Bio-based and Applied Economics 7(3): 249-263, 2018
DOI: 10.13128/bae-7678

Full Research Article

Can menu labeling affect away-from-home-dietary choices?

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Date of submission: 2018 28th, September; accepted 2019 23rd, July

Abstract. This study aims to evaluate the impact of two menu-labeling formats on changes in dietary choices in an away-from-home meal, specifically in a university cafeteria. A field experiment at a university cafeteria in Italy was conducted providing two different types of nutritional labels. The experiment lasted four days, spread over two weeks during which a total of 930 observations were collected. During each day of the experiment, only in one food line (*treated* line) a label indicating the healthy options was displayed, while in the other line no label was presented (*control* line). The paper describes two indexes to measure how the selected food choices for each participant are in line with what suggested by the labels. We define five different classes of these indexes and we test our hypothesis using an ordered logit model. Results show the labels we provided had no significant impact on changing the tray composition, in accordance with other previous experiments suggesting that adding only nutritional information in a restaurant setting does not necessarily encourage healthier choices. The paper concludes highlighting the need of a multifaceted approach to design effective public policies enhancing healthier choices in a self-service restaurant. Specifically, the provision of nutritional information by itself can have zero or low impact unless it synergizes with others instruments such as nutritional education, social norm provision and nudges. In the conclusions, some suggestions on public policies addressing the promotion of healthy food habits are given.

Keywords. Menu Labels, Food away-from-home, Healthy food policies, Food labeling.

JEL Codes. I12, I18, D12.

1. Introduction

Food away from home (FAFH) consumption plays an increasing role in the daily diets of many people worldwide. In Italy, the share of FAFH on total food expenditure was 33% in 2015, versus 46% in Spain, 44% in the United Kingdom, 27% in Germany, and 26% in

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ISSN 2280-6180 (print)
ISSN 2280-6172 (online)

France (Agrifood Monitor, 2016). In 2015, about 12 million Italians (around 20% of the entire population) had lunch away from home 3-4 times a week (Fipe-Commercio, 2015). These patterns are actually similar for all industrialized and many developing countries (Mottaleb *et al.*, 2017). In the USA, the share of FAFH on total yearly food expenditure rose from 25.9% in 1970 to 43.1% in 2012 (USDA). In the 2007-2008 National Health and Nutrition Survey data 41% of adults said they had consumed foods and/or beverages from fast food-type restaurants during the previous 24 hours, and 27% of them from full-service restaurants (Seguin *et al.*, 2016).

While the rising in FAFH consumption is not a bad habit *per se*, researchers have found that the frequency of eating FAFH is positively correlated with some unhealthful outcomes, such as overweight and obesity (Binkley *et al.*, 2000; McCrory *et al.*, 1999; Satia *et al.*, 2004, Todd *et al.*, 2010).

The link between FAFH and obesity can be explained because people tend to underestimate calories and fat content when they select their meal in an away-from-home environment (Backstrand *et al.*, 1997). Indeed, restaurants and cafeterias typically use caloric dense ingredients (butter or dressings) to gain palatability[1]; yet, it is almost impossible for consumers to detect those "hidden" fats and overall taste remains a major force driving food choices (Glanz *et al.*, 1998).

The positive relationship between FAFH expenditure and BMI has also been found in children. According to a study by Bowman *et al.* (2004), on a typical day when eating at quick-service food, children (aged 4-19) tended to consume more fat (+ 9 g), added sugars (+ 26 g), sugar-sweetened beverages (+ 228 g), and less fiber (-1.1 g), milk (-65 g) and fruits and non-starchy vegetables (-45 g), compared to those who did not, leading to 187 extra calories compared to a meal consumed at home.

