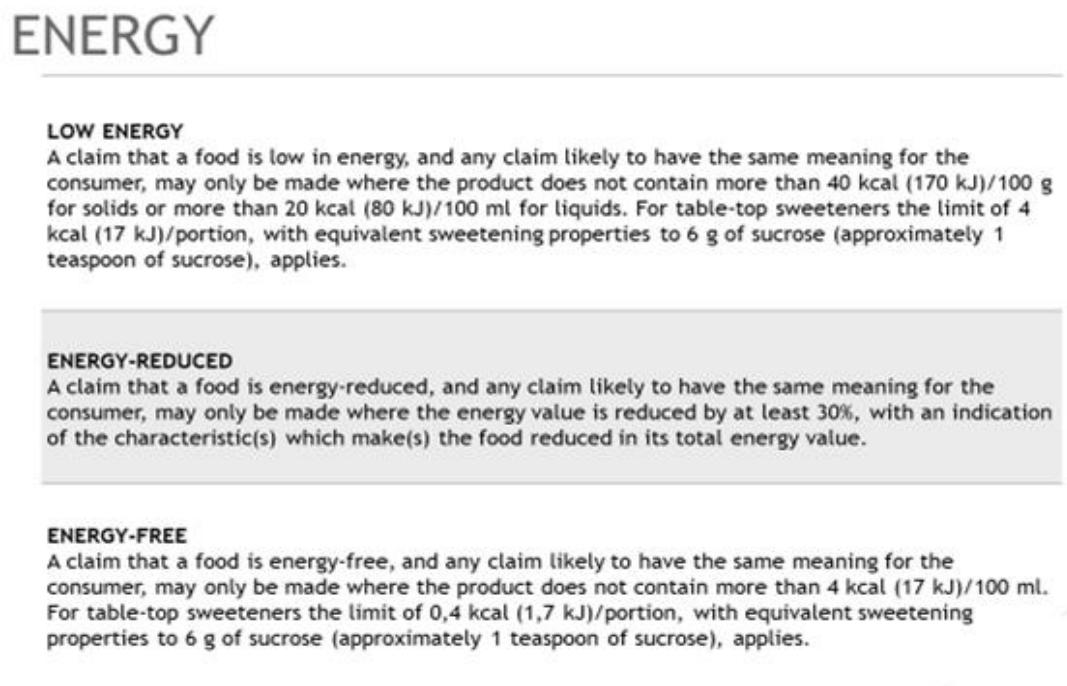
c. does not provide

The nutrients or other substances it: a. contains

b. contains in reduced or increased proportions or

c. does not contain

Regulated Nutrition Claims



ENERGY

LOW ENERGY
A claim that a food is low in energy, and any claim likely to have the same meaning for the consumer, may only be made where 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. For table-top sweeteners the limit of 4 kcal (17 kJ)/portion, with equivalent sweetening properties to 6 g of sucrose (approximately 1 teaspoon of sucrose), applies.

ENERGY-REDUCED
A claim that a food is energy-reduced, and any claim likely to have the same meaning for the consumer, may only be made where the energy value is reduced by at least 30%, with an indication of the characteristic(s) which make(s) the food reduced in its total energy value.

ENERGY-FREE
A claim that a food is energy-free, and any claim likely to have the same meaning for the consumer, may only be made where the product does not contain more than 4 kcal (17 kJ)/100 ml. For table-top sweeteners the limit of 0,4 kcal (1,7 kJ)/portion, with equivalent sweetening properties to 6 g of sucrose (approximately 1 teaspoon of sucrose), applies.

FAT

LOW FAT
A claim that a food is low in fat, and any claim likely to have the same meaning for the consumer, may only be made where the product contains no more than 3 g of fat per 100 g for solids or 1,5 g of fat per 100 ml for liquids (1,8 g of fat per 100 ml for semi-skimmed milk).

FAT-FREE
A claim that a food is fat-free, and any claim likely to have the same meaning for the consumer, may only be made where the product contains no more than 0,5 g of fat per 100 g or 100 ml. However, claims expressed as 'X % fat-free' shall be prohibited.

