Does Easily Accessible Nutritional Labelling Increase Consumption of Healthy Meals away from Home?

- *A Field Experiment Measuring the Impact of a Point-of-Purchase Healthy Symbol on Lunch Sales*[i]

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Abstract

This paper analyses the effect on meal consumption away from home of a point-of-purchase healthy symbol. We base the analysis on a field experiment in a lunch restaurant. Our results suggest that meal consumption does not increase if the meal is labeled with a healthy symbol. Also, the mean nutritional content of meals consumed seems unaffected by the introduction of a healthy labeled meal on the menu. Even if easily accessible and understood, menu labeling therefore seems inefficient in promoting healthier meal choices. Factors influencing meal consumption are meal ingredients and the order of the meal on the menu.

Keywords: consumer economics; food labelling; experiment; health.

JEL-classification: D12; I10

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1. Introduction

During the last few decades there has been a sharp increase in diseases related to the modern diet and a sedentary lifestyle. The modern diet is often characterized by a high content of so called ‘empty calories’, i.e. rich in calories, due to a high content of carbohydrates and fat, while of poor nutritional quality. A diet mainly consisting of empty calories has proven to be a risk factor for many serious diseases, such as several types of cancer, diabetes, cardiovascular disease, osteoporosis and dental caries, as well as for overweight and obesity, the latter two themselves major risk factors for many of these diseases. The increase in the prevalence of obesity and overweight (measured by Body Mass Index, BMI) has been so dramatic that it is often referred to as an ‘obesity epidemic’. WHO estimates that globally in 2008 approximately 1.5 billion adults were overweight or obese and that this number will rise to 2.3 billion in 2015. In Sweden, obesity has doubled since the 80s and today around 10 percent of adult men and women are obese. Alarming is also that childhood obesity is rising. The percentage of obese or overweight children has risen from 8 to 21 percent over the last two decades. Direct and indirect costs of obesity and overweight have been estimated at SEK 3.6 billion (Persson et al. 2004) and SEK 12.4 billion (Persson et al. 2005) respectively, which corresponds to about three percent of the total cost for all sickness (Socialstyrelsen 2003).

Environmental factors have been argued to be the main cause behind the increased prevalence of overweight and obesity over the last few decades (Binkley et al., 2000; Chou et al., 2004; Boumtje et al., 2005; Binkley, 2006; Rashad et al., 2006). Here, the increased consumption of food away from home has been highlighted as a major driving force (Chou et al., 2004; Binkley, 2006; Rashad et al., 2006). This is likely to be a result of the lower nutritional quality of food prepared away from home. Studies (e.g. Lin et al., 1999; 2001; Guthrie et al., 2002) have found that food away from home is generally higher in calories, fat, saturated fat, natrium and cholesterol, while lower in fibre, calcium and iron. In Sweden, food away from home amounts to around 25 percent of total household food budget (Statistics Sweden, 2010), while in the US, where obesity rates are the highest in the world, food away from home amounts to nearly 50 percent of the total household food budget (Variyam, 2005). In a recent study, Kyureghian et al. (2007) find that lunch is the meal of the day that has the single most detrimental effect on BMI. Their results imply that an increase (decrease) in the number of foods eaten away from home at lunch by 10 percent would make the average person obese (normal weight).

Public health experts have claimed that the lack of nutritional information on food away from home, and hence the inability for consumers to make fully informed choices, contributes to people over consuming calories when eating food away from home. Therefore, mandatory labelling for food away from home has been called for (see e.g. Nestle, 2002; Center for Science in the Public Interest, 2003). In the U.S., the government has assigned food labelling a new purpose; to align individual food choices with social objectives, i.e. help people make healthier food choices and thereby contribute to a healthier population (Golan et al., 2001). Studies show that consumers generally do not look for information provided by nutritional labels when making food purchases (Grunert et al., 2010a; 2010b). Nutritional information is therefore likely to influence meal choice the most when associated with minimal search cost and provided at the point when consumers make their final decision, i.e. at the point of purchase (see e.g. Conklin et al., 2005), such as menu labelling. In 2008, New York City was the first state to introduce mandatory menu (calorie) labelling at chain restaurants and since, several other states have followed.

