



## Exploring the correlation between self-reported preferences and actual purchases of nutrition labeled products

Anna Kristina Edenbrandt\*, Sinne Smed

*Institute of Food and Resource Economics, University of Copenhagen, Rolighedsvej 23, 1958 Frederiksberg C., Denmark*

### 1. Introduction

Despite the fact that consumers, in general, are aware of the importance of eating healthy and nutritious food, and state an interest in nutritional information in surveys (Grunert and Wills, 2007), the general trend is that diets are becoming less healthy (Müller-Riemenschneider et al., 2008; WHO, 2004). The main risk groups for diet-related health problems are overweight and obese individuals, although diet-related problems also are a concern for normal and underweight persons (WHO, 2004). As diet-related health problems constitute a growing cost for societies, different strategies and policies have been initiated to enable consumers to choose healthier food alternatives. For example, a range of nutrition labels, which summarize or evaluate the nutritional content, have been introduced to the front of packaging, thereby making the information easier to access for consumers. Most research on the effect of such labels is, however, based on self-reported perceptions and use in surveys or preferences elicited in experiments (hereafter summarized with the term *self-reported use* or *self-reported preferences*) (Balcombe et al., 2010; Barreiro-Hurlé et al., 2010; Campos et al., 2011; Grunert and Wills, 2007; Hamlin, 2015; Hersey et al., 2013; Lachat and Tseng, 2013). While these self-reported preferences provide valuable insights, an important question remains on how this translates into actual use in the market situation. The hypothetical nature of surveys and experiments may cause a gap between respondents' self-reported preferences on the one hand, and their actual purchases on the other. Knowledge of this potential gap is important in relation to health policy analysis as nutrition labels are one of several measures to counteract the increase in unhealthy eating. Effect evaluations of such initiatives are often warranted, but most of the prevailing studies that analyze the effect of nutritional labeling on behavior, are based on self-reported preferences or self-reported use as such data are more easily accessible and less costly to obtain. Furthermore, given that the introduction of nutrition labels is often motivated by their potential to counteract the obesity epidemic, it is important to analyze whether the gap between self-reported preferences and actual purchases is larger, smaller or unchanged for obese and overweight consumers compared to normal weight consumers. If obese and overweight consumers tend to overstate their purchases of healthy food

(understate the purchases of unhealthy foods) to a larger degree than normal weight consumers, the findings from studies based on self-reported use and self-reported preferences may be misleading in terms of their conclusion on the usefulness of nutrition labels for targeting overweight and obese individuals. Finally, when evaluating the usefulness of nutrition labels, it is important to know whether purchases of nutrition labeled products are part of a healthy diet, or whether they are rather used by consumers that indulge in non-healthy alternatives within other product areas.

This study adds to the literature by answering the following three questions: (1) Do consumers' self-reported preferences for nutrition labels correlate with actual purchases? (2) Does the purchasing of nutrition labeled products, and the correlation between self-reported preferences and actual purchases of labeled products, differ depending on the BMI of the consumer? And finally; (3) What is the relationship between nutrition label use and the overall healthiness of food purchases? All three questions aim to facilitate the evaluation of whether nutrition labels are useful strategies for encouraging consumers to choose healthier food. The questions are tested based on consumer HomeScan data from a Danish consumer panel, including information about whether the purchased products display the nutrition label "Keyhole" on the package. Furthermore, the data include responses from a questionnaire, issued to the same panel, which covers information about personal health measures such as BMI, socio-demographic characteristics and questions about preferences regarding products labeled with the Keyhole. The results are compared across six basic food categories to determine whether the results diverge depending on product type.

#### 1.1. Reliability of self-reported use and preferences and consistency with actual purchases

A discrepancy between what consumers say they intend to do, and what they actually do is referred to as an intention-behavior gap, attitude-behavior gap or value-action gap. Similarly, a discrepancy between stated preferences in contingent valuation surveys, where the willingness-to-pay is estimated, and revealed preferences elicited from market data is referred to as hypothetical bias (Ajzen et al., 2004;

\* Corresponding author.

E-mail address: [ake@ifro.ku.dk](mailto:ake@ifro.ku.dk) (A.K. Edenbrandt).

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Kollmuss and Agyeman, 2002). The potential inconsistencies between self-reported use and preferences, on the one hand, and purchase behavior in real market situations, on the other, give rise to concerns regarding the reliability of predicting market behavior from surveys and experiments. Such inconsistencies are of particular concern when public good aspects are involved, which is why food characteristics that include public-good properties, such as environmental benefits from the restricted use of pesticides in organic production, are particularly exposed. The literature on organic food purchases has found that the main drivers behind organic purchases are not the same as those that dominate attitudinal surveys and questionnaires. For instance, while many respondents state that concerns about animal welfare and environmental issues are important features of organic food, empirical studies have shown that the main driver behind actual purchases is instead related to personal health (Andersen, 2011; Hughner et al., 2007; Wier et al., 2008). Moreover, while a large share of respondents in surveys state a willingness and intention to purchase ethical or sustainable products (such as the Fair Trade label), the market share for such products is small (Carrington et al., 2014; Vermeir and Verbeke, 2006). Inconsistencies between self-reported preferences and use and actual purchases are also a concern when predicting market behavior for goods or characteristics of goods that are not yet on the market, particularly for controversial attributes as revealed in the literature on consumer acceptance and willingness-to-pay for genetically modified food (Lusk et al., 2005). While the discrepancies between self-reported preferences and use elicited in surveys or experiments and market behavior are particularly discussed and of concern regarding the above-mentioned public good aspects and attributes not yet on the market, the same concerns may be raised in the context of nutrition labels. There is a rich literature on consumers' use of nutritional information (for reviews, see Hamlin (2015); Nocella & Kennedy (2012), Campos et al. (2011), Grunert and Wills (2007)). However, the studies are typically based on survey responses, but whether these responses correspond with actual behavior has not yet been established (Grunert and Wills, 2007). Few studies have been conducted based on market data, and those that are typically based on only a few products and/or only purchases from specific retailers (Boztuğ et al., 2015; Cawley et al., 2014; Sacks et al., 2009)), which explains the call for more studies on consumers' actual purchases of labeled products (Grunert and Wills, 2007; Hersey et al., 2013; Lachat and Tseng, 2013). Some studies support a relationship between attitudes and stated behavior regarding the health aspects of food (see examples in Scheibehenne et al. 2007). However, to our knowledge, there is no evidence for the relationship between self-reported preferences for nutrition labels and actual purchase behavior. This paper, therefore, explores the relationship between self-reported preferences for the Keyhole in Denmark and the same consumers' actual purchases of products displaying this label.

