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## FRONT-OF-PACK LABELLING OF FOOD PRODUCTS: INTERNATIONAL PRACTICES AND PROSPECTS

**Introduction.** A prerequisite for the development of the food market is to provide consumers with accessible and necessary information about properties of food products. Food products labeling on the front of the package is aimed at facilitating consumers' understanding of information about their usefulness.

**Problem.** A wide range of symbols, schemes and formats have been developed which would provide information about the properties of food products to the consumer in the most convenient and accessible form. However, it is important to analyze the existing options and the effectiveness of this method of informing consumers about the usefulness of food products.

## ФРОНТАЛЬНЕ ЕТИКЕТУВАННЯ ХАРЧОВИХ ПРОДУКТІВ: МІЖНАРОДНІ ПРАКТИКИ І ПЕРСПЕКТИВИ

**Вступ.** Обов'язковою умовою розвитку ринку харчових продуктів є надання споживачам доступної та необхідної інформації щодо їхніх властивостей. Етикетування харчових продуктів на передній частині паковання спрямоване на полегшення розуміння споживачами інформації про їхню корисність.

**Проблема.** Розроблено широкий вибір символів, схем та форматів, які б у максимально зручній і доступній формі доводили до споживача інформацію про властивості харчових продуктів. Однак важливо проаналізувати існуючі варіанти й ефективність такого способу інформування споживачів про корисність харчових продуктів.


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*The aim* of the work is to analyze different approaches to food products labeling on the front of the package in terms of their informativeness and usefulness for consumers.

**Methods.** The methods of comparative analysis and synthesis, selection and generalization, legislative and regulatory documents were used.

**Results.** Many front-of-pack labeling systems are known today, including Multiple Traffic Lights, Reference Intakes, Health Star Rating system, Nutri-Score, etc. Each of these systems has its own peculiarities regarding the content and way of presenting information about the components of the product, in terms of their usefulness for the human body and the presence / absence of components that may have a negative impact on health.

However, the current labeling systems make it possible to compare food products without taking into account other aspects of health impact (degree of processing, added additives that make them unhealthy), which does not allow to provide a complete profile of the health benefits of the food product.

**Conclusions.** The analysis of different front-of-pack nutrition labels systems proved that thanks to such information, consumers have the opportunity to choose more healthy food products.

The adoption and implementation of a single label on the front of the package can be useful for consumers and reduce the number of cases associated with the negative impact of food products on health.

*Keywords:* front-of-pack nutrition labeling, informing, marking, quality, consumer.

*Метою* роботи є аналіз різних підходів до етикетування харчових продуктів на передній частині паковання щодо їхньої інформативності та корисності для споживачів.

**Методи.** Використано методи порівняльного аналізу та синтезу, виокремлення й узагальнення, законодавчі та нормативні документи.

**Результати дослідження.** Нині відомо багато систем етикетування на передній панелі паковання, зокрема системи *Multiple Traffic Lights*, *Reference Intakes*, *Health Star Rating system*, *Nutri-Score* тощо. Кожна з цих систем має свої особливості щодо змісту і способу представлення інформації про складові продукту, з погляду їхньої корисності для організму людини і наявності/відсутності компонентів, які можуть чинити негативний вплив на здоров'я.

Однак діючі системи етикетування уможливлюють порівнювати харчові продукти, не беручи до уваги інших аспектів щодо впливу на здоров'я (ступінь обробки, додані добавки, які роблять їх некорисними для здоров'я), що не дає змоги надання повного профілю корисності харчового продукту.

**Висновки.** Аналіз різних систем етикетування харчових продуктів на передній частині паковання засвідчив, що завдяки такій інформації споживачі мають можливість вибирати більш корисні для організму харчові продукти.

Прийняття та впровадження єдиної етикетки на лицьовій стороні паковання можуть бути корисними для споживачів та уможливлять зменшити кількість випадків, пов'язаних із негативним впливом харчових продуктів на здоров'я.

