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Consumer Research Needs from the Food and Drug Administration on Front-of-Package Nutritional Labeling

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Americans have increasingly busy lifestyles and desire quick and nutritious food choices. To provide consumers with at-a-glance nutrition information, many food manufacturers have introduced front-of-package (FOP) nutritional labeling systems. The purpose of this review is to reach out to the marketing and public policy discipline by identifying research needs on FOP systems not only to aid decision making for federal agencies, but also to help advance research on this important topic. We describe the many FOP systems, the FDA's regulatory background and approach to FOP systems, recent experimental research and gaps in knowledge, and research needs on FOP nutrition labeling.

Keywords: front-of-package, nutritional labeling, FDA, consumer research, food packages

The Problem and Its Significance

Over the past 20 years, obesity has increased at an alarming rate, and this trend is likely to continue (Centers for Disease Control and Prevention [CDC] 2014). Currently, 68.7% of all adult Americans aged 20 years or older are overweight (body mass index [BMI] ≥ 25), including 35.7% who are obese (BMI ≥ 30) and 6.3% who are extremely obese (BMI ≥ 40). When adjusted for age and smoking factors, obesity is associated with an estimated 300,000 deaths each year over normal weight categories (U.S. Surgeon General 2010), and it has been linked to an increased risk of type 2 diabetes, coronary heart disease, high blood pressure, arthritis, and several types of cancer (CDC 2014). An original purpose of the Nutrition Labeling and Education Act of 1990 (NLEA) was to help consumers make “more informed and healthier food choices in the context of their daily diet” (*Federal Register* 2010). No doubt, millions of consumers who wish to maintain a healthful diet, and particularly those with dietary restrictions, rely on the crucial information provided in the Nutrition Facts label (Cowburn and Stock-

ley 2005; Levy, Fein, and Schucker 1996; Lewis et al. 2009; Ollberding, Wolf, and Contento 2010). Although the trend in obesity has escalated dramatically since 1993, one could argue that without the Nutrition Facts label information, it may have been worse. Yet, it is not clear the extent to which the label is directly related to obesity rates, because it is not always consulted when consumers purchase food products (CDC 2013; Choinière and Lando 2013); self-efficacy, time concerns, and perceived value of the information are among the possible obstacles to greater use (Lin, Lee, and Yen 2004). In addition, some consumers may not fully utilize the Nutrition Facts labels, for example, truncating their back-label search in the presence of health claims (Roe, Levy, and Derby 1999).

Today, Americans have increasingly busy lifestyles, yet they desire quick and nutritious food choices in addition to considering just taste and price (*Federal Register* 2010). These conflicts arise in the presence of crowded food labels that often contain textual and graphic labeling statements for the many nutritional or health benefits that manufacturers and retailers choose to feature. Examples of such statements might include “structure/function” claims (e.g., “helps promote heart health”; DSHEA 1994), nutrient content claims and symbols (e.g., “low in saturated fat,” heart images), health claims (e.g., “calcium rich foods such as yogurt may reduce the risk of osteoarthritis”), and/or dietary guidance statements (e.g., “grain foods may reduce the risk of heart disease”) (Lin 2008). In addition, and more so recently, food labels now display statements such as “gluten-free,” “natural,” “organic,” and “GMO free,” as well as front-of-package (FOP) icons and symbols, such as Facts Up Front (2014) and the American Heart Association’s (AHA’s) Heart-Check mark (AHA 2014). These

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statements have flooded the food label marketplace, presenting potentially helpful, yet often confusing information for consumers. Despite using labeling statements such as “low fat” or “high fiber,” consumers do not trust all of them (Choinière and Lando 2013). Also, recent experimental research has shown that consumers presented with disorganized and chaotic decision environments tend to take longer in tasks and are willing to pay more for products than in more organized environments (Chae and Zhu 2014). Other research indicates that distractions increase food sampling, but this is due primarily to the role of affect and not in processing information per se (Nowlis and Shiv 2005). However, as U.S. Food and Drug Administration (FDA) Commissioner Hamburg has noted, ready access to reliable information about calories and nutrient content in foods remains an important objective (FDA 2010; Hamburg 2010). With this in mind, the intended purpose of the FOP nutrition labeling initiative by many manufacturers is to increase the ease of use of nutrition information and to aid in nutrition decision making in the fight against chronic diseases including obesity. As such, FOP labeling might be viewed as a helpful *supplement* (as opposed to an alternative) to the Nutrition Facts label, and its location may serve as a more convenient and effective tool for consumers in making food choices (*Federal Register* 2010).

