

## Chapter 2

# Literature Analysis on Consumer Understanding of Nutrition Information

**Abstract** With the continuous introduction of new products claiming nutrition and health benefits, the development of food market reveals some issues with regards to consumer understanding and perception of these actual messages. In general, many questions arise regarding the effective comprehension of nutrition information—made by consumers on food and in promotion—and about the actual use of such information in food choices and purchasing decisions, in order to support a healthy diet concept. Indeed, it seems that many consumers have difficulty in understanding nutritional information and prefer simpler ways in providing such information, which is able to help them in the rapid evaluation of nutritional characteristics of a foodstuff. In addition, specific consumer features and conditions influence their preferences and perception of foods with health-related benefits. In the present chapter, results are presented from a literature review on factors influencing consumer perception, understanding and use of nutrition information made on food. Finally, some results achieved by the selected papers are analyzed, and implications discussed.

## Background: Consumer Food Choices and Nutrition Information

The social and economic welfare and the large availability of foods on the market have increased consumption and daily caloric intake (FAO [2013](#)). Nutrition and medical science have tried to steer consumers towards food choices by meeting health and well-being demands. The demand for food products that promote health and nutrition benefits has really boosted (Leatherhead Food Research [2014](#)) during the last few years, thereby encouraging the food industry to innovate and develop new products with improved nutritional properties. Food health benefits are among the most important innovation drivers of the global food and drink market, also due to an increasing ageing population in richer countries (Robinson [2014](#)). Foods with health-related benefits are generally called functional foods.

The latter has several definitions which vary from simple “foods that may provide health benefits beyond basic nutrition”, to complex “food similar in appearance to conventional food, that is intended to be consumed as part of a normal diet, but has been modified to subserve physiological roles beyond the provision of simple nutrient requirements” (Roberfroid 2000, p. 13). In any case, healthy properties of foods have to be communicated because they are typically credence attributes that must be conveyed to consumers through information (Darby and Karni 1973), and their best carriers are labels, as well as claims made on the package and in promotion. During the last few years, several nutrition information formats and many terms expressing health-related benefits have appeared on food packages in order to support consumer choices (Carrillo et al. 2012). Given the increasing amount of several differentiated formats continuously appearing on the market, worldwide legislators have tried to rule nutrition information made on food packages in order to protect consumers and their preferences from misleading messages. However, today some concerns still exist about the actual contribution of this information, to help consumers in a healthier food consumption. These issues have mostly a dual origin: the existing differences between worldwide regulations regarding information on food; and the actual impact of nutrition information on consumer food preferences for a healthier diet, namely, if consumers use nutrition information in their food decision-making and food choices. However, the recent modifications in regulations and the new or subsequent introduction of mandatory nutrition labelling in many countries, European Union included, seem to trace a converging trend, which can help overcome the former detected obstacle (EUFIC 2015). The impact that nutrition information has on food preferences can relate to the consumer competence regarding the understanding of nutrition information on food. To this regard, the numerous studies and analysis that have been conducted with time, reveal mixed results (Lähteenmäki et al. 2010). The first results of a research carried out by the authors seem to highlight that consumers have a general knowledge of correct nutrition, but they scarcely use their knowledge in food decision-making and purchasing. Annunziata and Vecchio (2012) have also reported that consumers do not use nutrition information made in foods packages, and in particular, on food labels, because it is not easy to understand. Consumer knowledge on nutrition information and its use in food choices seems to be largely influenced by subjective features and personal conditions such as age, interest in healthy habits and social status (Grunert et al. 2010). It should also be noted that purchasing impulses may be originated by both internal personal convictions, and external signals (Shepherd 1989). In fact, food preferences are influenced by sensory and non-sensory factors, which concur to shape consumer perception (Ares et al. 2010). Therefore, worldwide legislators shall take into consideration all aspects influencing consumer perception regarding nutrition messages, in order to define a globally harmonized nutrition information format that is really able to create an impact on consumer food preferences. Such a label could really be used as the preferred driver of the decision-making process in healthier food choices. This chapter aims at contributing to provide information regarding consumer understanding of nutrition information, and factors affecting the related knowledge and

use through an extensive literature review of the empirical analyses published. Findings may help the food industry enhance nutrition labelling, and governments to create a coherent and unique framework for the mandatory use of nutrition information, so as to help consumers.