*Ключові слова:* етикетування харчових продуктів на передній частині паковання, інформування, маркування, якість, споживач.

**Introduction.** The consumer right for safe food and good quality nutrition cannot be ensured until fair, easily accessible and sustainable food systems are created. To this end, the strongest emphasis has to be made on food safety determinants and nutrition (sustainable and effective supply, stable quality with keeping to all the hygienic requirements and wide accessibility), consumer choice determinants and peculiarities of consumption. Bearing in mind that consumers do not have adequate awareness about the properties of foods, organizations engaged in health protection, safety of foods and consumer rights protection keep introducing measures aimed at wide-scale informing of consumers about properties of foods, including through elaborating transparent and consumer friendly labelling that is supposed to be a cost-effective means designed to inform consumers in points of sales and help with the choice of foods [1]. This is also important bearing

in mind that a central objective of health protection is to prevent an increase in the most widespread non-communicable diseases that account for more than the half of global diseases. Unhealthy diets are a major risk factor for the development on non-communicable diseases [2; 3].

**Problem.** A necessary condition for the expansion of food market is providing accessible and required information on food properties to consumers. Because decision-making on purchase point of a certain food product is complicated due to limitations on accessibility, clarity, comprehensiveness and reliability of information about it, provided to consumer, lack of argumentation concerning its utility or functionality, and irrelevance to the consumer expectations on the whole.

The Codex Alimentarius Commission identifies three types of nutrition labelling: nutrient declarations; nutrition and health claims; and supplementary nutrition information, which includes front-of-pack labelling (FOPL). Nutrition information via food labels on food and beverage packages are a widespread way to guide consumers towards appropriate diet choices. The aim of FOPL is to "provide convenient, relevant and readily understood nutrition information or guidance on food packs, to assist all consumers to make informed food purchases and healthier eating choices" [2]. Being a special kind of labelling, front-of-pack nutrition labels are designed to simplify consumer understanding of information on nutritional and biological value of a food product or its utility have importance for all the stakeholders [4]. In the latest years, governments, food makers and retail traders have been making active efforts devoted to labelling of nutritional value of food, and could elaborate a wide range of symbols, schemes and formats aimed to inform consumers on the value and utility of a food product in a convenient and accessible manner to simplify their choice. Also, the ultimate goal of front of pack labels is to achieve an improvement in nutritional and/ or health status of consumers. The consumer awareness through labelling can be regarded as one of the effective tools to address the increasing occurrence of disorders linked with an unhealthy diet, such as obesity, type 2 diabetes, cardiovascular diseases and some categories of cancer [5; 6].

Most of the proposed and existing systems for front-of-pack nutrition labels are elaborated on scientific grounds and designed to drive consumers towards healthier choices. However, the existence of varying approaches to the content and format of the data given on labels, their informativeness and significance, differentiation and ease of use for various consumer categories cause the need for the analysis of different types of front-of-pack nutrition labels. This would enable to determine strong and weak sides of all the existing systems, allowing in this way to design labelling systems in future, which would be maximally relevant to consumer needs by the set of criteria "informativeness, accessibility, simplicity, utility" and make the food choice more conscious.

**Analysis of recent research and publications.** The effects of front of pack labeling on consumer understanding, perception, use and purchase behaviour have been investigated by researchers like W. McGlynn [6], M. Egnell et al [7], N. Khandpur et al. [8], R. Kanter et al [9], J. Chantal, S. Hercberg [10] and others. The existence of various approaches to labelling systems and the results of respective consumer research devoted to their efficiency have revealed the need for analysis of the most widespread labelling systems for foods from the perspective of their utility and clarity for consumers.

This research *aims* to analyze various approaches to front-of-pack nutrition labels of foods with respect to their informativeness and utility for consumers, helping them make the conscious choice of a product.

**Methods.** The methodological framework of this research builds on methods of comparative analysis and synthesis, highlighting generalization, systematization of the approaches designed to achieve the appropriate informing of consumers.