However, to date, limited experimental consumer research exists on exactly how consumers use FOP symbols in making accurate nutrition evaluations and dietary decisions with and without the Nutrition Facts labels. Thus, the purpose of this Policy Watch review is to briefly describe (1) some of the many FOP systems that have appeared, (2) the FDA’s regulatory background and current approach with respect to FOP systems, (3) some of the recent experimental research on FOP systems and the gaps in knowledge, and (4) specific consumer research needs on FOP nutrition labeling.

FOP Systems and Symbols

Over the past few years, consumers of packaged food products have faced a barrage of FOP nutrition systems, symbols, and icons, including the Smart Choices icon, Kellogg’s Nutrition at a Glance, Mars’ Guideline Daily Amounts (GDAs), the AHA’s Heart-Check mark, Wal-Mart’s Great for You initiative, Hannaford’s Guiding Stars, the Grocery Manufacturers of America (GMA) and the Food Marketing Institute’s (FMI) Facts Up Front system, the NuVal nutrition scoring system, and the United Kingdom’s traffic light system, based on the GDAs (AHA 2014; Center for Science in the Public Interest 2006; Department of Health and Human Services 2012; Facts Up Front 2014; Food Standards Agency 2007; GMA 2011; National Health Service [NHS] 2013; NuVal 2014; Sebolt 2008). Other FOP approaches have been proposed, such as the Institute of Medicine (IOM) system and symbol (IOM 2011). All these FOP systems have objectives intended to help consumers make accurate nutrition evaluations and better food choices in the fight against chronic diseases, such as obesity. In general, these FOP systems can be grouped into two categories: summary (“evaluative”) symbols or nutrient-specific

(“reductive”) symbols (*Federal Register* 2010; Lichtenstein 2013; Newman, Howlett, and Burton 2014).

Summary FOP Systems and Symbols

The summary or evaluative symbol provides consumers with an overall evaluation of a product’s healthfulness. The summary systems usually offer a FOP symbol or check(s) if the product meets certain predetermined nutritional criteria. Perhaps the first such summary system was the Smart Spot offered by PepsiCo in 2004 (Nutraceuticals World 2004). Then, the Keystone Group introduced the Smart Choices program and icon, appearing on food packages from Unilever, Kraft, Coca-Cola, Pepsi, and Kellogg’s from August 2009 to October 2009 (Lupton et al. 2010). As with most summary systems, the Smart Choices icon was based on meeting required levels of positive nutrients (e.g., fiber, vitamins A and C), yet not exceeding limits set for negative nutrients (e.g., fat, sodium, sugar). One issue that arises with most summary systems is with the criteria that specify where such limits are set (e.g., the sugared cereal Froot Loops was found to qualify with 12 grams of sugar per serving; Neuman 2009).

The IOM (2011) proposed a summary system based on two sets of criteria with the eventual FOP symbol displaying calories per serving and a set of three checks (or another symbol) based on points, which also appear next to their associated nutrients on the Nutrition Facts label. To determine the points, there are two steps: Step 1 represents *eligibility criteria* and is based on saturated fat, sodium, and added sugar levels not being at “high” values (IOM 2011; Lichtenstein 2013). Zero points are awarded for being eligible. Step 2 represents *qualifying criteria*, in which one point is awarded for each of saturated and trans fat, sodium, and added sugars being “low” in value; up to three points are given and displayed with checkmarks (or another symbol) on the FOP icon. The low and high evaluations are based on the Nutrition Facts label for the given food.

The NuVal Nutritional Scoring System also is a summary system and icon based on a 0–100 score from the Overall Nutritional Quality Index (ONQI) (NuVal 2014). The ONQI algorithm makes use of the IOM Dietary Reference Intakes and Dietary Guidelines for Americans in quantifying the presence of more than 30 nutrients and their impact on diets and risks of chronic diseases. The actual score is calculated as a ratio of positive to negative nutrients and is based on “the quality and density of nutrients, as well as the strength of their association with specific health conditions” (NuVal 2014). There are many other summary systems and icons; we have highlighted only a few for illustrative purposes. The nutritional criteria to qualify for a FOP symbol remain an issue for many summary systems.