In this study, we analyse if easily accessible nutritional information (point-of-purchase labelling in the form of a healthy symbol) increases consumption of healthy meals away from home. We also analyse if introducing the point-of-purchase label increases the average nutritional quality of meals consumed. We do so in a field experiment in a Swedish lunch restaurant. To the best of our knowledge, this is the first study to use a field experiment analyzing the effect of introducing a point-of-purchase symbol that indicates a healthy meal choice. Also, our experiment is performed on Swedish data

Previous studies have analyzed people's behavior in response to point-of-purchase nutritional information on meals, using experimental methods (see e.g. Aron et al., 1995, Perlmutter et al., 1997, Harnack et al., 2008, Chu et al., 2009, Downs et al., 2009, Pulos and Leng, 2010, Roberto et al., 2010 and a literature review by Harnack and French, 2008). Most of the (field) experiments have been performed in worksite or university restaurants and cafeterias. A few studies have used the mandatory calorie labeling introduction in New York and other states as a natural experiment in their analysis (Downs et al., 2009, Elbel et al., 2009; 2011, and Vadiveloo, 2011). Most of the studies analyze the effect on calorie intake from calorie labeling, and the findings from these studies are mixed. It seems the studies based on field experiments to a greater extent find that labeling decreases the intake of calories, than do the studies based on the natural experiment of mandatory calorie labeling – the latter studies generally report that calorie consumption remains unchanged after point-of-purchase-labeling is imposed. As an exception, Downs et al. (2009) find that calorie information may decrease the intake of calories.

A potential reason for small, or lacking, effects from calorie labeling on calorie consumption is that consumers have difficulties in evaluating information on calorie content. One way of facilitating information to consumers is to relate the calorie information to recommended daily or meal levels of caloric intake. However, Downs et al. (2009) show that relating calorie information to recommended levels may have perverse effects on calorie consumption, i.e. lead to an increased intake of calories (a potential explanation being that ignorant consumers overestimate the calories in less healthy meals and therefore eat less of healthy meals than they would if they knew the actual calorie content). Information provided by an easily accessible healthy symbol may therefore be preferred as a means of guiding consumers to healthy, low-calorie, meal alternatives.

To enhance the effect of nutritional information it is important that information is readily visible to consumers at the point of purchase, in addition to highly understood and legitimate. In our experiment we therefore use nutrition information in the form of a healthy label, "the Keyhole" symbol. The Keyhole is a symbol that is placed on the menu, next to the healthy meal. The Keyhole is widely recognized by Swedish consumers – a recent study shows that as many as 98 percent of those responsible for household purchases recognize the Keyhole. Most know that the Keyhole indicates a healthy choice and express confidence in the label (The Swedish National Food Administration (SLV)/Zapera, 2009).[1] The Keyhole is a trademark held by the SLV and may be used to indicate healthy meals by restaurants who have achieved Keyhole certification, which is granted by an association of seven institutions (e.g. the SLV and the Swedish Hotel and Restaurant Association). A Keyhole labelled meal is particularly

[1] In Sweden the Keyhole has been in use since 1989 as a label that helps consumes identify healthier food products within a food product group. In June 2009, the symbol was also introduced in Denmark and Norway. Since 2009 Swedish restaurants can be granted Keyhole certification.

low in calories, as well as in fat, sugar and salt while particularly high in fibre. Worth noting is that a restaurant offering Keyhole labelled meals is also obliged to offer wholesome meal attributes (drinks, bread, salad and dressing). One of the aims of with the certification process is also to increase the restaurant professionals' knowledge about how to cook and serve healthy meals, i.e. provide restaurants with the tools to be successful in their work with healthy meals.

2. The field experiment and data

We analyse the effect of the healthy label (Keyhole symbol) in a field experiment conducted at a lunch restaurant at an industry company in the southern part of Sweden. Sales at the restaurant was recorded during 12 weeks (from the 2nd of March to the 29th of May 2010). In the middle of the study period, i.e. after 6 weeks (on the 20th of April), the restaurant was certified with the Keyhole label and as a result, a Keyhole labelled meal was introduced on the menu. In relation to the introduction of the Keyhole, employees at the industry company were informed of the meaning of the Keyhole symbol and healthy eating. Note that meals that fulfil the Keyhole criteria could have been offered on the menu before the 20th of April, even though the label itself was not on the menu. The restaurant is only open during workdays and the total number of workdays during the study period amounts to 57.