LOW SATURATED FAT
A claim that a food is low in saturated fat, and any claim likely to have the same meaning for the consumer, may only be made if the sum of saturated fatty acids and trans-fatty acids in the product does not exceed 1,5 g per 100 g for solids or 0,75 g/100 ml for liquids and in either case the sum of saturated fatty acids and trans-fatty acids must not provide more than 10% of energy.

SATURATED FAT-FREE
A claim that a food does not contain saturated fat, and any claim likely to have the same meaning for the consumer, may only be made where the sum of saturated fat and trans-fatty acids does not exceed 0,1 g of saturated fat per 100 g or 100 ml.

SUGAR

LOW SUGARS
A claim that a food is low in sugars, and any claim likely to have the same meaning for the consumer, may only be made where the product contains no more than 5 g of sugars per 100 g for solids or 2,5 g of sugars per 100 ml for liquids.

SUGARS-FREE
A claim that a food is sugars-free, and any claim likely to have the same meaning for the consumer, may only be made where the product contains no more than 0,5 g of sugars per 100 g or 100 ml.

WITH NO ADDED SUGARS
A claim stating that sugars have not been added to a food, and any claim likely to have the same meaning for the consumer, may only be made where the product does not contain any added mono- or disaccharides or any other food used for its sweetening properties. If sugars are naturally present in the food, the following indication should also appear on the label: 'CONTAINS NATURALLY OCCURRING SUGARS'.

SALT

LOW SODIUM/SALT
A claim that a food is low in sodium/salt, and any claim likely to have the same meaning for the consumer, may only be made where the product contains no more than 0,12 g of sodium, or the equivalent value for salt, per 100 g or per 100 ml. For waters, other than natural mineral waters falling within the scope of Directive 80/777/EEC, this value should not exceed 2 mg of sodium per 100 ml.

VERY LOW SODIUM/SALT
A claim that a food is very low in sodium/salt, and any claim likely to have the same meaning for the consumer, may only be made where the product contains no more than 0,04 g of sodium, or the equivalent value for salt, per 100 g or per 100 ml. This claim shall not be used for natural mineral waters and other waters.

SODIUM-FREE or SALT-FREE
A claim that a food is sodium-free or salt-free, and any claim likely to have the same meaning for the consumer, may only be made where the product contains no more than 0,005 g of sodium, or the equivalent value for salt, per 100 g.

NO ADDED SODIUM/SALT
A claim stating that sodium/salt has not been added to a food and any claim likely to have the same meaning for the consumer may only be made where the product does not contain any added sodium/salt or any other ingredient containing added sodium/salt and the product contains no more than 0,12 g sodium, or the equivalent value for salt, per 100 g or 100 ml.

FIBRE

SOURCE OF FIBRE
A claim that a food is a source of fibre, and any claim likely to have the same meaning for the consumer, may only be made where the product contains at least 3 g of fibre per 100 g or at least 1,5 g of fibre per 100 kcal.

HIGH FIBRE
A claim that a food is high in fibre, and any claim likely to have the same meaning for the consumer, may only be made where the product contains at least 6 g of fibre per 100 g or at least 3 g of fibre per 100 kcal.

PROTEIN

SOURCE OF PROTEIN
A claim that a food is a source of protein, and any claim likely to have the same meaning for the consumer, may only be made where at least 12% of the energy value of the food is provided by protein.

HIGH PROTEIN
A claim that a food is high in protein, and any claim likely to have the same meaning for the consumer, may only be made where at least 20% of the energy value of the food is provided by protein.

VITAMINS AND MINERALS

SOURCE OF [NAME OF VITAMIN/S] AND/OR [NAME OF MINERAL/S]
A claim that a food is a source of vitamins and/or minerals, and any claim likely to have the same meaning for the consumer, may only be made where the product contains at least a significant amount as defined in the Annex to Directive 90/496/EEC or an amount provided for by derogations granted according to Article 6 of Regulation (EC) No 1925/2006 of the European Parliament and of the Council of 20 December 2006 on the addition of vitamins and minerals and of certain other substances to foods[1].

HIGH [NAME OF VITAMIN/S] AND/OR [NAME OF MINERAL/S]
A claim that a food is high in vitamins and/or minerals, and any claim likely to have the same meaning for the consumer, may only be made where the product contains at least twice the value of 'source of [NAME OF VITAMIN/S] and/or [NAME OF MINERAL/S]'.