**Results.** Decision-making process at purchasing point is complicated due to the limitations on the understanding and reliability of information provided to the consumer, lack of argumentation concerning its utility or functionality, and irrelevance to consumer expectations on the whole.

The REGULATION (EU) No 1169/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 October 2011 on the provision of food information to consumers fixes the rules for informing consumers, enabling them to have access to the essential food information such as the nutritional declaration and the list of ingredients. To simplify understanding of this information, other forms of expression and presentation or voluntary information can be provided as supplements to the mandatory nutritional value in keeping with articles 35–37 of the Regulations [11]. The EU Regulation specifies the way of making the nutritional declaration and the nutritional and health claims on the label and in advertising, promotional campaigns or other commercial announcements. EU member states can take decisions at country level on what additional information should be given with respect to food products that are prepackaged for direct sales. According to the general requirements of the European law, information on food products has to conform with the set of criteria given in *Figure 1*.

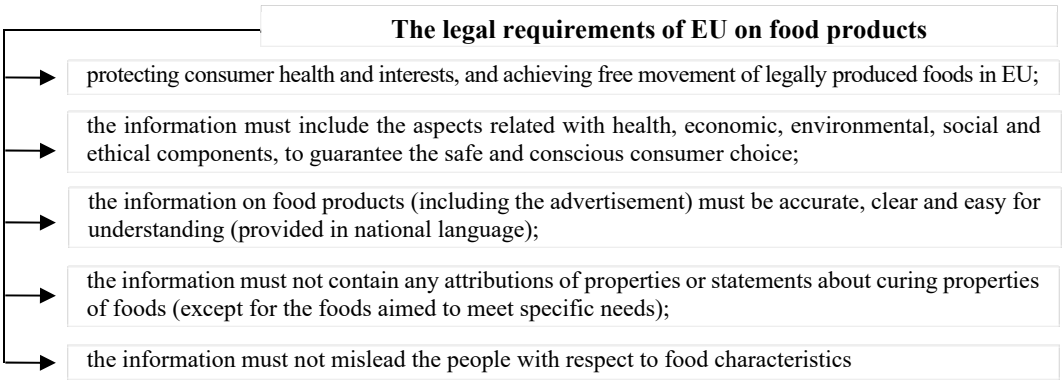


*Figure 1.* The requirements of EU law on the information about food products

The EU Regulation leaves each European country with the right for elaborating its own front of pack label with information on nutritional properties and using this single format for the whole food supply. The nutrient profiling models can be interpreted as a potential support for such simplified labelling. They are designed to classify individual food products on the basis of their nutritional value characteristics according to health-related purposes [12].

A great number of nutrient profiling models with various degrees of reliability has been created across the globe. They usually take into account the energy value of the food, the content in macro-nutrients and microelements, considering the balance between "unhealthy" components (such as saturated fats or added sugar) and "healthy" components (such as protein, fibers etc.). One of the first and scientifically substantiated nutrient profiling models developed in Europe is the British Food Standards Agency Nutrient Profiling System (FSA-NPS) [10; 13].

Balanced and healthy diet is a critical factor for maintaining health and avoiding diseases of various kinds. Yet, 39 % of the adult population across the globe have excessive weight or suffer from obesity, being more exposed to the risk of occurrence of cardiovascular diseases, diabetes and some types of cancer [12; 13]. A central factor of excessive weight and obesity is the increased consumption of high energy foods containing much fat or sugar. In view of this, various companies concerned with health protection tend to label processed foods in a way allowing consumers to consider important diet information about food products [14].

WHO defines front-of-pack labelling as referring to nutrition labelling systems that:

- are presented on the front of food packages (in the principle field of vision) and can be applied across the packaged retail food supply;
- comprise an underpinning nutrient profile model that considers the overall nutrition quality of the product and/or the nutrients of concern for NCD;
- present simple, often graphic information on the nutrient content and/or nutritional quality of products to complement the more detailed nutrient declarations usually provided on the back of food packages [2].