Nutrient-Specific FOP Systems and Symbols

The nutrient-specific or reductive FOP systems and symbols typically present a reduced amount or “snapshot” of information from the Nutrition Facts label (i.e., they are reductive in nature; Newman, Howlett, and Burton 2014) and display this information in the form of a FOP symbol. Perhaps the best-known nutrient-specific FOP symbol is that of the United Kingdom’s traffic light FOP icon (Food

Standards Agency 2007; NHS 2013). Although different variations exist, this program introduces the simple, colored traffic light icon with absolute and percentage GDAs. Usually, energy (calories), fat, saturates (saturated fat), sugars, and salt (sodium) are listed per 100 grams of the food in question. The U.K. traffic light system uses green for nutrients that are low in their amounts, amber for medium amounts, and red for high amounts (NHS 2013). In another nutrient-specific reductive system, Kellogg's displayed its "Nutrition at a Glance" FOP symbol for many of its cereal products (e.g., Frosted Flakes), showing an all-green FOP symbol containing calories, total fat, sodium, sugars, and positive nutrients (e.g., vitamins A and C), along with nutrient amounts and daily value percentages for one serving. Mars followed suit with similar all-green nutrition symbols for many of its products (e.g., Snickers, M&Ms).

More recently, two trade organizations, the GMA and the FMI, joined forces in introducing "Nutrition Keys" FOP labeling, which has evolved into the Facts Up Front FOP system and symbol (Facts Up Front 2014; GMA 2011). The Facts Up Front FOP labels display calories, saturated fat, sodium, and sugar levels for each serving, as well as their daily value percentages when available. Some labels also provide information about positive nutrients, such as fiber and calcium. The Facts Up Front label appears in a monochrome (e.g., all white, all light blue, all light brown) format with black text identifying the nutrient levels and daily value percentages.

FDA Regulatory Background and Approach to FOP Symbols

The Federal Food, Drug, and Cosmetics Act of 1938 was amended under the NLEA of 1990 to require nutrition labels on packaged foods for the first time, as well as providing for the use of nutrient content claims and health claims on the front display panel. In 1993, the FDA developed regulations, including definitions and standards, for the use of nutrient content claims (e.g., "low in fat," "lower sodium") and health claims (linking a nutrient and a disease; e.g., "low in saturated fat, may reduce the risk of coronary heart disease") (FDA 1994). Perhaps the most important aspect of the NLEA for consumers was the requirement for the standardized Nutrition Facts label, which contains product-specific information on serving sizes, calories, and nutrients, such as total fat, saturated fat, cholesterol, and sodium. These changes were in the spirit of recommendations dating back to 1969, when the federal government began to encourage healthy lifestyle changes to help prevent the increase in chronic diseases, such as hypertension, coronary heart disease, diabetes, and cancer (White House Conference on Food, Nutrition, and Health 1970).

Whereas the United States required such standardized nutritional labeling in 1993 on the back (or side) panel of most food products for sale in the United States, the European Union (including the United Kingdom) did not have similar requirements (Europa 2012; Food Standards Agency 1999). Instead, they opted for voluntary nutritional labeling that will become mandatory in 2016 (United Kingdom Department of Health 2013). Also voluntary in the United Kingdom are FOP symbols that began to appear in the mid-

2000s, such as the multiple traffic light system (Food Standards Agency 2007). Front-of-package nutrition symbols began to proliferate in the United States in the late 2000s, with the Keystone Group's Smart Choices program and icon being one of the more prominent FOP systems (Lupton et al. 2010). Yet, criteria for some systems (e.g., Smart Choices) were viewed as not being stringent enough in protecting consumers against misleading claims, were at times inconsistent with the Dietary Guidelines for Americans, and/or led consumers to choose processed foods over more healthful foods (FDA 2009; Neuman 2009). As a result, the FDA sent a warning letter to Smart Choices (FDA 2009) and state attorneys general later forced Smart Choices to drop the logo (State of Connecticut 2009).

In the following year, FDA Commissioner Hamburg addressed the many FOP initiatives at a 2010 Nutrition Summit, indicating that although it was important to provide consumers with simple, evidence-based, and easily understood FOP nutrition information, having the necessary consumer and nutrition science on the most appropriate standardized FOP format and criteria across differing literacy, education, and age levels was essential for success (Hamburg 2010). In the same year, the FDA issued a request for research on FOP consumer perceptions and behavior, different FOP approaches, FOP design and format, and the likely impact on product reformulation (*Federal Register* 2010). In 2011, the FDA elected to exercise enforcement discretion to the GMA and the FMI for their Nutrition Keys (now Facts Up Front) FOP system, provided that the disclosure statement referring consumers to the Nutrition Facts label be required for products that include optional icons (for positive nutrients) and exceed trigger levels of total fat, saturated fat, cholesterol, or sodium (FDA 2011). Then, in 2012, the Department of Health and Human Services, the FDA, and RTI International developed an evaluation plan for examining the effect of any FOP symbols (e.g., Facts Up Front, the IOM label, future symbols) on consumers, food manufacturers, and retailers (Department of Health and Human Services 2012).