Given the increasing trend in eating away from home, policy makers have considered the urgency of finding policy instruments which can lead to healthier consumption behavior. Labeling[2] is among the information-based instruments extensively used to lead consumers towards more informed and possibly healthier choices (Galizzi, 2014; Traill, 2012). We can think that in a FAFH environment providing some nutritional information may limit the misperception on nutrients' content when consumers are choosing their meal. However, while the introduction of nutritional information in a restaurant menu is supported by many researchers and health officials, their provision is mainly due to private sector or local government initiatives (Brambilla-Marcias *et al.*, 2011). In fact, the implementation of a mandatory policy in a catering environment would require the

[1] Elaborating data from household food consumption surveys conducted by the U.S. Department of Agriculture (USDA) during the period 1977-2008, Biing-Hwan *et al.* (1999; 2012) have shown a reduction of the share of saturated fat to the overall caloric intake of Americans. However, from their analysis, FAFH is still richer in saturated fat than food at home: in 2005-2008, fat contributed to 30.5% and 37.2% of the caloric intake from food at home and from FAFH, respectively (Biing-Hwan *et al.*, 2012; Kozup *et al.*, 2003). Moreover, the FAFH has been found higher in saturated fat, sodium and cholesterol and resulted in lower calcium content and dietary fiber than food at home (BiinHwan *et al.* 2012). Todd *et al.* (2010) estimated that in the USA each meal consumed away from home results in 134 additional calories.

[2] In the United States, under provisions of the Affordable Care Act of 2010, restaurant chains with twenty or more locations operating under the same brand are required to provide detailed nutritional information to consumers and to display calories on their menus. In the European Union (EU), with Regulation no. 1169/2011, new rules regarding nutritional information for food, both pre-packed and non-pre-packed, have been introduced. However, this regulation does not impose stringent rules for restaurants, unless differently required by each member state.

capacity of standardizing ingredients and portions, which is not a trivial task especially for smaller size and not-chained restaurants. As a consequence, requiring stringent adoptions of nutritional labels in a catering environment can have the side effect of pushing smaller, non-chain business out of market, and can reduce options for consumers (Mazzocchi *et al.*, 2009).

The aim of this study is to analyze if the provision of some nutritional information in a university cafeteria has an effect on the composition of the meal chosen. Specifically, it can be expected that, by providing some nutritional information using labels, consumers might be facilitated to reduce the bias of "hidden calories" and consequently to identify healthier options. At this end, the authors conducted a field experiment in a university cafeteria in Italy, where two types of informative labels were alternatively provided.

This article proceeds as follows: after a literature background, first the experimental design and the indicators used to evaluate the quality of the meal are described; then the model and the empirical results are presented, followed by some discussion and policy implications.

2. Background

Previous literature showed the provision of nutritional information can lead to mixed findings. In a systematic review, Mazzocchi and Trail (2005) evaluated the effect of food label in portion size consumption and they found varying impacts, from increasing, to decreasing or no effect. However, none of the studies examined found an effect on reducing energy-dense foods (Mazzocchi and Trail, 2005). Similarly, a literature review by Swartz *et al.* (2011) and another by Kiszko *et al.* (2014) have shown the provision of caloric labels had none effect on the caloric intake of the food ordered and consumed. Further, Harnack and French (2008) concluded that, even if some studies support the evidence of a relation between the provision of caloric labeling and food choices, these effects are weak or inconsistent.

Similarly, empirical studies have shown mixed results. Some have found the provision of nutritional information in a restaurant menu helps reducing the caloric intake (Roberto *et al.,* 2010, Wisdom *et al.,* 2010), others have measured no significant effect (Elbel *et al.,* 2009, Finkelstein *et al.*, 2011). Ellison *et al.* (2014) showed that numeric labels alone (i.e. labels where nutrients content was shown as grams or mg per 100 grams of products or as percentage) have no influence on food choices, unless reinforced by traffic light symbols. In fact, traffic light labels (i.e. labels where some nutrient contents are classified with colors red, orange or green based on some thresholds with respect to dietary recommendations) may lead restaurant patrons to introduce in the menu lower-calorie options. Marette *et al.* (2019) showed that the appearance of traffic light labels significantly impacts the Willingness to Pay of products offered in the experiment.

On the other side, an experimental study conducted by Seward *et al.* (2016), where traffic labels where provided in a university cafeteria setting, has shown that, while students reported to use the traffic light regularly and support their use, the intervention had no effect in improving dietary quality. Vasiljevic *et al.* (2015) have shown that, on selecting different snacks, emotion labels (such as smiling faces) yields stronger effect on the perception of the healthfulness of the snack than colored label; and overall frowning labels are more effective than smiling ones.