NUTRIENTS AND NON NUTRIENTS

CONTAINS [NAME OF THE NUTRIENT OR OTHER SUBSTANCE]
A claim that a food contains a nutrient or another substance, for which specific conditions are not laid down in this Regulation, or any claim likely to have the same meaning for the consumer, may only be made where the product complies with all the applicable provisions of this Regulation, and in particular Article 5. For vitamins and minerals the conditions of the claim 'source of' shall apply.

INCREASED [NAME OF THE NUTRIENT]
A claim stating that the content in one or more nutrients, other than vitamins and minerals, has been increased, and any claim likely to have the same meaning for the consumer, may only be made where the product meets the conditions for the claim 'source of' and the increase in content is at least 30% compared to a similar product.

REDUCED [NAME OF THE NUTRIENT]
A claim stating that the content in one or more nutrients has been reduced, and any claim likely to have the same meaning for the consumer, may only be made where the reduction in content is at least 30% compared to a similar product, except for micronutrients, where a 10 % difference in the reference values as set in Directive 90/496/EEC shall be acceptable, and for sodium, or the equivalent value for salt, where a 25% difference shall be acceptable.
The claim "reduced saturated fat", and any claim likely to have the same meaning for the consumer, may only be made:
(a) if the sum of saturated fatty acids and of trans-fatty acids in the product bearing the claim is at least 30% less than the sum of saturated fatty acids and of trans-fatty acids in a similar product; and
(b) if the content in trans-fatty acids in the product bearing the claim is equal to or less than in a similar product.
The claim "reduced sugars", and any claim likely to have the same meaning for the consumer, may only be made if the amount of energy of the product bearing the claim is equal to or less than the amount of energy in a similar product.

LIGHT/LITE
A claim stating that a product is 'light' or 'lite', and any claim likely to have the same meaning for the consumer, shall follow the same conditions as those set for the term 'reduced'; the claim shall also be accompanied by an indication of the characteristic(s) which make(s) the food 'light' or 'lite'.

OMEGA-3

SOURCE OF OMEGA-3 FATTY ACIDS
A claim that a food is a source of omega-3 fatty acids, and any claim likely to have the same meaning for the consumer, may only be made where the product contains at least 0,3 g alpha-linolenic acid per 100g and per 100kcal, or at least 40mg of the sum of eicosapentaenoic acid and docosahexaenoic acid per 100g and per 100kcal.

HIGH OMEGA-3 FATTY ACIDS
A claim that a food is high in omega-3 fatty acids, and any claim likely to have the same meaning for the consumer, may only be made where the product contains at least 0,6 g alpha-linolenic acid per 100 g and per 100 kcal, or at least 80 mg of the sum of eicosapentaenoic acid and docosahexaenoic acid per 100 g and per 100 kcal.

MONO – POLY UNSATURATED FAT

HIGH MONOUNSATURATED FAT
A claim that a food is high in monounsaturated fat, and any claim likely to have the same meaning for the consumer, may only be made where at least 45% of the fatty acids present in the product derive from monounsaturated fat under the condition that monounsaturated fat provides more than 20% of energy of the product.

HIGH POLYUNSATURATED FAT
A claim that a food is high in polyunsaturated fat, and any claim likely to have the same meaning for the consumer, may only be made where at least 45% of the fatty acids present in the product derive from polyunsaturated fat under the condition that polyunsaturated fat provides more than 20% of energy of the product.

HIGH UNSATURATED FAT
A claim that a food is high in unsaturated fat, and any claim likely to have the same meaning for the consumer may only be made where at least 70% of the fatty acids present in the product derive from unsaturated fat under the condition that unsaturated fat provides more than 20% of energy of the product.

Appendix E (Bio-Organic Products)

Organic farming is an agricultural method that aims to produce food using natural substances and processes. This means that organic farming tends to have a limited environmental impact as it encourages the responsible use of energy and natural resources, the maintenance of biodiversity, preservation of regional ecological balances, enhancement of soil fertility and maintenance of water quality.

Additionally, organic farming rules encourage a high standard of animal welfare and require farmers to meet the specific behavioral needs of animals.