As noted previously, a primary policy goal of the NLEA amendments to the Federal Food, Drug, and Cosmetic Act was to help consumers make "more informed and healthier food choices in the context of their daily diet" (*Federal Register* 2010). Similarly, because the Nutrition Facts label and FOP initiatives represent important policy interventions, their associated policy planning and evaluation outcomes can include a variety of short-, intermediate-, and long-term effects for consumers, food manufacturers, and retailers (Department of Health and Human Services 2012). In the case of FOP labeling programs and for consumers, these outcomes include increasing consumer recognition (short-term), aiding consumer understanding (intermediate-term), improving consumer diets in adherence with the Dietary Guidelines for Americans (long-term), and decreasing risks of obesity and chronic disease (overall impact) (Department of Health and Human Services 2012). In the case of manufacturers and retailers, many FOP activities are needed (e.g., consumer and stakeholder education, media campaigns) to affect a variety of outcomes, from an increased commitment of companies to adopt FOP symbols, greater sales of products with FOP symbols, and product

reformulation to longer-term impacts on consumer diets, obesity rates, and chronic disease (Department of Health and Human Services 2012).

Certainly, many consumer groups recognize the importance of the FDA leading the way with independent FOP labeling, similar to NLEA provisions resulting in the Nutrition Facts label in 1993 (Center for Science in the Public Interest 2006; Goad 2014). Yet, as noted in the *Federal Register* (2010, p. 22604), it is important to have standardized criteria based on the Dietary Guidelines for Americans; and a format that is (1) widely adopted by food retailers and manufacturers, (2) standardized such that consumers can readily notice, understand, and use it, and (3) one that takes into account a wide range of literacy and demographic factors. Thus, both consumer awareness and comprehension (through product nutrient knowledge/education) are important objectives for FOP labeling, as well as actual use (through dietary choices/behavior) (*Federal Register* 2010). In addition, research indicates that consumers desire a FOP label in which the healthfulness of a product is understood clearly and one that comes from a trusted source (Hawley et al. 2012). At present, and as noted by a FDA spokesperson, “The FDA is looking closely at the issue. The agency is seeking a science-based solution” (Goad 2014). Yet, as Hawley et al.’s (2012) and Hersey et al.’s (2013) extensive reviews indicate, many consumer research questions about FOP symbols still exist.

What Is Known and Gaps in Knowledge on FOP Consumer Research

FOP Symbol Research

A significant amount of FOP consumer research has been conducted internationally. For example, research in the European Union reveals that consumers actually like and prefer “healthy choice tick” (summary) FOP icons (Feunekes et al. 2008). However, studies in the United Kingdom also suggest that variations of the multicolor traffic lights (a nutrient-specific symbol) are more successful at signaling the nutritional characteristics of a given product than simple traffic lights that appear without separate nutrients listed or their GDAs (Food Standards Agency 2007). In experimental research (important in determining causality), when the Nutrition Facts label is not available, the multicolor traffic light FOP icon results in significantly greater nutrition accuracy scores than a simple (summary) FOP icon, or a no-FOP icon control (Andrews, Burton, and Kees 2011), or the Facts Up Front icon (Roberto et al. 2012). In general, color can serve to attract attention to the FOP icons (Bialkova and Van Trip 2010) and aid perceptual fluency (Reber and Schwarz 1999). Yet, Andrews, Burton, and Netemeyer’s (2013) study indicates that high-nutrition motivation respondents exposed to the traffic lights can at times generalize that certain negative nutrients were low in value when they were actually high. One reason is that these respondents may be more sensitive and favorably predisposed to nutritional appeals even though the appeals may not be accurate. Recent FOP research has shown that for a single food evaluation, a nutrient-specific (reductive) icon had a positive effect not only on product healthfulness (as

did the summary/evaluative icon), but also on purchase intentions (Newman, Howlett, and Burton 2014). However, when several food choice options were presented, the summary (evaluative) icon had a better effect on evaluation and choice. In Lin and Levy (2010), an experimental study of more than 4,900 consumers for nine different variations of FOP systems (i.e., three “Nutrition Tips” [an abbreviated facts label], two U.K. traffic lights, one healthy check, one star rating, one true control [no symbol], and one Nutrition Facts label control) revealed that all FOP systems (vs. the true control) increased the likelihood of making a healthy product selection when the choice difficulty and consumer health motivation were high. Yet, the Nutrition Facts label outperformed all FOP systems in inducing consumers to select healthier products. Overall, and on the basis of extensive reviews of FOP systems, although some summary systems may help consumers purchase healthier products, the multiple traffic light FOP icons (with text, color, and %GDAs; i.e., TL-GDAs) have been most consistent in helping consumers identify healthier products using nutrient-specific information (Hawley et al. 2012; Hersey et al. 2013).