Using a random control trial, Oliveira *et al.* (2018) find the provision of a menu labeling displaying different food information being positively associated with healthy food choices. Elbel *et al.* (2009) find that the provision of caloric labels on fast food menus in New York had no effect on the caloric content of the purchased meal.

In general, the literature has found paternalistic interventions (nudges), eventually combined with information provision, being more effective in producing behavioral changes (Downs *et al.*, 2009; Thapa and Lyford, 2014; Thunström and Nordtröm, 2013; Castellari and Berning, 2016). Other studies have shown the importance of providing social descriptive norms to encourage change in food choices (Burger *et al.* 2010).

This work evaluates the effect of nutritional labels' provision on the menu items selections, rather than the caloric content of the meal choices. Nutritional information may have little effect on the caloric content of the overall meal but might impact its composition inducing a shift from 'worse' to 'better' choices[3]. Other studies have found only a small portion of consumers (between 16% and 29%) have responded to nutritional labels changing their menu selections (Balfour *et al.* 1996, Yamamoto *et al.* 2005). We evaluate two different label intervention: (1) a label where the green color is matched with a positive emotion (smile) to identify the item within the same food group (first, second, side dish, fruit and dessert) that has the lowest caloric intake among the available options; (2) a label which ranks within the same food group (first, second, side dish, fruit-dessert) the options available based on their caloric composition using a medal (gold, silver and bronze).

3. Methods

3.1 Experimental design

The hypothesis behind the experiment is that displaying some nutritional labels (i.e. indicating either a partial or a complete ranking of dishes in terms of their caloric content) in a self-service restaurant may influence consumer when selecting food options. We expect the presence of the label would help consumers to identify the hidden calories and thus the less caloric options.

At this end, we collected data at a university cafeteria located in Piacenza, Italy; the experiment lasted four days, spread over two weeks (with a four-week break between them) between March and April 2016. The cafeteria is a self-service caterer, presenting two lines, each one providing identical food choices. The cafeteria meal has a fixed price and it allows to select one option within each menu category: first dish; second dish; side dish; fruit-dessert..

To test our hypothesis we provided (in separate settings) two different types of labels:

1) Less Caloric Labels (LCL): within each menu category (first dish; second dish; side dish; fruit-dessert.) the label indicates the option with the lowest level of calories[4] per portion (Fig. 1, left panel);

[3] Within each food category (first dish, side dish, second dish, fruit-dessert), we rank food choices based on their caloric content from best (less caloric content) to worse (higher caloric content).

[4] The canteen staff provided us the recipes of the dishes and, with their supervision, we used the website http://www.myfitnesspal.com to rank every dish in each category, from the less to the most caloric.

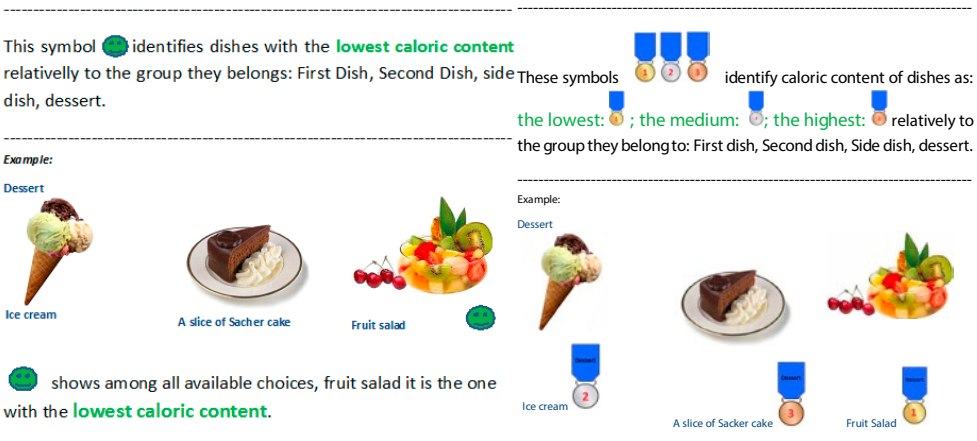
2) Calories Ranking Labels (CRL): within each meal category (first dish; second dish; side dish; fruit-dessert.) the labels indicate a ranking among options based on the level of calories from the least (gold medal, 1st place) to the most (bronze medal, 3rd place) caloric (Fig. 1, right panel).