Three meals were served at the restaurant each day, except one day (the 30th of April), when only two meals were served. The price of all meals was SEK 63. The data contains information on the type of meals served each day, the order at which they were displayed on the menu, the amount sold of each meal, and (on the 20th of April and onwards) if the meal was Keyhole labelled. The order of the meals, including the Keyhole labelled alternative, on the menu was varied over the study period.

Based on this information, a set of dummy variables have been created, indicating the main source of protein source in the meal (red meat, chicken or turkey, fish or seafood or vegetarian), the main source of carbohydrates in the meal (pasta, rice, potatoes and others, where “others” is bulgur and couscous, for instance), if the meal was Keyhole labelled and the order at which it was displayed on the menu. Also, dummy variables indicating weekdays were created.[2]

Finally, a nutritionist matched each meal with its nutritional content, using the software Dietist XP. The data therefore includes variables on number of calories and grams of fat, saturated fat, sugar, natrium and fibre per portion (excluding meal attributes, such as bread, bread spreading, salad and salad dressings). In Dietist XP, portion sizes are mainly based on surveys on food intake, i.e. portions consumed, rather than portions served. The nutritional values, as well as the portions, found in the data here are therefore generally smaller than the nutritional values served at restaurants.[3]

[2] The dummy variable for “red meat”, for instance, takes the value “1” if the meal contains red meat and “0” otherwise, while the dummy variable for “Monday”, for instance, takes the value “1” if the meal was sold on a Monday and “0” otherwise.

[3] It should be noted that the nutritional content of the meals is subject to uncertainties, though, since the nutritional contents have been calculated based on meal descriptions as found on the menu, where cooking procedures, portion sizes, etc, are unknown.

Table 1. Summary statistics of the variables included in the analysis.

Variable	Mean	Std. dev.	Min	Max
Number sold of meal per day	116	67.797	4	232
Total number sold per day	347	40.891	82	381
Dummy variables indicating weekdays:				
Monday	0.194	0.397		
Tuesday	0.212	0.410		
Wednesday	0.212	0.410		
Thursday	0.188	0.392		
Friday	0.194	0.397		
Dummy variables indicating appearance of meal on the menu:				
Top of menu	0.335	0.473		
Second from top	0.335	0.473		
Bottom of menu	0.329	0.471		
Dummy variable indicating healthy labelled meal:				
Keyhole label	0.171	0.377		
Dummy variables indicating main source of protein in meal:				
Red meat	0.400	0.491		
Chicken or turkey	0.053	0.225		
Fish or seafood	0.206	0.406		
Vegetarian	0.341	0.476		
Dummy variables indicating main source of carbohydrates in meal:				
Potatoes	0.429	0.496		
Pasta	0.082	0.276		
Rice	0.300	0.460		
Others	0.188	0.392		
Nutritional contents per portion:				
Calories	516	161	271	1091
Carbohydrates (grams)	51.8	22.6	11.9	120.4
Fat (grams)	21.4	12.9	3.0	77.0
Saturated fat (grams)	7.7	6.1	0.7	32.8
Fibre (grams)	5.5	3.0	0.4	15.0
Natrium (milligrams)	1307	565	249	3838
Sackaros (grams)	3.2	4.2	0	17.0

Number of observations: 170.

Customers were offered the option of receiving the menu of the restaurant in advance via e-mail. On the e-mail list were approximately 50-60 people. The lunch menu was also posted outside the restaurant. The restaurant staff estimates that each day approximately 10-20 percent of civil servants eat in the restaurant and 80-90 percent of blue-collar workers, as well as approximately 70 percent men and 30 percent women. The staff also estimates that the restaurant has an equal number of potential customers each week day. Opening hours are the same every day except on Fridays, when the restaurant is open until 3p.m., instead of 6 p.m. The restaurant is open to the general public, even if it primarily serves contractor employees. There are a couple of other lunch restaurants within walking distance.

Table 1 provides summary statistics of the variables included in the analysis. As shown by Table 1, the average number of each type of meals sold per day is 116, where the highest number of a single meal sold during the study period is 232 (a Keyhole labelled traditional Swedish meal: meatballs and mashed potatoes with lingonberries, displayed at the top of the menu and served on a Monday) and the lowest number is 4 (a non-Keyhole labelled vegetarian meal: falafel with lemon sauce and leek rice, displayed at the bottom of the menu and served on a Friday). On average, a total of 347 meals were sold during a day.