## Methods of Literature Review

The literature review has been developed using a rigorous protocol selection for papers, which has consisted in searching for keywords from the databases. In particular, computer research has taken the Web of Science (hereinafter WoS) into consideration, Scopus and European Business Source Complete (hereinafter EBSCO). Keywords have been chosen in order to obtain a large panel of papers. Only one set of primary strings has been applied to databases, without refining the first stage of computer research with secondary keywords. In particular, the exact phrase “consumer\* understanding” has been searched for in abstracts by using the Boolean operator OR with the exact phrase “consumer\* comprehension” and the operators AND and OR, respectively, with the words “food” and “nutrition”. Relevance of papers returned from EBSCO has been assured by limiting results to papers published in Academic Journals. No filter regarding the date of publication has been applied. The selection protocol has returned 377 abstracts: 105 have been deleted because they are replications, and 272 have been manually sorted by relevance to the paper objectives. In this way, more than 130 papers (132) have been detected in order to be analyzed. The discarded 142 papers did not meet the objectives of the research, i.e. they do not deal with consumer comprehension of labels made on foods packages, or in food promotion. The remaining papers were first sorted according to the type of label treated, and the results of these classifications are shown in Fig. 2.1. Given that some papers (5 %) have investigated the level of consumer understanding of nutrition information suggested by nutrition guides, the latter have been considered as nutritional information labels, in order to make classification easier.

The cluster called *nutritional information* includes all papers dealing with research, and studies on all existing formats of nutritional information made on food packages, such as nutrition labelling—namely the US facts panel or the EU nutrition declaration—and daily energy requirements, nutrition and health claims, traffic lights and other different forms of FoPs. In addition, *sustainable food* refers to all products labelled with ethical, environmental or quality certification, as well as with traceability of country of origin indications, or produced with more sustainable practices. For both clusters, a detailed list of the considered labels is reported close to the relative graphic sector.

As shown in Fig. 2.2, computer search has returned papers published starting from 1978. With time, there has been an increasing attention to consumer understanding or perception of food labels by scientific literature, and in the last few years, this attention has been specifically focused on labels containing nutrition