The labels were chosen together with the canteen managers. We proposed different types of labeling selected from previous studies. During the first week (1st and 2nd day) the effect of providing a LCL was tested, whereas the CRL was used in the second week (3rd and 4th day).

During each day of the experiment only one food line (*treated* line) displayed a label while in the other line no label was present (*control* line). It is assumed people randomly choose between the two lines, although to account for a possible self-selection bias the treated and the control lines from day one to day two (LCL) and from day three to four (CRL) were switched.

Participants were not aware to be part of the experiment before selecting the food choices. The first contact with the labels took place at the beginning of the treatment line, where a flier explained the meaning of the label (LCL in day 1 and 2: CRL in day 3 and 4 as in Fig. 1). Individuals taking the control line did not receive any nutritional information during the meal selection. The recruitment of participants to the experiment took place at the end of the lines (both control and treatment), where, with the support of a flier, two recruiters explained to users how to take part to the experiment. If they accepted, they were asked to take a picture of their tray using their smartphone *before* starting to eat and to share it using a digital platform. Moreover, after lunch, participants were asked to complete a survey including both demographic and behavioral questions. All participants were rewarded with a coupon redeemable at the university coffee shop. We collected 459 observations during the first week (1st and 2nd day) and 471 during the second week (3rd and 4th day). The final dataset contains 930 observations recording tray composition,

Figure 1. Explanation of LCL (left panel) and CRL (right panel).



demographics and behavioral characteristics for each individual. The final sample is mostly composed by university students (around 84% of the sample), and in small percentage by university faculty and staff. For a detailed description of the participants, please refer to the model and empirical results sections.

3.2 Indexes of meal composition

To summarize the food selections made by participant *i* at day *t* we computed two different indicators of the tray's meal composition. The purpose of this index is to measure how close the composition of the meal is to an "optimal meal", which in the case of LCL would correspond to a tray with all green labeled choices, while in the case of CRL to a tray with all gold medals. Two different indexes for both the treatment and the control subsamples were computed: (a) a *uniform index* (UI) where we attributed the same weight to each of the dish selections; (b) a *weighted index* (WI) where we attributed different weights to dishes of different categories (first dish, second dish, side dish and dessert).

The UI was computed as follows:

$$UI_{i,t} = \sum_{j=1}^{N_{i,t}} S_{jit} \frac{1}{N_{it}} \tag{1}$$

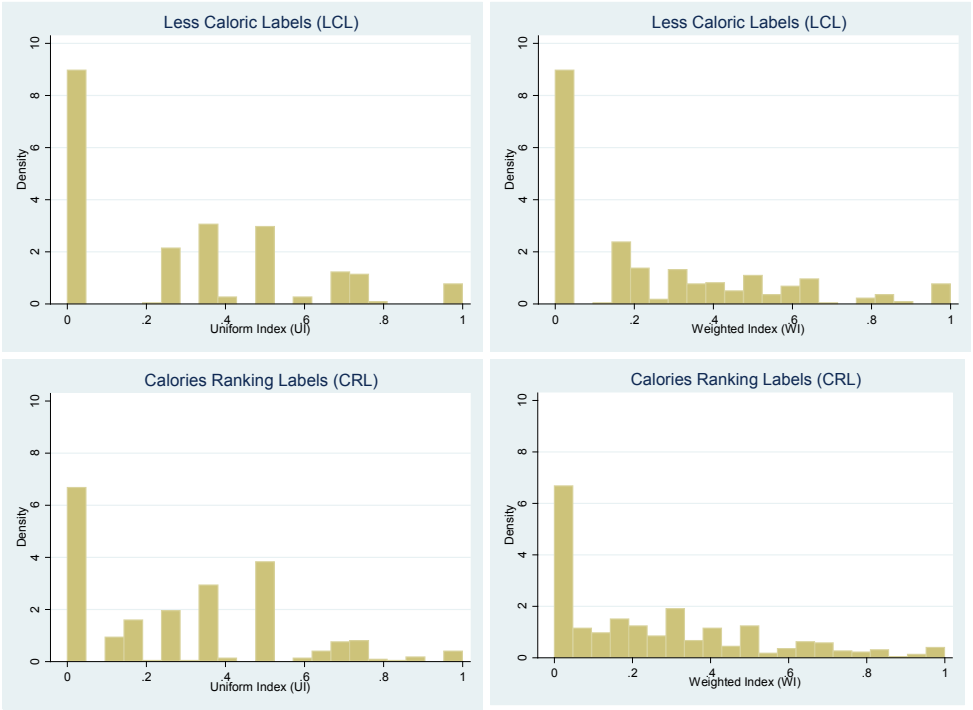
where N_{it} is the total number of dishes composing the tray of individual *i* at day *t* while S_{jit} is the score, which in the case of the LCL would be equal to one if individual *i* at day *t* made a choice *j* labeled as healthy (green label), and zero otherwise. In the case of the CRL S_{jit} has a value equal to 1 if the choice *j* made by individual *i* at day *t* was labeled as gold, equal to 0.5 if choice *j* was labeled as silver, and zero if it was labeled as bronze.

Similarly, to compute the WI we used the following:

$$WI_{i,t} = \sum_{j=1}^{N_{i,t}} S_{jit} \frac{P_{jit}}{\sum_{j=1}^{N_{i,t}} P_{jit}} \tag{2}$$

where P_{jit} is the weight attributed to each dish selected by individual *i* at day *t* The weight P_{jit} depends on the meals' category. Specifically, a weight of 0.35 was attributed to the first and second dishes, since they are typically more caloric, and a weight of 0.15 to side dish and dessert. Both indexes (UI and WI) range from one, when an "optimal tray" was chosen, to zero, when all choices are not the one "suggested" by the labels. Fig. 2 shows the distribution of the two indexes (WI and UI) under both label treatments (LCL and CRL). The index computed using the uniform approach is more concentrated around some specific values. Moreover, the distribution of all indexes is concentrated around zero: for the LCL indexes the zeros account for more than 80% of the observations, while for the CRL indexes this share reduces to around 60%.

Figure 2. Distribution of the Weighted Index (WI) and Uniform Index (UI) for the Less Caloric Label (LCL) and Calories Ranking Labels (CRL).



Source: Own data elaboration.

4. Results

To test whether the label provision had an effect on the food selections, we generated a variable indicating the propensity to select an "healthy option" (PHO), using the UI and the WI. Specifically, based on the index values, we compute the PHO as an ordinal variable with five possible outcomes as described in Table 1. The probability of being in a PHO class (k), is given by:

$$\Pr(PHO = k \mid \mathbf{Z}) = \Phi\,(\beta_k + [\mathbf{Z}]`\boldsymbol{\beta}) - \Phi\,(\beta_{k+1} + [\mathbf{Z}]`\boldsymbol{\beta}) \quad (3)$$

where Φ (.) is the standard logistic density function (CDF), k= [0,…,4], β_0 = - ∞ and β_5 = + ∞; $\mathbf{Z}$ is a set of covariates influencing PHO and $\boldsymbol{\beta}$ is a conformable set of parameters. Specifically, $\mathbf{Z}$ includes the following variables: a) T is a dummy variable equal to one if participant i in day t belongs to the treated sample; b) X_i is a set of demographics and behavioral variables collected for each person i, as described in Table 2.

Summary statistics are presented in Table 3. In both weeks, the sample is almost equally split between treated and non-treated observations. Students are the largest share

Table 1. Definition of the classes of PHO.

Outcomes	Classes
PHO=0	UI or WI = 0
PHO=1	0 < UI or WI ≤ 0.25
PHO=2	0.25 < UI or WI ≤ 0.50
PHO=3	0.50 < UI or WI ≤ 0.75
PHO=4	0.75 < UI or WI ≤ 1

Table 2. Demographic and behavioral variables.