Gaps in Knowledge

As noted in summaries of the reviews of FOP systems by Hawley et al. (2012) and Hersey et al. (2013), additional, controlled research is needed on the effects of FOP labeling on consumers’ actual shopping behaviors and dietary intakes. It would be helpful to examine moderating conditions more systematically in studying the role of consumers’ motivation, ability, and opportunity to process the FOP information (Batra and Ray 1986; Chaiken 1980; Moorman 1990; Petty and Cacioppo 1986; Wansink 2005) and their resulting comprehension and product choice decisions. General questions arise as to whether the FOP symbols interact with other labeling statements on the front of the package (e.g., “low fat”) or affect consumers’ use of the Nutrition Facts labels (Roe, Levy, and Derby 1999). Other issues that the FDA has raised previously (*Federal Register* 2010), such as how aspects of graphic design and clutter can affect consumers’ opportunity to process and comprehend FOP symbols, have yet to be addressed. In addition, research appears to suggest that the summary (evaluative) systems and symbols are better at encouraging healthier food choices (behavior), whereas the nutrient-specific (reductive) systems and symbols perform better with comprehension and education and, at times, with food choices (e.g., TL-GDAs). These differences are in need of further research. Finally, helpful organizing frameworks, such as McGuire’s (1980) Communication-Persuasion Model, might be employed in discovering additional gaps in research.

Specific Consumer Research Needs on FOP

The following points represent more specific, unresolved research questions and issues on FOP symbols for *JPPM* readers to consider. Several of these points are articulated in the *Federal Register*’s (2010) request for research on FOP topics, yet remain in question at this time.

- To what extent will consumers notice, understand, and use FOP symbols? What role will FOP symbols play in consumer nutrition education and motivation to make more healthful dietary choices? How will FOP symbols help meet the information needs of consumers with lower literacy and numeracy skills? In addition, prior research suggests that objective nutrition knowledge can vary significantly and influence the accurate comprehension of nutrition claims (Andrews, Netemeyer, and Burton 2009). The study of other moderating conditions (e.g., health/nutrition literacy) is needed.
- What are the most effective color, location, contrast, size, and other graphic design elements to enhance comprehension and other effects? Although several studies have explored the issue of color with respect to inappropriate generalizations from all-green traffic lights versus multicolored versions (Andrews, Burton, and Netemeyer 2013), many graphic design-related issues remain unresolved.
- With the FOP symbols, will there be excessive clutter in an already crowded package label environment? How will consumers with reduced opportunity to process the symbols (e.g., due to constrained time, distractions) perform given other nutrient content, structure/function, and health claims? Will the FOP symbols supplement the Nutrition Facts label, or will they truncate consumers' search for the Nutrition Facts label? Some FOP systems (e.g., IOM) are attempts to link the FOP symbols with the Nutrition Facts label.
- What evidence exists regarding FOP effectiveness in controlled field studies with sales data? A few studies (e.g., Hannaford Guiding Stars, summarized in Hersey et al. 2013; Rahkovsky et al. 2013) report positive sales effects of certain FOP symbols, but additional controlled field studies are needed (Hersey et al. 2013, pp. 11–12).
- What are the best/most defensible criteria if summary (evaluative) symbols are used? Are the criteria transparent, credible, and readily understood and accepted by consumers?
- Finally, how can one best balance the different primary objectives of each FOP symbol (e.g., education/knowledge through nutrient-specific symbols; behavior through summary symbols)? Is there a way/symbol/process that maximizes both? Does this vary by the type of consumer?

Conclusions

The purpose of this Policy Watch review is to reach out to the marketing and public policy discipline in identifying several areas of research needed on FOP symbols not only to aid decision making on behalf of federal agencies in charge of food-labeling practices (e.g., FDA, U.S. Department of Agriculture), but also to help move research forward on this important topic. We discuss the importance of the FOP systems and symbols in aiding consumer nutrition education and in making healthier food choices in daily diets to help address problems of chronic diseases, such as obesity. We also examine several FOP systems, including current research findings and gaps in knowledge. We then offer several, specific research initiatives for scholars to consider on the FOP systems and symbols. We hope that this Policy Watch review will generate a renewed interest in research on FOP systems and symbols that most effectively aid consumers in making healthier food choices.

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