Nutrition 30 (2014) 257–260

Contents lists available at ScienceDirect

Nutrition

journal homepage: www.nutritionjrnl.com

Review

Food labels: A critical assessment

Norman J. Temple Ph.D. [a,*], Joy Fraser Ph.D. [b]

[a] Centre for Science, Athabasca University, Alberta, Canada
[b] Faculty of Humanities and Social Sciences, Athabasca University, Alberta, Canada

ARTICLE INFO

Article history:
Received 11 March 2013
Accepted 16 June 2013

Keywords:
Food labels
Serving sizes
Traffic light labels

ABSTRACT

Objective: Foods sold in packages have both front-of-package (FOP) labels and back-of-package (BOP) labels. The aim of this review is to determine the role they play in informing consumers as to the composition of foods in order to help select a healthy diet.
Methods: Recent literature was evaluated and findings combined with assessments made by the authors of food labels used in the United States and Canada.
Results: Research shows that most consumers have difficulty understanding the information provided by both FOP and BOP food labels used in the United States and Canada. Research has evaluated the merits of alternative designs. FOP labels should be based on a clear and simple design. They should present information on key nutrients (total fat, saturated fat, sugar, and sodium or salt) and also energy value. They should have color and words that indicate "high," "medium," and "low" levels. Labels can also state quantity per serving. The traffic light system is the best example of this design. An extra traffic light indicating the overall health value of the food should be added. A clearer BOP label also is needed. Implementation of a new food labeling system will probably be opposed by the food industry. More research is needed into which food label designs are most effective, especially for persuading consumers to select healthier food.
Conclusions: Both FOP and BOP food labels used in the United States and Canada need to be redesigned using a traffic light system.

Introduction

Developed countries have regulations that specify what information must be stated on food labels. When well designed, labels can potentially have a positive influence on the national diet.

This area has been the focus of much research in recent years, with the generation of many new ideas, both for the front and back of food packages. In this review, we explore these issues with particular reference to food labels used in the United States and Canada. We reviewed papers up to February 2013.

Why food labels cause confusion

Generally, the labeling regulations only apply to food sold in packages, such as cans or cardboard boxes, whereas many foods that are not packaged by the manufacturer, such as fresh meat and fish, do not require a label.

There are two types of labels:

- Front-of-package (FOP) labels inform the buyer of the brand name and the type of food (e.g., Kellogg's Shredded Wheat). The FOP label also may have a statement about the composition of the food (such as "good source of fiber") or a health claim (such as "diets low in total fat may reduce the risk for some cancers").
- Back-of-package (BOP) labels include a Nutrition Facts panel that provides details of the nutritional composition of the food (such as 185 mg sodium per 35 g serving). To help the consumer interpret the information, the amounts also are stated as percent of recommended daily intake (called Daily Values in the United States and Canada). The BOP label also lists the ingredients in the food, in order by amount (main ingredient first).

Food labels play a vital role in informing consumers about the composition of foods. They guide the food choices made by millions of people. Approximately 60% of U.S. adults reported using the nutrient data on the BOP label, and about half

There are no conflicts of interest. The authors have no corporate affiliations.

* Corresponding author. Tel.: +1 780 450 0167; fax: +1 780 675 6186.
E-mail address: normant@athabascau.ca (N. J. Temple).

0899-9007/$ - see front matter © 2014 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.nut.2013.06.012

reported looking at the ingredient list and serving size information [1].

Unfortunately, food labels in common use North America can be a source of confusion for consumers. Here are the major problems:

- FOP labels often give misleading names to foods. Soft drinks may be the most egregious example. In North America, only pure fruit juice can be called "juice." However, there are several imitation juice products that contain no more than 20% actual juice; many contain none at all. These pseudo-juice products are, in reality, sugar solutions with added colors and flavors. Despite being only slightly different from cola drinks, they have names that suggest real fruit, such as fruit beverage, fruit nectar, and fruit cocktail. Adding to the confusion, the brand name also may be suggestive of real fruit (e.g., Sunny Delight).
- The BOP label lists the ingredients in the food in order by amount, but seldom gives the actual quantity of each ingredient. What this can mean in practice is that a manufacturer sells a juice containing mainly apple juice (which is cheap) with some added berry juice (which costs much more). But as many customers prefer berry juice, the FOP label will likely say, in large letters, "made with real berries" and have large images of berries. The list of ingredients will merely indicate that there is more apple juice than berry juice. Therefore, even if the customer realizes that the label is deceptive and tries to determine how much berry juice is actually present, this will be impossible.
- In addition to the list of ingredients, BOP labels also give a table with the content of selected food components (energy, fiber, sugar, fat, and some nutrients). However, food components that should be consumed in limited amounts (such as sodium, sugar, and saturated fat) are interspersed with others that often are lacking in the diet (such as dietary fiber and ω-3 fatty acids). The effect of this is almost certainly to make food labels more confusing for consumers.
- Serving sizes on food labels in the United States and Canada are different from the serving sizes used in each country's food guide. Adding to this confusion, labels for similar products in Canada often use different serving sizes, thereby making it difficult for consumers to compare them. The information in Table 1 has been extracted from actual labels of foods sold in Canada. Let us suppose a shopper wishes to buy crackers low in energy and sardines low in sodium. Brand A crackers contain 80 kcal per four crackers (20 g), whereas brand B contains 130 kcal per five crackers (32 g). The shopper might easily conclude (wrongly) that brand A is lower in energy. In fact, measured as kcal/100 g the two products are almost identical in energy density. We see a similar problem with the sodium content of sardines. Brand C contains 210 mg sodium/58 g serving (which is half of the 115 g can), whereas brand D contains 420 mg sodium/106 g serving (the whole can). This means that the two brands have an almost identical content of sodium (as mg/100 g). However, the shopper may decide to compare the cans by looking at the sodium content in terms of percentages of daily values. But because brand C has a much smaller serving size than brand D, the label states that it has much less sodium per serving (9% versus 17%). This leads to a false conclusion.

Table 1
Examples of information found on food labels

Brand	Type of food	Serving size	Calories	Sodium (mg)	Percentage of daily value
A	Crackers	4 crackers (20 g)	80		
B	Crackers	5 crackers (32 g)	130		
C	Sardines	58 g (half can)		210	9
D	Sardines	106 g (whole can)		420	17

Let us now suppose that a typical shopper wishes to buy breakfast cereals. The time spent evaluating each of the choices is typically no more than a few seconds. For that reason it is the FOP labels that are crucial for making a choice. But as we have seen, FOP labels may give misleading information. Even if the shopper is especially diligent and carefully reads the BOP labels, he or she is likely to end up being confused by the information. Indeed, research studies in various countries reveal that the majority of people have problems understanding food labels [2]. This is especially the case with older adults and those with less education. In a Canadian study, only about 12% of individuals who were shown a label stating the energy value per serving of Coca-Cola could calculate the energy content of the whole bottle [3]. In one American study, the majority of participants misinterpreted the meaning of claims commonly made on children's cereals [4].

Many foods have a logo on the front of the pack indicating an endorsement by a health-related organization. Alas, this system is both inconsistent and flawed. In Canada, the Heart and Stroke Foundation allows its logo to be added to many food products. Some brands of margarine and orange juice have the logo yet other brands do not despite having an almost identical composition. One brand of rice has the logo on both brown and white rice. The former is reasonable but the latter makes little sense.

Improved designs for food labels

It is clear that the types of food labels used in many countries fail to give consumers the information they require in a user-friendly format. This is a serious barrier that prevents consumers from making informed choices as to which food items are healthiest. In response to these challenges, several new designs have been proposed. These are discussed here, going from most complex to least.

The Guidelines Daily Amount (GDA) system is a FOP label used in the United States, United Kingdom, and other European countries. It displays the amounts of several nutrients per serving, and also states these amounts as percentage of GDA (similar to daily values on BOP labels). This system is, in effect, a simplified version of the Nutrition Facts panel.

A system that shows much promise has been developed in Britain and is based on traffic lights [5]. Colored circles are placed on the FOP and indicate if the food has a high (red), medium (orange), or low (green) content of total fat, saturated fat, sugar, and sodium. The label also indicates the actual quantity of these substances per serving. Energy levels also are included. The system is in widespread use in the United Kingdom and some other countries.

One possible addition to traffic light labels is to add an extra traffic light to indicate the overall health value of the food. This would require a standardized methodology for comparison of diverse foods. Several such systems have been proposed [6–10].

An even simpler FOP label displays a summary of the overall health value of a food as stars (or a similar symbol); healthier products are given more stars. This format obviously provides less information than traffic light labels. One system based on stars is called Guiding Stars; each food receives from zero to three stars based on an overall health score.