Variable name	Variable Description
Student	One if student, zero otherwise
Female	One if female, zero otherwise
Commuter	One if commuter, zero otherwise
Frequent User	One if he/she eats at the cafeteria at least 3 times a week, zero otherwise
Cook	One if he/she prepares his/her own dishes often or sometime, zero if rarely or never
Label	One if he/she reads the label of the food consumed often or sometime, zero if rarely or never
FV5	One if he/she consumes at least 5 portions of Fruit or vegetables per day, zero otherwise
Water	One if during the meal he/she never or rarely substitutes water with other drinks, zero if often or always
Weight	One if in the last six months he/she had a weight increase, zero otherwise
Nutritionist	One if he/she ever visits a nutritionist for a diet, zero otherwise
Active	One if he/she practices physical activity at least once-twice a week, zero otherwise

Source: Own data collection.

of the sample (around 84%) and females are around half of the sample. Around 40% of the sample is commuting from nearby areas and almost 90% of the participants use the cafeteria at least three times a week. A large share of the sample declared to usually pay attention to the labels of the food they purchase (around 80%), to prepare its own meal often or sometimes (around 70%), to practice regular physical activity at least once a week (around 70%), and to not substitute water with other drinks during a meal (around 70%). More than 30% of the sample experienced some weight gain in the last six months and more than 20% sometimes visited a nutritionist to receive diet advises. Surprisingly, only 2.6% of the whole sample reported to consume at least five portions of fruit and vegetables daily.

Given the nature of the dependent variable, model (3) was estimated in STATA using an ordered logit model. Equation (3) was estimated for both LCL and CRL samples, using both uniform and weighted indexes. Results are reported in Table 4.

All parameters on the treatment line variable (T) are not statistically significant, suggesting that all our specifications fail to identify any significant positive effect of the label

Table 3. Summary Statistics.

Variable	Less Caloric Label (LCL) N=459		Calories Ranking Label (CRL) N=471	
	Mean	Std. Dev.	Mean	Std. Dev.
Uniform Index (UI)	0.279	0.289	0.286	0.262
Weighted Index (WI)	0.245	0.279	0.256	0.261
PHO (from UI)	1.251	1.243	1.314	1.122
PHO (from WI)	1.203	1.278	1.306	1.167
Treated line (T)	0.468	0.500	0.482	0.500
Student	0.843	0.364	0.851	0.356
Female	0.525	0.500	0.501	0.501
Commuter	0.397	0.490	0.372	0.484
Frequent User	0.854	0.353	0.868	0.338
Cook	0.786	0.410	0.769	0.422
Label	0.806	0.396	0.794	0.405
FV5	0.026	0.160	0.030	0.170
Water	0.778	0.416	0.726	0.446
Weight	0.327	0.470	0.344	0.476
Nutritionist	0.255	0.436	0.225	0.418
Active	0.691	0.463	0.705	0.457

Source: Own data elaboration.

provision on the level of the index (UI and WI)[5]. These results are in line with several other studies which found information based policies are effective on improving consumer awareness but not necessarily to significantly impact behavior (Galizzi, 2014).

Results show students tend to be more reluctant to change their food selections (for all models coefficients are negative and significant). In line with previous studies (i.e. Krieger *et al.*, 2013), this paper also finds women have a different attitude towards menu labeling, with specifications (3) and (4) of table 4 showing positive and significant coefficients.

Frequent users of the canteen service do not seem to respond differently than less frequent users (i.e. coefficients are not significant). This study also finds people who sometimes or often cook their own meal tend to have a higher index under the LCL approach, while for the CRL the difference is not significant.

Variables associated with more attention to the diet, as the attitude on reading food labels, or consuming more fruit and vegetables, are significantly correlated with higher PHO under the CRL scheme, but not under the LCL. Similarly, people who declare to never substitute water with other drinks, or having required the opinion of a nutritionist, tend to have higher PHO, with a positive improvement of the index, only under the LCL scheme. Furthermore, results show variables such as having gained weight in the previous six months, or practicing sport at least once a week, are not associated with different PHO.