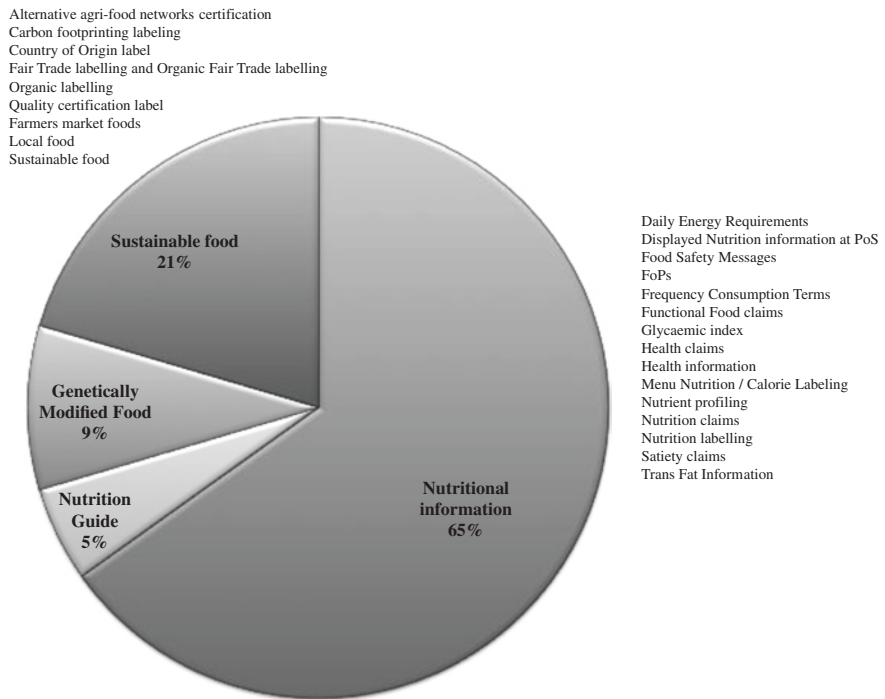


Fig. 2.1 Food labels treated in the analyzed papers

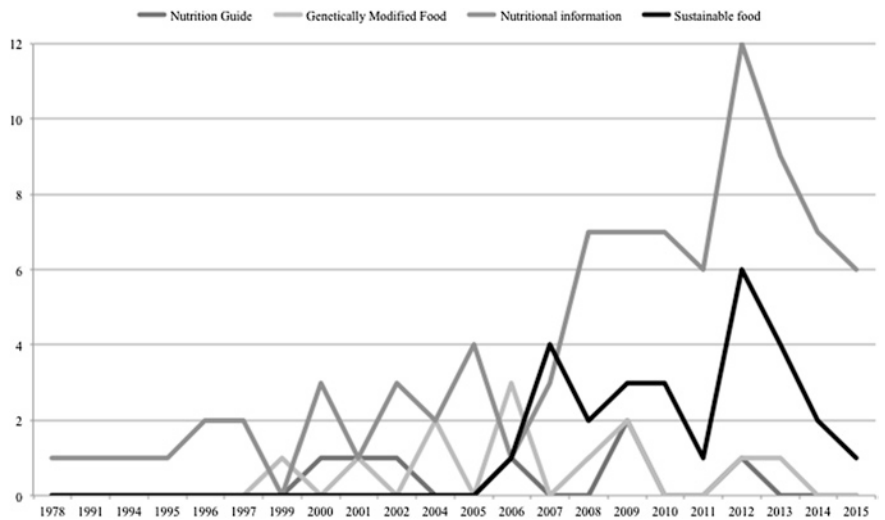
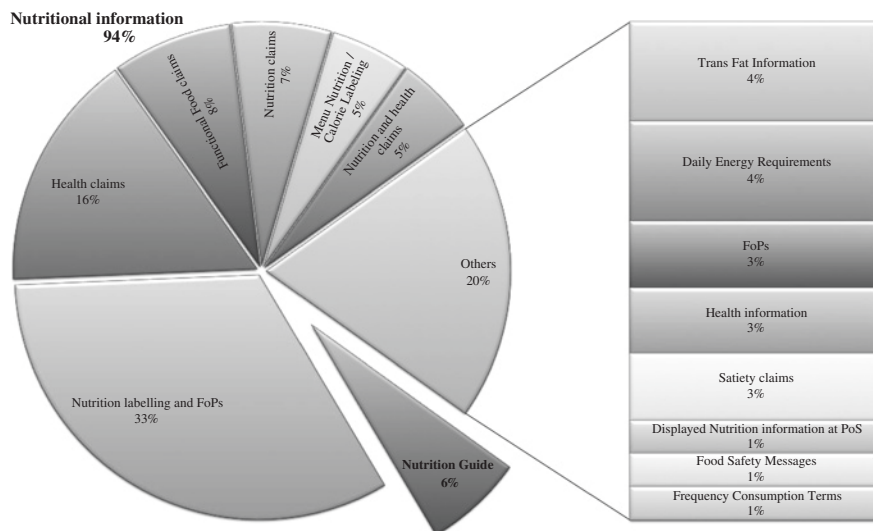