The objective of all the front-of-pack nutrition label systems is to provide consumers with information about the composition of a food product, to help them make a more rational choice with due consideration to the needs and health status.

The development of a FOPL system should be an iterative process. It should be government led, whereby the government first confirms the aims, scope and principles of what is being proposed, and then uses a collaborative approach to determine the specificities of the system (e.g. the content and format) while staying faithful to the overarching principles *(Table).*

**The principles of FOPL system** [2]

| Target orientation of the principles | Principle |
|---|---|
| Overarching principles for FOPL systems | 1. The FOPL system should be aligned with national public health and nutrition policies and food regulations, as well as with relevant WHO guidance and Codex guidelines.<br>2. A single system should be developed to improve the impact of the FOPL system.<br>3. Mandatory nutrient declarations on food packages are a prerequisite for FOPL systems.<br>4. A monitoring and review process should be developed as part of the overall FOPL system for continuing improvements or adjustments as required.<br>5. The aims, scope and principles of the FOPL system should be transparent and easily accessible |
| Principle for a collaborative approach to FOPL development | 6. Government should lead the multisectoral stakeholder engagement process for the development of trusted systems, including nutrient profiling criteria |
| Principles related to FOPL system format (i.e. design and content) | 7. The FOPL system should be interpretive, based on symbols, colours, words or quantifiable elements.<br>8. The design of FOPL systems should be understandable to all population subgroups, and should be based on the outcome of consumer testing, evidence of system performance and stakeholder engagement.<br>9. Content should encompass nutritional criteria and food components with the aim of informing choice and enabling interpretation of food products against risks for diet-related NCDs, and of promoting healthy diets. Principle<br>10. The FOPL system should enable appropriate comparisons between food |
| Principles for the implementation of FOPL system | 11. Uptake of the FOPL system should be encouraged across all eligible packaged foods, either through regulatory or voluntary approaches.<br>12. Early engagement of industry groups and the development of guidance documents (e.g. a style guide) are necessary in facilitating the implementation of the FOPL system.<br>13. Engagement with key opinion leaders (including food and nutrition experts and the media) and consumers are essential, and should be well managed.<br>14. Well-resourced public education campaigns and consumer education, with special consideration of techniques to target at-risk groups, are necessary for improving nutrition literacy and consumer understanding and use of the FOPL system<br>15. Baseline data should be collected to support monitoring and evaluation of the impact on consumers and reformulation of food products. |

Today there many well-known labeling systems: Multiple Traffic Lights, Evolved Nutrition Label, Reference Intakes, Health Star Rating system, Nutri-Score, etc. Below we are going to analyze the most common front-of-pack nutrition label systems [9].

***Reference Intakes (RI)*** indicates the quantity of calories, the amount in grams of sugars, total fat, saturated fats and salt per portion of food *(Figure 2).*

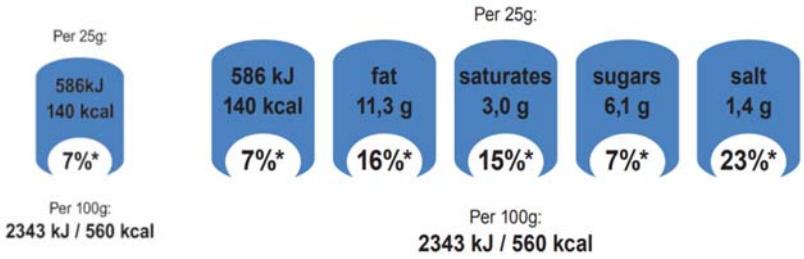


*Figure 2.* An example of Reference Intakes

Most foods are not consumed on a 100g/ml basis. Therefore, the RI nutrition labelling scheme provides consumers with nutrition information on a "per portion basis", in addition to the information per 100 g/ml provided back of pack. The Reference Intakes information allows you to see directly the amount of energy or nutrient contained in the portion you are eating or drinking, so that you can consider it in the context of your daily diet [15].