[5] This study considers only a selected sample of a university cafeteria in Italy, for regulatory purpose and policy interventions an extended study with a more representative sample need to be consider.

Table 4. Results - Ordered Logit model.

VARIABLES	(1) (UI LCL)	(2) (WI LCL)	(3) (UI CRL)	(4) (WI CRL)
T	0.019	-0.121	0.260	0.146
	(0.175)	(0.175)	(0.171)	(0.170)
Student	-1.024***	-1.263***	-1.387***	-1.366***
	(0.232)	(0.235)	(0.251)	(0.246)
Female	0.008	-0.046	0.310*	0.368**
	(0.179)	(0.178)	(0.182)	(0.183)
Commuter	-0.139	-0.189	-0.786***	-0.769***
	(0.184)	(0.183)	(0.186)	(0.185)
Frequent User	-0.025	0.091	0.021	0.076
	(0.264)	(0.262)	(0.269)	(0.268)
Cook	0.500**	0.514**	0.216	0.252
	(0.222)	(0.222)	(0.214)	(0.212)
Label	0.044	0.024	0.399*	0.430**
	(0.229)	(0.229)	(0.216)	(0.216)
FV5	0.544	0.671	1.042**	1.188**
	(0.568)	(0.559)	(0.482)	(0.475)
Water	0.550**	0.493**	0.305	0.280
	(0.220)	(0.219)	(0.204)	(0.201)
Weight	0.120	0.041	-0.018	-0.073
	(0.190)	(0.189)	(0.180)	(0.179)
Nutritionist	0.396*	0.469**	0.345	0.199
	(0.203)	(0.202)	(0.211)	(0.209)
Active	-0.052	-0.066	-0.003	0.175
	(0.192)	(0.190)	(0.201)	(0.199)
Constant cut1	-0.254	-0.554	-1.222***	-1.064**
	(0.461)	(0.470)	(0.456)	(0.450)
Constant cut2	0.195	0.245	-0.200	0.151
	(0.461)	(0.469)	(0.452)	(0.448)
Constant cut3	1.753***	1.503***	1.734***	1.745***
	(0.470)	(0.476)	(0.460)	(0.457)
Constant cut4	3.333***	2.534***	3.306***	2.963***
	(0.512)	(0.495)	(0.508)	(0.484)
Observations	459	459	471	471

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

5. Discussion

The main objective of this research was to analyze whether the provision of nutritional information influenced the meal composition in an away-from-home environment. To this end, we conducted a field experiment at a university cafeteria.

The use of information based policies is among the most debated instruments when policy makers look for solutions to promote behavioral changes towards healthier and more sustainable food choices. Yet, effects of these information-based policies on actual behavioral changes are mixed. While some previous studies have found some potential benefits of menu labeling in a restaurant setting, in terms of calorie intake reduction and healthier food choices (Oliveira *et al.,* 2018; Ellison *et al*., 2013; Roberto. *et al*., 2010), this paper did not find any statistically significant effects of caloric labeling on food selections, in accordance with several other studies (Elbel. *et al.*, 2009; Swartz *et al*., 2011; Downs *et al*. 2009; Mazzocchi and Trail, 2005; Swartz *et al.* 2011; Kiszko *et al.*, 2014; Harnack and French, 2008).

While these results can also be driven by the experimental settings, they suggest that compulsory nutritional labeling in a dining-out environment may not be effective per se. First the effect of a label on dietary choices depends on many unobservable or not-recorded factors, such as the environment characteristics, the sample composition, the way the labels have been explained and communicated, the type of labels, and many behavioral characteristics. Most of the studies are referred to relatively small sample and to selected group (such as university students), so it becomes difficult to generalize the results from this type of studies to the whole population, as well to find ad hoc recipe valid for all settings. Further, even if a strong link between nutritional label and caloric intake reduction as well as food environment improvement would be found, there would still be the need to consider the final outcomes of this policy interventions on health and BMI (Jaime and Lock, 2009).