Fig. 2.2 The time distribution of the analyzed papers

information, or suggesting product sustainability. However, within the scope of the present work, only papers showing the assessment of consumer comprehension of nutrition information and nutrition guides have been analyzed in depth in the content. Specifically, the text analysis of the resulting 93 papers took objectives, results and the country of investigation into consideration. Objectives of these articles are mostly classified in *Understanding and use of nutritional information*, including factors influencing them, and in *Nutritional information policy /regulation effectiveness*. In particular, the first cluster also includes papers analyzing the general attitude of consumers towards foodstuffs showing nutritional information labels or representations, and how these formats affect consumer preferences and purchasing behavior. The level of consumer understanding on nutrition information and the relation with the use of such information to promote awareness in food choices were extracted from results of the selected papers, as well as features—personal, objective, or contextual—influencing such a level, and consumer perception.

## Results on Consumer Understanding of Nutrition Information

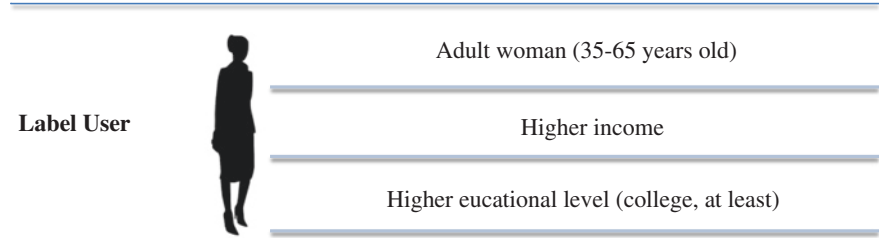
About 18 % of the resulting 93 papers focus on evaluating the effectiveness of current policies or systems in providing nutritional information to consumers. In particular, these papers specifically deal with health claims (Nocella and Kennedy 2012; O'Connor 2011; Richardson 2012, 2014; Jun and Yeo 2008), general nutrition labelling (Best and McCullough 1978; Hurt 2002; Moss 2006), nutrient profiling (Bryans 2009; Nafziger 2008; Scarborough et al. 2007), functional food claims (Hirahara 2005; Taylor 2004), food and nutrition guide (Pijls et al. 2009; Shaw et al. 2000), Glycemic index (Slabber 2005), and both nutrition and health claims (Aschemann-Witzel 2011). In addition, two of them also propose new formats for nutrient profiling and food guide respectively, in order to facilitate consumers in a healthier consumption of food (Scarborough et al. 2007; Shaw et al. 2000). These 17 papers show interesting and more effective cues for the policy and regulation review, in order to define nutritional information systems in protecting consumers, while promoting market differentiation and innovation in food industry. However, they do not provide useful insight on the level of consumer understanding of nutrition information made on food, and relative use for food choices. Such evidence is shown by most papers included in the specific cluster called *Understanding and use of nutritional information*. As reported in Fig. 2.3, more than 90 % of these papers have investigated the level of consumer understanding on nutritional information made on food package, while only 6 % have carried out a similar research by taking nutrition indications suggested by food or nutrition guides into consideration. With regard to the latter, they prove that there is a general understanding of nutrition key concepts provided by the food pyramid, but specific knowledge of correct food group placement and appropriate serving size is very poor (Britten et al. 2006;



**Fig. 2.3** Food labels treated by papers classified under the cluster Understanding and use of nutritional information

Tuttle 2001). In addition, Keenan et al. (2002) found that consumers have difficulty interpreting Dietary Guidelines, and in particular, fat. Figure 2.3 shows that most papers focusing on the analysis of consumer understanding of nutrition information made on food have investigated the comprehension of different formats in nutrition labelling and FoPs, as well as several nutrition and health claims. The analysis of these papers revealed that consumer ability in correctly extracting and using nutrition information from nutrition labelling is quite scarce (Fatimah et al. 2010; Jones and Richardson 2007; Liu et al. 2015b).

