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## Effects of an icon-based menu labelling initiative on consumer food choice

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## Abstract

**Aims:** The purpose of this study was to examine the impact of an icon-based menu labelling initiative on consumer buying behaviour.

**Methods:** This quasi-experimental study recruited a convenience sample of eight foodservice establishments, all with at least one menu item meeting the heart healthy criteria. Data from sales of all menu items sold over an eight week period were collated four weeks prior to and four weeks during the display of information icons related to healthy food choices on menus.

**Results:** The absolute change in menu item sales showed a non-significant trend towards an increase in healthier menu item selections. Furthermore, there was no association between the type of foodservice establishment and the percentage change in labelled menu item sales.

**Conclusion:** The study did not find a statistically significant influence of the icon-based menu labels on consumer food choice. Given the limited amount of research that examines alternative menu labelling formats in real-world settings, more studies are necessary to confirm these results. Further research is needed to identify the optimal format, content and impact of menu labels on consumer behaviour.

*Keywords:* menu label, obesity, food, health behaviours, healthy public policy

## Introduction

Poor diet is one of the leading causes of cardiovascular disease (CVD) in Europe and worldwide.<sup>1-3</sup> Food and menu labelling approaches have the potential to help reduce the prevalence of unhealthy dietary behaviours by promoting healthier choices at the point-of-purchase. They aim to inform consumers about the composition of foods and help them to make an informed choice.<sup>4,5</sup> However, there is ongoing debate on the effectiveness of labels in influencing consumer behaviour.

In Europe, the majority (85 %) of food products have some nutrition information on the back of the pack and nearly half (48 %) have nutrition information on the front-of-pack (FOB).<sup>6</sup> A large and growing body of literature has investigated the effects of nutrition labelling on consumer behaviour, including six systematic reviews.<sup>7-12</sup> These existing studies show that consumers use nutrition labels, however, there is strong evidence that label use is considerably lower among groups of lower socio-economic status and people with little nutritional knowledge.<sup>13,14</sup>

Due to rising concerns regarding consumers lack of understanding of nutrition labels, various FOB formats have emerged for presenting nutrition information in ways that are more likely to be understood by the consumer and/or directly influence their food choices. Some studies have found that FOB labels featuring logos or symbols based on nutrition criteria, rather than raw quantitative data, is more effective in promoting healthier food choices.<sup>15-19</sup> Other research has shown that traffic-light labels and logos may prompt consumers to consider their health and nutrition at the point of purchase.<sup>20,21</sup> Further evidence from a systematic review concluded that out of all the FOB labels studied, the traffic light labelling system was the most liked and readily understood by consumers.<sup>22</sup> Moreover, a recent randomized controlled trial found that a five-colour nutrition label

based on a colour-coded and graded scale indicating overall nutritional quality was effective in promoting healthier food choices compared to other FOB formats.<sup>23</sup>

While the provision of nutrition information on packaged foods is well established, menu labelling is a relatively new concept. Calorie menu labelling was first introduced on a voluntary basis in 2003 in the United States of America (USA) and made mandatory in 2010 for chain restaurant with 20 outlets or more.<sup>24</sup> In Ireland, calorie menu labelling has been introduced on a voluntary basis since 2012.<sup>25</sup> Research has shown a high level of consumer demand for menu labelling in Ireland, with 96% of consumers calling for calorie menu labelling in all or some foodservice establishments.<sup>26,27</sup>

During the last decades, eating out-of-home has become habitual and contributes significantly to dietary habits and nutritional status worldwide.<sup>28,29</sup> Eating out-of-home has become part of the Irish lifestyle, with adults consuming 24% of their total energy from food and drink outside the home.<sup>30</sup> Moreover, 77% of children aged 5-12 years consume food and drink outside the home at least once a week.<sup>31</sup> With eating out-of-home becoming more prevalent, menu labelling has garnered growing public and legislative support as a potential strategy for addressing the obesity epidemic.<sup>32,33</sup> Studies have shown that eating out-of-home is a risk factor for higher energy and fat intake and lower micronutrient intake.<sup>28,34</sup>

To date, most menu labelling studies have provided the number of calories for each menu item. However, the evidence for the effectiveness of this approach is equivocal.<sup>35-39</sup> Furthermore, the addition of a contextual label about daily recommended calorie intake has also shown mixed results.<sup>38,40,41</sup> However, recent research has shown that calorie menu labelling may contribute to more healthful food choices if combined with other interventions, such as qualitative information (i.e. describing ingredients and important nutrients such as vitamins) emphasising the healthfulness of a menu item<sup>42</sup> and information

about the amount of exercise required to burn off calories in each menu item.<sup>43</sup> To date, most studies have been conducted in controlled laboratory settings which cannot simulate real world behaviour, particularly when repeated exposure to menu labels may be required to influence choice.<sup>37</sup> Moreover, where studies have been conducted in real world settings, they tend to be multi-outlet fast food establishments and are not generalisable to other foodservice establishment types.<sup>37</sup>

