

Brief Report

Are food labels effective as a means of health prevention?

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Significance for public health

Food label represents the identity card of food products: it reports composition, ingredients and their relative amounts, it informs about quality, origin, processing and preservation. This information gives the consumer the opportunity to consciously choose what to purchase. The label could concretely help us in protecting and improving our health, if our choices are supported by some basic knowledge of wholesome nutrition, based on a balanced and varied diet. In a wider perspective, this may translate into a reduction of obesity and chronic disease incidence – closely related to negative eating habits – and significantly impact on public health in terms of costs for individuals and medical systems. The study proposed highlights how, despite the reported nutritional information is often clear and comprehensive, consumers do not necessarily take the healthiest choice, but decision-making process is also influenced by the ability to decode the label and its graphical representation, by socio-economic status and self-perception of psychophysical well-being. Food security and related issues won't be debated in the following paper, but it is worth reminding that the label is also a key element to guarantee consumers safety. Providing the product's lot number, it is essential for tracing the product itself and to quickly recall it from the market in case of food alert.

Abstract

Chronic diseases related to unbalanced and unhealthy eating habits have definitely become one of the major issues of modern age, not only in western countries but also in those ones where rapid economic growth has increased global prosperity levels. In order to avoid medical systems to collapse under excessive costs, International and Public Organizations strongly support health policies that aim to make people shift towards wholesome dietary patterns, also encouraging the use of food-labels to choose healthier products. To evaluate the consumers' knowledge and perception about food-labels a brief questionnaire was developed and shared on Facebook between January-March 2016. Most of the participants were young adults with higher education. They declared to do their shopping at least once a week, reading the food-labels quite often. Despite owing limited knowledge in basic nutrition principles and food-labelling they were generally able to recognize healthier products looking over their nutritional fact tables. Anyway, on average, what they care the most about the products they purchase is the global quality level rather than the nutritional values. In order to induce the whole population to use food label as an effective self-protection tool, more efforts should be done to improve their knowledge on nutrition fundamentals and basics about food labelling, because that would make them able to take safer and more conscious choices as regards their own health.

Introduction

One of the most challenging and ambitious goals that Public Health is striving to achieve worldwide is the promotion of healthy lifestyles and nutrition. Nutrition-related health problems including obesity, diabetes and metabolic syndrome have a marked impact on modern society. The prevalence of such chronic diseases has been rapidly increasing during latest years, both in western countries and in developing ones.^{1,2} Since economic costs would be excessive and unsustainable to medical systems, Public Organizations are taking particular care in encouraging the population to adopt healthier lifestyles and to comply wholesome dietary habits, since diet is one of the earliest modifiable risk factor everyone could personally handle to protect his own health.³⁻⁶ To date, three main nutritional goals are strongly recommended to reduce the risk of becoming obese and developing diabetes as well as cardio vascular diseases: to reduce salt, saturated and *trans* fats intakes, while increasing the consumption of fruit and vegetables. We also remind that this needs to be joined to appropriate physical activity.

In order to make people feel more responsible about their diet, and to induce them to make informed choices, hopefully opting for high-quality food, several communication strategies have been taken. One of the simplest deals with food labels, which can provide some useful elements helping us to control our diet.⁷⁻¹⁰ To further support the consumers in this challenging task, a new label scheme using colour coding system has been recently devised and tested in the UK. Green, amber and red signals show whether a product is high, medium or low in fat, saturated fat, salt, sugar and energy (in calories), hence allowing a quicker identification of healthier options. Moreover, this approach makes similar products easier to compare.