European Union (EU) regulations on organic farming are designed to provide a clear structure for the production of organic goods across the whole of the EU. This is to satisfy consumer demand for trustworthy organic products whilst providing a fair marketplace for producers, distributors and marketers.

The organic logo gives a coherent visual identity to European Union produced organic products sold in the EU. This makes it easier for EU based consumers to identify organic products and helps farmers to market them across all EU countries.

The organic logo can only be used on products that have been certified as organic by an authorized control agency or body. This means that they have fulfilled strict conditions on how they are produced, transported and stored.

Appendix F (Quality Schemes)

Quality schemes: Geographical indications PDO, PGI, GI and Traditional specialty guaranteed

PDO: Protected designation of origin (ΠΟΠ: Προστατευόμενη Ονομασία Προεύλευσης)

Product names registered as PDO are those that have the strongest links to the place in which they are made.

Products

Food, agricultural products and wines

Specifications

Every part of the production, processing and preparation process must take place in the specific region.

For wines, this means that the grapes have to come exclusively from the geographical area where the wine is made.

Example

Kalamata olive oil PDO is entirely produced in the region of Kalamata in Greece, using olive varieties from that area.

Label

- mandatory for food and agricultural products
- optional for wine

PGI: Protected geographical indication (ΠΓΕ: Προστατευόμενης Γεωγραφικής Ένδειξης)

PGI emphasizes the relationship between the specific geographic region and the name of the product, where a particular quality, reputation or other characteristic is essentially attributable to its geographical origin.

Products

Food, agricultural products and wines

Specifications

For most products, at least one of the stages of production, processing or preparation takes place in the region.

In the case of wine, this means that at least 85% of the grapes used have to come exclusively from the geographical area where the wine is actually made.

Example

Westfälischer Knochenschinken PGI ham is produced in Westphalia using age-old techniques, but the meat used does not originate exclusively from animals born and reared in that specific region of Germany.

Label

- mandatory for food, agricultural products
- optional for wines

Geographical indication of spirit drinks and aromatized wines (GI)

The GI protects the name of a spirit drink or aromatized wine originating in a country, region or locality where the product's particular quality, reputation or other characteristic is essentially attributable to its geographical origin.

Products

Spirit drinks and aromatized wines

Specifications

For most products, at least one of the stages of distillation or preparation takes place in the region. However, raw products do not need to come from the region.

Example

Scotch Whisky GI has been produced for over 500 years in Scotland, including the distillation and maturation, but the raw materials do not exclusively come from Scotland.

Label

Optional for all products

TSG: Traditional Specialty Guaranteed (ΕΠΠΠ: Εγγυημένα Παραδοσιακά Ιδιότυπα Προϊόντα)

Traditional specialty guaranteed (TSG) highlights the traditional aspects such as the way the product is made or its composition, without being linked to a specific geographical area. The name of a product being registered as a TSG protects it against falsification and misuse.

Products

Food and agricultural products

Example

Gueuze TSG is a traditional beer obtained by spontaneous fermentation. It is generally produced in and around Brussels, Belgium. Nonetheless, being a TSG, its production method is protected but could be produced somewhere else.

Label

Mandatory for all products

Appendix G (Greek Products)

The Greek logo certifies the origin of the products and services produced in Greece. It is the official logo of the Greek state and is awarded according to the award regulations, separately for each one of the products and service category.

Basic criterion for the award is the domestic added value. For rural and livestock products, it is required that the production, the rearing and the harvest take place in the Greek territory. For processed products, it is required that the basic raw material comes from Greece, while the basic criterion for industrial products and services is defined as the percentage of the production cost that takes place in Greece, especially in the field of research and growth.

Appendix H (Fortified and Enriched Food Products)

Both enriched and fortified terms mean that nutrients have been added to make the food more nutritious. Enriched means nutrients that were lost during food processing have been added back. An example is adding back certain vitamins lost in processing wheat to make white flour. Fortified means vitamins or minerals have been added to a food that weren't originally in the food. An example is adding vitamin D to milk.

According to the regulation, when a product is enriched or fortified, the amount of the component added must be mentioned at the label of the product.

For fortified foods a * behind the value indicates the food is fortified with this component.

When a * does not appear behind the value of the component added, it is mentioned at the package with which components the food product has been enriched or fortified.