Menu labels that frame nutritional information in more familiar and tangible ways may be easier to understand and have greater potential to influence choice than those that provide only calorie data.<sup>36,44</sup> Consumer understanding is highest for formats combining text with other visual cues to indicate healthier items, since this requires less interpretive work on the part of the consumer.<sup>45-48</sup> However, alternative labelling formats have scarcely been examined within the restaurant context.<sup>36,49,50</sup>

The use of icons to designate more healthful options on restaurant menus can help make choosing such options easier especially in the absence of nutrition information.<sup>47,51</sup> Recent cross-sectional studies in San Antonio, USA, demonstrate an effect on consumer purchasing behaviours in response to a menu labelling/healthy item recognition programme both in a workplace catering setting and in restaurants.<sup>52,53</sup> Thomas and Mills<sup>54</sup> found health claims, such as heart healthy, are perceived as helpful when attempting to make informed decisions about restaurant menu items. The inclusion of heart healthy claims on restaurant menus can have a positive influence on nutrition attitude and purchase intentions in the absence of nutrition information and can also be a supplement to nutrition information when it is provided.<sup>55</sup> Moreover, Pang and Hammod<sup>56</sup> found that menu labelling that includes contextual health statements are more effective in influencing food choice than calorie labelling alone.

As menu labelling is a relatively new concept, it is an important area that requires additional research. A recent systematic review concludes that most of the evidence to date is based on mandatory calorie labelling in large fast-food chain restaurants in the USA, which shows mixed results.<sup>50</sup> The review highlights that further robust research is required, not just of calorie labelling and in European populations.<sup>50</sup> Moreover, an assessment of the effectiveness of different menu labelling formats may inform and provide policy makers with an evidence based approach that can impact on unhealthy food choices and the broader public health challenge of overweight and obesity.

This paper reports on an icon-based menu labelling initiative to help guide menu selection of healthier options which was implemented in the West of Ireland in 2013. This was a pilot project to assess the feasibility and effectiveness of an icon-based non-calorie menu labelling initiative in different foodservice establishment categories. The initiative was delivered as a service to foodservice establishments in the West of Ireland and menu items meeting the heart healthy criteria were allocated one or more of five icon-based menu labels. We sought to examine the impact of the icon-based menu labelling initiative on consumer buying behaviour. Furthermore, we sought to examine the impact of these menu icons by type of foodservice establishment.

## **Methods**

### *Design*

A quasi-experimental field study with a non-equivalent control group pretest-posttest design was employed. The quasi-experiment was used to test the effect of icon-based menu labels on menu item sales. The experimental group included menu items allocated icons and the control group included menu items without icons. Sales data were

collected 4 weeks pre-labelling (pretest) and 4 weeks post-labelling (posttest). The outcome variable in this study was the sales data and the independent variable was the menu items (with and without icons-based labels).

### *Sample*

Eleven foodservice establishments participated in the menu labelling initiative and were invited to the study through telephone, email and face-to-face contact.

### *Menu labelling*

Menus from each foodservice establishment were evaluated by a dietitian. Menu items that appeared to be heart healthy were selected for complete nutritional analysis ( $n=46$ ). For the purpose of this study, the term “heart healthy” refers to menu items that are low in fat, sugar, salt and high in fibre. Recipe nutrient composition was analysed using WISP (Weighed Intake Software Package) version 4.0 (Tinuviel Software, Anglesey, UK). Upon completion of the nutritional analysis, the nutrient composition of the menu item was compared with the heart healthy criteria (Table 1). These criteria are based on the ‘traffic light’ colour coding system developed by the Food Standards Agency (FSA) in the United Kingdom<sup>57</sup> and the British Dietetic Association (BDA) guidelines on ‘Improving Outcomes through Food and Beverage Services’.<sup>58</sup> Menu items meeting the relevant criteria were assigned one or more of the icon-based menu labels i.e. Cholesterol Friendly, Blood Pressure Friendly, Weight Friendly, Diabetes Friendly and Healthiest Heart Award.

Each foodservice establishment was notified of the nutritional value of each menu item and where applicable, the assigned icon-based menu label(s). Upon nutritional advice from the dietitian, some foodservice establishments choose to modify portion sizes or



ingredients to improve the nutritional value of menu items e.g. substituting full-fat products for their low-fat counterparts. Where foodservice establishments chose to implement recipe modifications, the relevant menu item(s) were re-analysed. Designated menu icons were displayed beside the appropriate menu items (Figure 1) and a menu footer explained the corresponding icons (see Figure 2).