### 1.2. Nutrition label use and BMI

Studies based on surveys and experiments suggest that obese consumers use nutritional information on food packages to a greater extent than normal weight consumers. For example, in a survey undertaken in the US, Lewis et al. (2009) found that overweight respondents read nutrition labels more frequently. Furthermore, a study based on self-reported data among African-Americans in North Carolina found that obese respondents read nutrition labels to a greater extent (Satia et al., 2005), while in an Italian survey, Banterle and Cavaliere (2014) found that respondents with excess weight paid more attention to nutrition claims than respondents of normal weight. Loureiro et al. (2012) find support for a negative relationship between BMI and nutrition label use among respondents in a large survey in the USA. Meanwhile, the results from studies investigating the effects of introducing nutrition labels on BMI are inconclusive. For example, Variyam and Cawley (2006) find that nutrition labels have a negative effect on BMI among certain consumer groups (non-Hispanic females), while Drichoutis et al. (2009)

conclude that, in general, the Nutrition Labeling and Education Act, which was introduced in the USA in 1990, has had no effect on BMI.

### 1.3. Relationship between nutrition labeled purchases and overall healthiness

There is some evidence that consumers who eat healthily supplement their meals, to a greater extent, with unhealthy snacks and drinks (Chandon and Wansink, 2007), and that they serve themselves larger portions when the food is perceived as healthy rather than unhealthy (Provencher et al., 2009; Wansink and Chandon, 2006). The behavior of complementing healthy choices with unhealthy choices is further emphasized in a review by Chandon & Wansink (2012). These studies are based on experiments or observations of take-away food purchases. There is, however, also evidence that self-reported use of nutrition or health labels is correlated with the consumption of healthier food, assessed according to different measures (Neuhooser et al., 1999; Ollberding et al., 2010; Visschers et al., 2013). A study based on survey data on overall food purchases and nutrition label use found a positive relationship between the self-reported use of such information and overall diet quality, assessed according to a healthy eating index (Kim et al., 2001). However, the nature of the data, which are based on self-reported food intake and label use, is a limitation of the study. As suggested by Storcksdieck genannt Bonsmann and Wills (2012), especially in Europe, there is little evidence regarding nutrition labels and consumer dietary intake based on actual purchases. This study aims to contribute to the literature by analyzing the correlation between purchases of nutrition labeled products and the observed overall healthiness of total food purchases.

## 2. Data

The analysis is based on HomeScan data from the Danish GfK PanelServices Denmark (hereafter abbreviated GfK), where members of the panel (the main shopping responsible of the household) report all their food purchases on a daily basis. The composition of the panel is described in more detail in Appendix A. We note that while the sample corresponds reasonably well with the Danish population with respect to age, income and education, it is heavily overrepresented by females. This is due to the fact that females do the grocery shopping to a greater extent and, therefore, the panel can be assumed to be representative of food purchasers in Denmark. Panel-membership is unpaid, but members earn "points", which they can use in the GfK shop. The data include information on the different characteristics of the products, while a questionnaire, which was issued to panel members in 2012, provides information about their *self-reported preference* for the Keyhole and their self-reported BMI. This information is, hence, at the individual level of the respondent, while the purchases are made for the entire household. The self-reported preference regarding the Keyhole is elicited from the question "I have begun to prefer food products that are labeled with a Keyhole over those without the Keyhole within some food categories" and the 5-point Likert scale ranged from 1 = totally disagree, 5 = totally agree. Lastly, a Healthy Eating Index (HEI), measuring the overall healthiness of the households' food purchases, is calculated for each household based on their total food purchases during the year. The HEI was developed by Smed (2008) and is based on the official dietary recommendations of the Danish Ministry of Family and Consumer Affairs, taking the composition of the household's diet into account. The HEI indicates how well the household complies with the recommended levels of intake, covering five aspects of the diet including the amount of fruit and vegetables, fish, and the sugar, fat and fiber content. The specific recommendations are provided in Appendix B. The lowest possible value of HEI is 0, while the maximum value is 24.5 with the HEI values among the households in the consumer panel ranging from 8.1 to 24.5, with a mean value of 20.0 and standard deviation of 1.97. The HEI is calculated for the entire household based on the assumption

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