3. Empirical analysis

To analyse if easily accessible nutritional information provided by a healthy symbol (the Keyhole symbol) increases meal consumption, we estimate the following model:

$$\mathbf{Y} = \boldsymbol{\beta}\mathbf{x} + \boldsymbol{\delta}\mathbf{D} + \boldsymbol{\varepsilon}$$

Y is the number of portions sold of meal j (where $j = 1,2,3$) at time t (t=$1,\ldots$T, where T is the number of days of the experiment and equals 57), such that **Y** and **ε** are $n\mathrm{T} \times 1$ ($n = 3$). **x** contains the k continuous characteristics representing the nutritional content in lunch alternative j at time t, such that **x** is $k \times n\mathrm{T}$ and **β** is $k \times 1$. Since the variables indicating nutritional contents are highly correlated (especially calories per portion with carbohydrates and fat, respectively, as well as carbohydrates per portion with sackaros), **x** in the full model only contained grams of fibre, carbohydrates, fat, as well as milligrams of natrium per portion. The matrix **D** is $(\mathrm{K} - k) \times n\mathrm{T}$ and contains dummy variables for discrete characteristics (the indicator of the main variable of interest, the Keyhole symbol, as well as indicators of weekday, order of display on the menu, and main sources of protein and carbohydrates). The reference lunch alternative is sold on a Monday, displayed at the top of the menu, consisting of fish or seafood as the main source of protein and pasta as the main source of carbohydrates.

Having estimated the full model as stated by equation (1), t-tests revealed that none of the parameter estimates of main source of carbohydrates (rice, potatoes, others) was statistically significant, as well as none of the estimates of nutritional content (fat, carbohydrates, natrium, fibre). Tests were performed to analyse if the dummy variables indicating the main sources of carbohydrates as a group, respectively if the variables indicating nutritional content as a group, contribute to the explanatory power of the model. The test results revealed that the hypothesis of these groups not contributing to the explanatory power of the model could not be rejected.[4] Therefore, a reduced model was estimated, excluding these groups of variables from the model.[5] A Hausman test implied that the fixed effects model provides consistent parameter estimates, hence, a fixed effects model was estimated. Since the individual intercepts are of interest, though (i.e. it is of interest to analyze if the display of the meal on the menu increases sales of the meal) the fixed effects were included in the statistical analysis of the model as dummy variables representing meal 2 and meal 3 on the menu (i.e. alternative 1 is baseline).

Further, we extended the analysis by examining if the effect of the Keyhole symbol differs over meal types. To do so, we estimated the model with daily sales of meals containing different protein sources (red meat, chicken and turkey, seafood or vegetarian, respectively) as the dependent variable, instead of daily meal sales.

Finally, to analyze if the average nutritional quality of meals consumed was improved due to the introduction of the Keyhole symbol on the menu, we compare the average nutritional

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[4] A χ_2-test was used to test the null hypothesis that the nutritional content variables, as a group, do not contribute to the explanatory power of the model: $\chi_2(4) = 5.04$, Prob > $\chi_2 = 0.284$. An *F*-test was used to test the null hypothesis that the variables indicating the source of carbohydrates, as a group, do not contribute to the explanatory power of the model: $F(3,156) = 0.88$, Prob > $F = 0.455$.

[5] When having removed these variables, the model was estimated including the variable calories per portion, which in the full model had caused too much multicollinearity, but since a *t*-test revealed that the parameter estimate of calories was not statistically significant, this variable was also excluded from the model.

value in meals consumed before the Keyhole label was introduced with the average nutritional value of meals consumed after the reform.