This system has its shortcoming: because the indicated content of calories in one portion is based on "the need of the average statistical person", it offers a consumer guide rather than a consumer objective. It cannot account for the needs of various consumer categories by age, gender, physical activity, etc.

A labelling system commonly used in many countries is ***Traffic Light Labelling***, developed as an alternative to Reference Intakes label and first introduced in U.K. This labelling allows for quick and clear demonstration of the product composition [16, 17]. It indicates the data on the content of fat, saturated fats, sugars and salt, classified by level as *low, medium or high*. It uses color range: green color indicates a low amount of a certain component in the product composition, being an evidence of a higher utility of the product for human health; yellow color is an indicator of the medium amount of these substances, whereas red color shows a high amount and can be used as a warning of the need in a modest (or sometimes limited) consumption of a given product. Color coding is based on the content of components in 100 grams of a product. Apart from traffic light colors, the number of grams of fat, saturated fats, sugar and salt are indicated for the typical "portion" of food [18; 19]. Therefore, when the amount of a portion is higher than 100 grams, one should use the criteria of color coding "per portion" *(Figure 3)*.


*Figure 3.* An example of Traffic Light Labelling

The objective of traffic light systems is to give consumers advice to avoid food products with high contents of fat, sugars and salt, thus helping them make choice in favor of healthier nut-rition [18].

Results of the study (Kunz et al., 2020) show that labelling really improves the accuracy of consumer judge-ment of the food product's utility for health. But the conclusions about the efficiency of labelling the nutritional substances by traffic light colors prove to be ambiguous when it comes to their effects in promoting healthy diet. While some studies demonstrated that traffic light labels could encourage healthier diet behavior, others failed to reveal any impact of these labels on the sales or the consumption of healthy foods [19]. When this model is used, it poses a controversial issue: this approach can probably increase the attractiveness of unhealthy foods as an undesirable by-side effect. First, the light traffic labelling may provoke a reaction or a negative motivational condition which occurs in people when

they feel a threat to their personal freedom of choice and which makes a "prohibited" unhealthy alternative more attractive. Second, traffic light labels may refocus the consumer attention on the utility of products and activate the intuition "unhealthy = tasty", which means that unhealthy alternatives are supposed to have a better taste than heathy ones.

***Nutri-Score labelling***. The system of front-of-pack nutrition label "Nutri-Score" was developed in France in 2017 as part of a voluntary initiative of the National Agency on Health Protection (ANSES) and par Santé Publique France [20]. This labelling has the objective to inform consumers, by simple and understandable way, on the nutritional value of a product, in order to help them make more conscious choice in favor of healthier foods and stimulate producers to improve nutritional properties of foods. Today, this system is recommended for use by national bodies of Belgium, Germany, the Netherlands, Spain, Switzerland, Luxemburg and other countries of the world [21].

The logo "Nutri-Score" represents a colored FOPL (front-of-pack nutrition label) that synthesizes the numerical information from the obligatory statement of the nutritional declaration, given on the back side of each package. The Nutrient Profiling System (NPS) laid in the basis of Nutri-Score assigns scores in accordance with the content of nutrient substances per 100 grams of a food product or 100 milliliters of a beverage [22].

The nutrient substances of food products are divided by their impact on human health into "favorable" (fiber, proteins, fruits, vegetables, legumes, nuts, oils, etc.) and "unfavorable" (energy, sugars, saturated fat, salt). Each component is scored in accordance with its amount in the product composition. The overall score is derived by deducting the absolute value of "favorable" scores from "unfavorable" ones (the theoretical range is from −15 to +40). A lower number of scores corresponds to a higher utility of a product [23; 24].

The result of calculations is used for labelling a product by a certain color and its respective letter. The products are classified into five categories: letters from "A" to "E" with the colors in the range from dark green (A) (related with a higher content of the substances useful for healthy nutrition) to red (E). Positive and negative sides are compensated by each other *(Figure 4)*.