Nutrition labeling in Europe became mandatory for pre-packed food since 13th December 2011, when the Regulation (EU) No1169/2011 came into effect. It establishes the conditions for a standardized label writing in form and content, and, as regards nutritional declaration, it lays down that manufacturers have to declare the energy value of the product as well as 6 nutrients amounts (fat, saturates, carbohydrate, sugars, proteins, salt) expressed per 100 g or 100 mL of product. In recent years, it has been stressed the need to provide the consumers more and more accurate, detailed and crystal clear labels, specifying the types and relative amounts of saturated and unsaturated fats, polyols, starch, salt and fiber; the list of preservatives, additives, dyes and allergens.⁷ Described this way food label would seem a practical and easily accessible tool, allowing for an informed purchase. An essential condition that would make labels really efficient in guiding food choices and in modulating dietary patterns would be that the consumers were interested in consulting them, but most of all they understood what they read.¹¹⁻¹³

Recent international studies highlight how many variables influence the consumer's approach to food labels, the degree of comprehen-

sion and the frequency of reading. Of great importance are, first of all, socio-demographic factors like education level and socio-economic status, age, gender, individual interest and knowledge in nutrition, as well as health-consciousness.¹⁴⁻²³ Sometimes, anyway, food choice is merely a matter of taste or brand.²⁴ In this case, all information reported may be totally irrelevant because the label is ignored.

Besides, we should consider that nutrition/health claims, regulated by Reg. CE 1924/2006, and sometimes front-of-pack labels (also known as extrinsic cues) might discourage the proper use of the label in selecting a product, since they usually are well visible on the front side of the package and they take a shortest time to be read.^{25,26} Even if they generally refer to a single or a couple of nutritional features, they might be considered informative enough to determine the final purchase decision. That's may be true especially for those people who have limited ability to process information and/or have a low involvement.^{25,27}

The survey aimed to elucidate consumers' perception about food label and its efficacy as a means of health prevention and self-protection.

Design and Methods

A brief questionnaire (21 items) has been developed *de-novo* and administered on-line between January-March 2016, using *LimeSurvey*, open source survey software. The link to fill in the questionnaire (<http://igiene.unibs.it/indagini/index.php/621542?lang=it>) has been shared on Facebook in order to invite as many people as possible to participate. No selection criteria limited the participation to the survey. Volunteers who agreed to take part in the survey have been firstly asked about their food-shopping habits, their attitude in reading labels and in choosing products. Then participants' knowledge about elementary nutrition notions, food label tools, and the information reported on labels has been tested. A third group of questions has been used to collect few basic bio-data: age, sex, height, weight, education and food allergies or intolerances. All the questions, except those pertained to biodata, were closed-ended: some of them were multiple-choice type, while others used rating scales according to Likert.

STATA program was used for the statistical analysis (Stata statistical software: release 12.0, College station, TX: Stata Corporation). Continuous variables were summarized as means' of standard deviation (SD) and categorical variables as frequency and percentage. Comparisons between groups were made by using a Student t-test for continuous variables and a 2 test or Fisher's exact probability test for categorical data.

Two-sided P-values < 0.05 were considered statistically significant.

Results

A total of 340 subjects accepted to participate in the survey, and 248 questionnaires have been included in statistical analysis: 217 of them were completely filled-in, 31 were considered eligible despite the section regarding demographic data was partially lacking. Participants' socio-demographic characteristics are summarized in Table 1.

Women and men, both with a mean age ranging 31.3-32.3, are equally distributed in the sample ($P < 0.05$). Fifty-nine percent of women and sixty-five percent of men has a normal BMI, ranging 18.5-22.5 (Body Mass Index = weight in Kg/height in m²). More than 80% of the respondents, independently from gender, have a higher education, even if the frequency of high-school degree exceeds the graduates (57% and 26% respectively).