4. Results

Table 2 shows the parameter estimates from the final, reduced, model. Our results imply that sales of a meal is not affected by the meal being displayed with a healthy symbol (Keyhole symbol). The parameter estimate for the dummy variable indicating that a meal is Keyhole labeled is both very small and statistically insignificant. Also, the results from our models with daily sales of different types of meals reveal that the Keyhole symbol does not affect sales of any type of meal, i.e. sales of meals containing red meat, chicken or turkey, fish or seafood or vegetarian meals are all unaffected by displaying that the meal is Keyhole labeled.[6]

Table 2. Model results – the effect on meal sales from meal attributes

Variable	Coeff.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Second from top	-1.239	5.340	-0.23	0.817	-11.786	9.308
Last on menu	-118.445	20.068	-5.90	0.000	-158.080	-78.810
Keyhole label	-.40252	4.187	-0.10	0.924	-8.673	7.868
Meat	25.313	6.120	4.14	0.000	13.226	37.399
Chicken or turkey	40.694	10.566	3.85	0.000	19.826	61.563
Vegetarian	6.053	20.905	0.29	0.773	-35.234	47.340
Tuesday	-9.069	6.770	-1.34	0.182	-22.440	4.301
Wednesday	-2.237	6.522	-0.34	0.732	-15.117	10.643
Thursday	-12.606	7.052	-1.79	0.076	-26.533	1.321
Friday	-18.946	6.677	-2.84	0.005	-32.132	-5.760

R-squared = 0.8505
Adj R-squared = 0.8412

[6] The results from those regression models are not presented here but are available upon request from the authors.

Further, the negative and statistically significant parameter estimate of a meal being displayed at the bottom of the menu imply that the order at which the lunch alternative is displayed on the menu matters. A meal displayed at the bottom of the menu sells as many as 118 portions less than a meal displayed at the top of the menu. Also, the negative and statistically significant estimates of later weekdays suggest that later weekdays negatively affect sales. Also, the positive and statistically significant estimates of main source of protein in the meal imply that sales increase if a meal contains red meat or chicken and turkey, relative to fish or seafood. If the meal contains red meat, 25 more portions are sold, compared to if the meal contains fish or seafood, and if the meal contains chicken or turkey, as many as 41 more portions are sold. Worth noting is also that the main source of carbohydrates in the meal, as well as the nutritional content, does not seem to matter for sales.

The model should not be subject to endogeneity problems concerning the variable of main interest, i.e. the dummy variable indicating that the meal is Keyhole labeled. However, some of the control variables may be endogenous, which we are unable to control for, provided the lack of adequate instruments. Potential sources of endogeneity are the type of meal served (represented by the main source of protein in the final model) and order of display on the menu.

However, even if consumers do not seem to increase their consumption of healthy meals due to the introduction of a healthy symbol on the menu, as mentioned above, the reform itself may positively impact the nutritional quality of meals consumed. Table 3 shows the change in the average nutritional value of meals consumed due to the introduction of the Keyhole on the menu.

Table 3. Average nutritional content in meals consumed before and after the introduction of the healthy symbol (Keyhole).

	Pre-Keyhole (No of obs = 87)		**Post-Keyhole** (No of obs = 83)	
Variable	**Mean**	**Std. dev.**	**Mean**	**Std. dev.**
Dummy variables indicating main source of protein in meal:				
Red meat	0.414	0.495	0.386	0.490
Chicken or turkey	0.046	0.211	0.060	0.239
Fish or seafood	0.184	0.390	0.229	0.423
Vegetarian	0.356	0.482	0.325	0.471
Dummy variables indicating main source of carbohydrates in meal:				
Potatoes	0.437	0.499	0.422	0.497
Pasta	0.057	0.234	0.108	0.313
Rice	0.276	0.450	0.325	0.471
Others	0.230	0.423	0.145	0.354
Nutritional contents per portion:				
Calories	520	165	511	158
Carbohydrates (grams)	51.3	23.2	52.2	22.2
Fat (grams)	22.1	13.0	20.6	12.9
Saturated fat (grams)	7.8	6.0	7.5	6.3
Fibre (grams)	5.3	3.3	5.7	2.6
Natrium (milligrams)	1302	579	1314	553
Sackaros (grams)	3.4	4.5	3.1	3.9

As shown by Table 3, it appears that the average calorie content of a meal declined after the Keyhole label was introduced, from 520 calories to 511 calories. Also, the mean content of fat, saturated fat and sugar declined after the Keyhole was introduced, while the mean content of fibre increased. The content of natrium also seems to have increased, though, after the reform. As for ingredients in meals consumed, it appears that the average share of meals sold that contain red meat declined from 41 to 39 percent, after the Keyhole was introduced, whereas the share of seafood sold on an average day increased from 18 to 23 percent. However, results from two sample *t*-tests reveal that none of the differences in the means presented in Table 3 are statistically significant. Even when relaxing the restrictive two sample *t*-test assumption of equal variances around the two sample means, this result remains.[7] This result supports the line of research that finds no evidence of calorie labeling changing consumption of calories (Harnack et al., 2008; Elbel et al., 2009 and 2011; Vadiveloo, 2011).