Bonanno *et al.* (2018), using a quantile regression approach, have shown that the relationship between reading food labels and BMI highly differs among demographics groups. Krieger *et al.* (2013) have measured the effect of calories posting in fifty restaurants, and after eighteen months, have found a decrease of menu calories only in some sites and in women, but not in men. These previous studies highlight the difficulties to find a "best for all" policy. Thus, some ad-hoc interventions are needed to set up eating environments where healthy food choices are enhanced.

In this sense, the synergies among different actions can be valuable to reach broader demographic groups. However, in general, especially in cafeterias linked to educational or working environments, a sure action that need to be reinforced is the setup of common protocols to monitor the nutritional quality of the service and to measure the effect of any in-site healthy initiative. Only continuously and carefully monitoring the nutritional quality of food options and the effects of interventions can ensure their effectiveness on enhancing healthier behavioral changes.

6. Conclusions and policy implications

The provision of nutritional labels in a food canteen have many practical difficulties. First, recipes need to be standardized and carefully followed; second, dish sizes need also to be standardized, with additional burdens on the food preparation process. However, asking to provide nutritional labels without enforcing the use of standard procedures on food preparation might lead to misleading information signaling, while, at the same time, enforcing this standardization might push out of business small no-chained restau-

rants (Mazzocchi *et al.*, 2009). Given these practical issues, applying the requirements for the labels only to chain restaurants, as experimented in the USA, is probably the easiest option to be applied in Europe. Moreover, chain restaurants are usually chosen to dine out by people driven by time and price constraints, which represent a population group most likely to be targeted by policy makers.

However, even if nutritional labels alone will not be the solution to the obesity problem, their provision can increase consumer awareness and lead to some beneficial spillover effects, such as encouraging restaurants to offer healthier food and meal "reformulation" (Schulman, 2010). As nutritional information is presented to consumers, restaurants might find incentives to offer lower calorie and healthier options, as observed by Ellison *et al.* (2014).

In this scenario, if the final goal of these policies is to improve the healthiness of food choices, our results, together with the existing literature, suggest the need of continuous monitoring of behaviors in order to design effective policies. However, we can also think of label policies for only their information value "per se", independently from their effect on final food choices and health outcomes. In this sense, Marette *et al.* (2019) have found a traffic light label significantly impacts the willingness to pay for the different types of products offered in an experiment, showing that consumer positively evaluate the provision of an easily readable label. An analysis sizing the cost and the benefits of implementing a labeling policy could be valuable to understand to what extent this policy is economically feasible and if it can be potentially sustained under a voluntary scheme. However, at this end, it is also important to consider that the literature has previously mentioned that an overload of information reduce the marginal effect related to it (Keller and Staelin,1989), at the point that consumers can even lose any interest, which is a big challenge for regulators.

In accordance with previous findings, we believe that, in order to encourage behavioral changes in an away-from-home food environment, public policies need to rely on a multifaceted approach, where the provision of nutritional information synergizes with other instruments such as nutritional education, social norms provision and nudges (Downs *et al.*, 2009; Thapa and Lyford, 2014; Thunström and Nordtröm, 2013, Burger *et al.* 2010, Storcksdieck genannt Bonsmann and Wills 2012, Castellari and Berning, 2016). Moreover, the discussion highlights the importance of reinforcing common protocols to ensure the nutritional quality of the food options in cafeterias, and to constantly monitor any intervention promoting healthy food styles. Moreover, further research needs to evaluate if the implementation of a "health related" intervention in a cafeteria, such as the introduction of nutritional label, has an effect on the sustainability of the food environment and on the produced waste. Overall, it is important for regulators to follow a multidisciplinary and systemic approach to the food system where all possible spillovers from the demand and supply side are evaluated in order to promote a more sustainable and healthy food environment.

7. Acknowledgements

We thank Giorgia Ciulli for the help during the data collection, Stefano Longo and Elena Barbieri and EDUCATT for the fruitful collaboration. The authors only are responsible for any errors or omissions.

8. Funding

This work was supported by the Daniel & Nina Carasso Foundation through the FP7 SUSFOOD ERA-Net Research Project "SUSDIET - Implementing sustainable diets in Europe" (Scientific Coordinator: Louis-George Soler).

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