Though consumers tend to perceive nutrition labelling and FoPs as a reliable source of nutrition information, and the self-reported used of these labels is high (Campos et al. 2011; Cowburn and Stockley 2005; Guthrie and Saltos 1995), more objective analyses show that consumers rarely use nutrition labels in their food choices (Cowburn and Stockley 2005; Guthrie and Saltos 1995; Liu et al. 2015b; Mhurchu and Gorton 2007; Tessier et al. 2000). Indeed, the most important barriers to using nutrition labels are firstly, the general lack of understanding, knowledge and confidence with nutrition information terms, symbols, and values (Besler et al. 2012; Jacobs et al. 2011; Liu et al. 2015b) and secondly, the format of presentation (Baltas 2001; Besler et al. 2012) because consumers complain about the font size being too small (Jacobs et al. 2011; Tessier et al. 2000). Indeed, consumers demand a simplified standard with clearer and more comprehensible indications (Besler et al. 2012). Consumer understanding of labels was also affected by the presence of FoPs (Ares et al. 2012), which is evaluated positively if in graphical format (Geiger et al. 1991), such as the traffic light for instance (Roberto et al. 2012). Smith Edge et al. (2014) have shown that FoP labels with complete



**Fig. 2.4** The profile of the average Label User. Source: Our elaboration of Guthrie and Saltos (1995), and Josiam and Foster (2009)

information improve consumer comprehension of nutrient content in foodstuffs. However, the existence of multiple FoP formats limits consumer comprehension and discourages their use (Draper et al. 2013). In addition to the level of consumer knowledge of nutritional information, the use of nutritional labelling and FoPs also depends on several subjective, objective and contextual characteristics. The former includes consumer socio-demographic conditions (Burton and Andrews 1996; Worsley 1996), sex, age, marital status, level of education (Besler et al. 2012), and perceived product attributes such as taste (Jacobs et al. 2011) (Fig. 2.4). Objective factors are mainly price (Jacobs et al. 2011), wording, and other product features (Annunziata et al. 2014), while contextual characteristics refer to situational time constraints (Jacobs et al. 2011). In most cases, major attention to health or nutritional information and being on the lookout for nutrition labels by consumers, seem to be related to a general food involvement (Hansen et al. 2013), and a voluntary healthier diet (Campos et al. 2011; Guthrie and Saltos 1995) or a low fat/low cholesterol diet, following medical advice (Guthrie and Saltos 1995).

With regard to nutrition and health (hereinafter NH) claims, understanding and perception, it was found that consumers hardly distinguish between these two different kinds of labels (Verhagen et al. 2010). In this regard, concerning health and nutrition claims, it is noted that the veracity of the claim plays an important role. If nutrition labelling and information confirm the claim message, it is likely that consumer expectations are satisfied (Mazis and Raymond 1997). Conversely, consumers will probably develop a negative opinion about products with claims that are not validated by nutrition information. Besides, by generating expectations about health benefits, nutrition and health claims could influence the hedonic appreciation, and lastly, sensory factors (Varela et al. 2010). The contemporary analysis of nutrition information or labelling, and NH claims, seems to decrease the efficacy of the latter in supporting consumer food choices (Andrews et al. 2000; Ford et al. 1996; Garretson and Burton 2000). In such cases, information about nutrition properties seems to prevail on claims, diminishing confidence toward the latter if they are biased by the former, as discussed above. Carrillo et al. (2012) have also highlighted that although NH claims—as non-sensory features—effectively influence the first acquisition, only sensory characteristics determine loyalty