*Figure 4.* Nutri-Score Labelling

It should be noted that this system, not being an absolute rating, is used to compare the nutritional quality of similar products within a specific food category. For example, a pizza marked by green will mean a healthier choice than a pizza marked by orange. A red yogurt is less advisable than a yellow one. But a pizza and a yogurt cannot be compared by means of "Nutri-Score" system. It should be noted that Nutri-Score system is not a recommendation on the diet and cannot replace it.

Today, Nutri-Score system is a labelling scheme fully conforming to the existing concepts and approaches of the World Health Organization with respect to the information on the front side of the package [25]. The efficiency of Nutri-Score could be proved by numerous research works. Several works could confirm that the algorithm of Nutri-Score has the ability to determinate foods according to the food based dietary guidelines. Also, a series of research works were aimed to confirm the high performance of Nutri-Score system, including its good perception and understanding by consumers and its ability to focus their choices on the foods that are healthier [26].

The advantages of Nutri-Score system are numerous: scientifically validated algorithm, clarity, visibility, simplicity for consumers. Nutri-Score was shown to allow the consumer to make more informed choices and facilitate nutritional comparison of foods. In parallel, Nutri-Score encourages food making companies to improve the nutritional composition of their products. This system has a positive consumer feedback. According to a survey held by Public Health France in 2020, nearly 94 % of the respondents said that they supported its availability on the package, and more than 50 % confirmed that Nutri-Score had changed at least one of their shopping habits [27]. The efficiency of Nutri-Score could be demonstrated in terms of the consumer ability to classify foods correctly according to their nutritional value and make use of this in time of shopping and choice of the portion size.

However, several studies could give clear evidence that the labels on the front of pack seems in a way controversial. These systems enable to compare food products without consideration to other dimensions of health (degree of processing or mixtures of additives), which does not allow for a full profiling of the food product's utility [22–24].

This analytical review of front-of-pack nutrition labels systems allows to outline a series of recommendations for their improvement and further effective use by all the market agents:

- the need to consolidate the effort of public bodies responsible for health protection and food product safety, manufacturers, trade associations, consumer associations in elaborating recommendations on unification of front-of-pack nutrition labels;
- creating schemes for the accountability of manufacturers and adequate control of the reliability of information on front-of-pack nutrition labels, in order to avoid consumer misguiding;
- organizing educative events among consumers in order to increase their awareness of nutritional properties of food products and their impact on health.

Effective implementation of a FOPL system requires a well-resourced and robust consumer education programme that provides key messaging on using FOPL, as part of a wider suite of country nutrition messaging and dietary guidance [28; 29]. Effective nutrition labelling, including simple-to-use FOPL, should be been identified as one of the strategies that countries should use to address the growing global concern of unhealthy dietary patterns.

**Conclusions.** Policies to promote the implementation of simplified nutrition information on the front of food packages can be an important element of strategies which aim to improve population diets. This literature review of nutrition labelling systems for food products on the front of the pack demonstrates that front-of-pack nutrition labels help consumers to easier interpret and choose foods that are healthier. Information given on labels of food products is useful, but the presentation may impact consumer awareness and interest.

However, academic discussions around the label content and algorithm behind that would account for all the dimensions necessary for consumer have been on. If a unified front-of-pack label is adopted and introduced in Europe, it can be useful for consumers when purchasing food.

Further research is expected to define the impact of combined sustainability and nutrition front of pack labelling systems on the consumer behavior.

**Conflict of interest.** The authors certify that they have no financial or non-financial interest in the subject matter or materials discussed in this manuscript; the authors have no association with state bodies, any organizations or commercial entities having a financial interest in or financial conflict with the subject matter or research presented in the manuscript. Given that one of the authors is affiliated with the institution that publishes this journal, which may cause potential conflict or suspicion of bias and therefore the final decision to publish this article (including the reviewers and editors) is made by the members of the Editorial Board who are not the employees of this institution.

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