Those who go shopping quite often represent the majority: on average, both men and women do their shopping once or twice a week

(66%) while 17.7% declare to do it more often. Excluding a very little percentage (5%) that never looks at the food-labels, about half the sample pays great attention to them, since 53% checks them most of the times or even always (38% and 15% respectively). Generally, despite 11% of the subjects involved in the survey is more concerned in animal products' labels, and 25% focuses on high-calorie foods (such as snacks, candy-bars and so on), the interest for a particular food category it doesn't seem to prevail. Moreover, our results show that, over half of the participants (66%), either men or women, reckon the quality of ingredients, goods provenience and additives presence more important than the Nutrition Facts Panel. However, subjects who care more about nutritional contents are mostly women ($P = 0.003$). To test basic knowledge about elementary nutrition principles we asked participants to indicate if they knew what is a Food Pyramid and then to select the right model of it among three different figures proposed. Eighty-seven percent of the subjects answered correctly to the first question, although only 68% of them were able to choose the right picture.

Six items of the questionnaire were strictly related to technical aspects of food labels, such as the order of the ingredients, use of specific and technical words, acronyms and logos. Only 47% of the respondents returned more than four correct answers, meaning that they are insufficiently skilled in food-labeling subject. Although 64% knows that ingredients are reported in descending order, only 48% recognizes the official EU organic-farming logo, and even a lower percentage knows the meaning of RDA (Recommended Daily Allowance) acronym (37%). Many are familiar with the definition *light* (61%), but they are poorly conscious of the global health-related effects of several substances, even though most of them frequently occur in the ingredients list. When asking the participants to express, to their own perception, the degree of danger of different substances, has emerged that sodium nitrate is recognized to be mild harmful by 44% of the sample, together with aspartame and monosodium glutamate, perceived as hazardous respectively by 61% and 53% of the respondents; conversely, only 20% thinks that potassium bromate (classified as possibly carcinogenic to humans by IARC) is very harmful. Noteworthy, 63% of respondents believe that palm oil is mild or even very harmful, and a 26% assumes that also ascorbic acid (commonly known as Vitamin C) is mild-dangerous. Of note it is also that almost 8 people out of ten define fructose harmless (Figure 1). When analysing the answers distribution according to BMI and age, we didn't find any statistically significant differences; on the contrary those who declared to have a higher education level demonstrated to own overall a better knowledge about the topic ($P < 0.05$). Anyway is relevant that 41.5% of more educated subjects totalized less than 3 correct answers. Similarly to other studies, we

Table 1. Demographic profile of the sample.

Participants	N.	%
Gender	226	
Male	102	45.1
Female	124	54.9
Age 220		
<20 years	13	5.9
20-49 years	171	77.7
>50 years	36	16.4
Education	226	
Primary/middle school	38	16.8
High school	129	57.1
University degree	59	26.1
Weight status	220	
Underweight	33	15
Normal weight	136	61.8
Overweight	38	17.3
Obese	13	5.9

found that reading frequency is related to level of knowledge: the less a subject is informed, the less he worries about reading labels ($P=0.004$). We also reported in the questionnaire the labels of different food products without showing the brands: three types of crackers, three fruit juices and three chocolate hazelnut spreads. The participants were invited to carefully read the labels and then select one product for each category taking into account a specific criterion: ingredients list or nutritional value. Considering the ingredients, crackers containing extra virgin oil were preferred by 50%, followed by the ones with many organic ingredients (35%). Among fruit juices, the one without preservatives, thickeners and flavours was pointed out as the most appropriate for a child (85%), but 48% of the sample chose an organic one rather than a normal juice with a higher amount of fruit. Finally, also the chocolate spread with the best ingredient composition has been chosen by the most among the respondents (58%).

When the choice was about the nutrition facts panel, almost 70% of the subjects ticked off as the healthiest one, the variety of crackers that had the lowest fat contents (47%), the lowest salt contents (22%) and the lowest caloric intake (17%) compared to the others. Products having a better ingredient composition and a healthier nutritional profile were identified by those who demonstrated to own a better knowledge about food labels ($P=0.001$) and have a higher education.

Discussion and Conclusions

In the sample analyzed we observed that reading the food label is a widespread practice (only 5% of the subjects declare to never read it), moreover it doesn't appear to be limited to some specific food categories.