5. Conclusions

In this paper we use a field experiment in a Swedish lunch restaurant to analyse if easily accessible point-of-purchase information on the nutritional value of meals increases sales of meals. The nutritional value is provided by a widely known Swedish healthy symbol, the Keyhole, certified to restaurants by a coalition of authorities and private organisations, such as the Swedish National Food Administration and the Swedish Hotel and Restaurant Association. A Keyhole labelled meal is particularly low in calories, as well as in fat, sugar and salt while particularly high in fibre.

The results from our field experiment suggest that consumption of a meal is not increased if the meal is labelled with easily accessible nutritional information in the form of a healthy symbol (Keyhole). This result seems to hold not only for consumption of meals in general, but also for consumption of different meal types (meals containing red meat, chicken or turkey, fish or seafood or vegetarian), i.e. neither, for instance, consumption of meals containing red meat or consumption of meals containing seafood increases if these meals are displayed as particularly healthy, with the Keyhole symbol.

[7] The results from the two sample *t*-tests are not presented here but are available upon request form the authors.

Even if the Keyhole label itself does not matter to consumers, the introduction of Keyhole labelled meals on the menu could, however, indirectly promote health if the reform positively impacts the average nutritional value of meals sold. Our results point towards that the average nutritional content of meals sold improved some due to the introduction of the Keyhole labelled meals on the menu: the mean contents of calories, fat, saturated fat and sugar decreased, while the mean content of fibre increased (on the downside, the mean content of natrium also increased, though). However, these differences in the nutritional content before and after the reform are not statistically significant. The general result support the line of research that finds no effect on calorie consumption from point-of-purchase menu calorie labeling (Harnack et al.,2008; Elbel et al., 2009 and 2011; Vadiveloo, 2011). Our results therefore imply that the effect of point-of-purchase nutritional information does not seem to be enhanced by the information being displayed as a symbol, rather than as more complex information (such as number of calories) that might be more difficult for consumers to assess.

It could be that the inability of the Keyhole label to increase sales is due to consumers not caring for the Keyhole symbol specifically, even if they care for health. The conclusion that consumers do not respond to meal labelling would in that case be wrong, they just respond to other symbols. Consumers may, for instance, be more concerned about carbohydrates or sugar (than fat, saturated fat, sugar, natrium and fibre collectively, as represented by the Keyhole). Further research is therefore needed to analyse what health symbols (if any), or labels representing dietary regimes, that affect sales the most. Also, considering that consumption seems to be unaffected by the healthy symbol, research is needed to determine if it is profitable for restaurants to invest in providing Keyhole labelled meals, considering that providing Keyhole labelled meals means investing in training staff and developing meals that fall within specific nutritional guidelines.

Our results suggest that the factors affecting sales of meals are the main source of protein in the meal (where chicken and turkey increase sales the most, followed by red meat), and weekdays: sales are higher in the beginning of the week than in the end of the week. The former result could imply that taste matters more than health – ingredients are of greater importance than the nutritional content. The trade-off between taste and health should be further analysed, and how healthy meals can be composed to attract as many consumers as possible.

The analysis is subject to short comings. The first concerns the ability to generalize the results. The experiment is performed in a single lunch restaurant, where men and blue-collar workers are over represented. Since studies find that women use labels more than men (see e.g. McLean-Meyinsee, 2001; Driskell et al., 2008), and blue-collar workers may need more calories since they often have more physically demanding jobs (even though technological progress is narrowing the gap between the physical activity of civil servants and blue-collar workers), an experiment based on a more representative sample might provide different results. It would also be of interest to be able to identify different groups of consumers. From a public health perspective, it is here of particular interest to determine how those of poor health respond to easily accessible nutritional information. (In general, studies on more representative samples are needed, both in terms of consumer characteristics and restaurant characteristics.) Another short coming concerns the time perspective. If consumers are slow to respond to the Keyhole label, (unobserved) long term effects of the introduction of the Keyhole label on the menu may differ from the short term effects observed in this field experiment. More research is needed to analyse long-term effects of point-of-purchase nutrition information.

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