and repeat consumption. Moreover, NH claims probably do not influence food choices, because they don't seem to drive product evaluations or purchase intentions (Naylor et al. 2009; Wills et al. 2012), and they can decrease the perceived naturalness (Lähteenmäki et al. 2010). Although consumer perception of nutrition and health claims is quite positive (Ares et al. 2010; Burton et al. 2000; Carrillo et al. 2012; Kozup et al. 2003; Wansik and Chandon 2006), it is affected by both personal and objective factors, as shown for nutrition labelling. In particular, perceived relevance of health characteristics and attitudes towards food health properties or functional foods are important drivers of consumer perception (Andrews et al. 1998; Dean et al. 2012; Lähteenmäki 2013), as well as consumer product involvement (Aschemann-Witzel and Hamm 2010; Hansen et al. 2013) while socio-demographic conditions have a minor impact (Lähteenmäki 2013). With regard to more objective drivers, country differences in food habits can affect NH claims (Bech-Larsen and Grunert 2003; Dean et al. 2007; Van Trijp and Van der Lans 2007). In addition, other studies have pointed out that perception of NH claims is related to the carrier product, namely it is linked to its general healthy image (Lähteenmäki 2013; Wills et al. 2012), or specific type of claims (Van Trijp and Van der Lans 2007), or contained functional ingredients (Bech-Larsen and Grunert 2003; Dean et al. 2012; Rimal 2005; Urala and Lahteenmaki 2003; Wills et al. 2012), while wording is mostly case sensitive (Annunziata et al. 2014; Lähteenmäki 2013; Williams 2005). In relation to the different levels of scientific substantiation required in some countries for the approval of health claims, consumers have difficulty in discriminating among these levels, and it is hard to understand if they perceive the variations in scientific support correctly (Hooker and Teratanavat 2008; Kapsak et al. 2008; Kim et al. 2010). Lastly, similarly to that found for nutrition labelling and FoPs, consumers showing familiarity with functional foods of the claimed nutrition or health effects are more favorable towards these products (Lähteenmäki 2013; Williams 2005). Menu nutrition or calorie labelling do not impact on restaurant choice (Jun et al. 2009), though some market segments for eating healthy food at home are more likely to use this information in restaurants (Josiam and Foster 2009). In general, consumers are not able to understand levels of calorie and nutrition fundamentals of restaurants correctly—quick service (Burton et al. 2009)—meals, and to this purpose, there is evidence that the introduction of calorie ranges really reduce energy misestimation among different menus (Liu et al. 2015a). To conclude the present review concerning the results obtained by previous research on consumer understanding of nutritional information, displays at Point of Sales (PoS) seem to improve knowledge, but they fail to increase retention (Colapinto and Malaviarachchi 2009). Suggestions from this literature analysis mainly highlight the need to improve consumer nutritional knowledge (Burke et al. 1997; Kozup et al. 2006; Jacobs et al. 2011), although this does not necessarily result in a positive impact on consumer purchasing decisions to buy healthier food (Williams 2005). Indeed, as obtained by Onozaka et al. (2014), consumer intentions to buy foodstuffs claiming nutritional or health benefits is not directly related to knowledge or interest in healthy eating, but other behavioral factors.



## Conclusion

Previous studies have highlighted that consumers have a general knowledge on nutrition key concepts, but they are poorly able to place food groups correctly, and to define the appropriate serving size with respect to the suggested optimal nutritional needs. This fact may negatively impact the awareness of existing links between food and nutrition components and diet, explaining why consumers rarely use nutritional information made on foods, though they perceive nutrition labelling and FoPs as reliable sources of nutrition information. Moreover, numerous items like socio-demographic and cultural features, product involvement and perceived relevance, as well as product category, affect consumer ability to use nutrition labelling and FoPs for their food choices correctly. These results indicate the need of more research on what kind of information or knowledge regarding nutrition, food principles and components, and related health effects, have to be provided to consumers, and in which way, in order to really help them gain awareness in composing a healthy diet. Evidence from such new studies could support experts and policy makers in planning new solutions—labels, educational pathways, displays at shops—for communicating nutritional information and increasing consumer comprehension concerning links between health and diet. Consumers could really be made more aware of food choices, resulting in more balanced consumption habits. In this way, the food industry and market could also benefit because they could continue to innovate and differentiate by developing foods that actually respond to consumer needs, without prejudice to consumer protection and security.

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