Even if the respondents showed scarce technical expertise in nutrition and food science, the basic information they know would be enough to allow them to make healthier choices. Alike other studies report, when consumers are asked to compare different products and select the one having the best nutritional profile, most of them are able to satisfy the task.¹¹ According to our results, although the evaluation of nutritional composition is the task where the consumer performs the best, it does not appear to be the main criterion leading the decision-making process. The subjects involved in the survey were more worried to check the global quality level of the products, namely its origin, the ingredients quality and the presence of additives. In line with other studies we confirm, anyway, that women are more interested in consulting the nutritional profile of foods compared to men.^{14,28}

Sometimes taste is still the most relevant factor. Among subjects who

took part in the survey, in fact, there was who declared to prefer a specific brand of a product only because of its taste, without comparing the label to those of other similar products.

We confirmed what many international and wider studies had already been found: a better knowledge of basic nutrition principles, as well as a better expertise in reading labels, are significantly related to education level. However, even more informed people amongst participants, (those who answered correctly to more than 4 questions in the survey) demonstrated to have confused and unclear ideas relatively to some substances contained in foods or used in food processing. That may be due to owning poor, incomplete and even wrong notions about nutrients, ingredients and food processing technologies.

Because of the small size of our sample and the prevalence of young people, we cannot take on the results of the survey as representative of the whole Italian population. Subjects who participate in the survey, in fact, are mainly young adults, with a normal BMI and highly educated. Those elements let us assume that the sample analyzed include people sufficiently aware of the health-diet relationship, hence more interested in keeping their diet balanced and more likely to use food labels as an aid-instrument leading their decisions in food and beverage selection.^{15,21,23} Several previous international studies found that label reading actually affects dietary practices and sometimes it is significantly associated with lower fat and salt intake.^{29,32} Moreover, findings of a recent systematic review and meta-analysis of randomized studies by Cecchini and Warin endorse the role of nutrition labeling as an effective approach to empower consumers healthier choices.²³

Anyway, even if health policy makers strongly encourage the use of food labels emphasising their informative and protective role, we noticed that they are not used completely consciously by the most. We believe that up-stream efforts should be done first of all on the educational front, to improve general public basic knowledge about nutrition and the relationship between diet and health status, in order to make the consumer more concerned of changing eating habits.²⁹ Secondly, label format may be simplified to be easily read also by non-expert people. Finally, if we aim for food labels to significantly affect general public behavior, a wider use of them should be encouraged. To this end, the awareness of label usefulness among all the consumers categories should be raised. According to a review published this year by Cecchini and Warin, the traffic light scheme tested in the UK resulted to be more effective in increasing the selection of healthier options.²³ Moreover, since it works at a glance and colour codes are easily interpretable by everyone, this kind of format may be a successful approach for Italian population as well, in order to achieve two more goals at least: encourage a regular consultation of labels and attract also the attention of less informed/educated people.

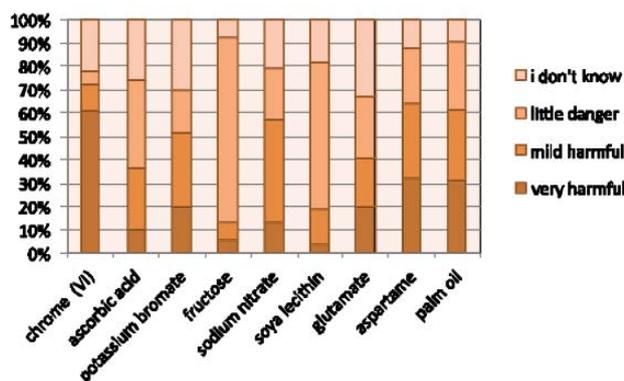


Figure 1. Respondents' perception about riskiness of specific substances frequently used as ingredients in food processing. (We considered chrome (VI) as a positive control).

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