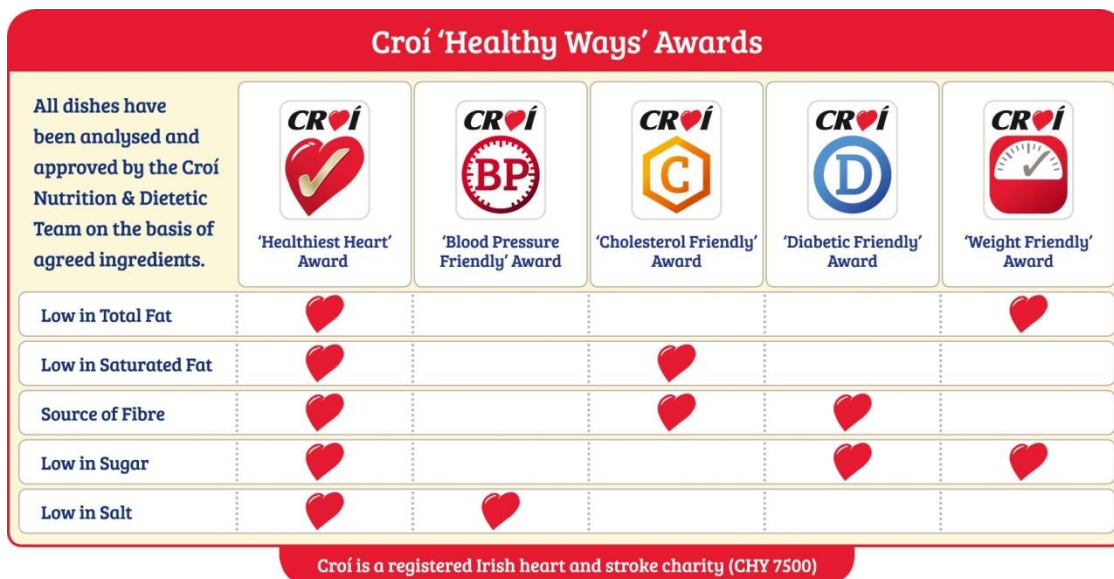
**Table 1:** Criteria for Icon-Based Menu Labels

Icon-Based Menu Labels	Criteria Per Portion
Cholesterol Friendly	≤ 5g of saturated fat ≥ 3g of fibre
Blood Pressure Friendly	≤ 1.5g of salt
Weight Friendly	≤ 20g of fat ≤ 15g of sugar
Diabetes Friendly	≤ 15g of sugar ≥ 3g of fibre
Healthiest Heart	≤ 15g of sugar ≤ 20g of fat ≤ 5g of saturated fat ≤ 1.5g of salt ≥ 3g of fibre

*Note.* Criteria based on the ‘traffic light’ colour coding system<sup>57</sup> and the BDA guidelines on ‘Improving Outcomes through Food and Beverage Services’.<sup>58</sup>



**Figure 1.** Icon-based menu labels



**Figure 2.** Menu footer explaining icon-based menu labels

### *Sales Data*

Using the foodservice establishments' electronic point-of-sale (POS) system, sales data were obtained for all items on the menu (excluding beverages and side-orders) sold during the four weeks before and after the icons were placed on the menu. The sales data were used as a proxy to measure response to menu labelling. The pre/post labelling period varied for each foodservice establishment, depending on when they engaged with the menu labelling initiative. For the majority, the pretest period included the month of February and beginning of March 2014; the posttest period included the remainder of March and beginning of April 2014. All sales data were gathered from foodservice establishments in the summer of 2014.

The sales data were presented in different formats, including Microsoft Excel, Adobe Portable Document Format (PDF) and hardcopy. In addition to sales data, some foodservice establishments provided further information such as coding, categories, price and profit. The variation in format and content were due to different POS software models. Sales data

were entered into Microsoft Excel 2007 for data cleaning and preparation. Data was prepared for SPSS (Statistical Package for Social Sciences, Version 22) analysis through recoding and reformatting. The Excel data was then imported into SPSS for analysis.

### *Data Analysis*

Data were analysed using SPSS. Data were assessed for normality by obtaining skewness and kurtosis values. The sales data were not normally distributed and therefore, non-parametric statistical tests were used. Sales of icon-labelled menu items were summed and compared with the total sales of all menu items tracked in the pre-labelling and post-labelling periods. To assess differences in the quantities of menu items sold before and after menu labelling was introduced to foodservice establishments, the Wilcoxon signed-rank test was used. To examine the relationship between the type of foodservice establishment and the percentage change in labelled menu item sales, a Fisher's exact test was conducted. All tests were two-tailed and the alpha level for significance of  $p \leq 0.05$  was set.

## **Results**

### *Foodservice Establishments*

Eight (73%) foodservice establishments agreed to participate and constituted the convenience sample for the study. Four of these (50%) were restaurants, three (38%) were café/coffee shops and one (13%) was a pub restaurant/bar. All the foodservice establishments were independent operators (i.e. non chain) and well established (i.e. in business greater than 5 years). All establishments were located in urban areas around the West of Ireland.

### *Icon-Based Menu Labels*

A total of 46 menu items from the eight foodservice establishments, which appeared to be healthy, were nutritionally analysed. Four foodservice establishments whose menu items did not meet the criteria for a healthy meal were notified of the nutritional value of each menu item. Upon nutritional advice, all foodservice establishments agreed to modify menu items accordingly. Following re-analysis, all modified menu items met the criteria for one or more of the icon-based menu labels. Overall, the number of menu icons in foodservice establishments ranged from 7 to 24 with a mean number of 14.5 menu labels ( $SD=5.73$ ).

### *Sales Data*

Change in menu sales after labelling the relevant menu items with icon(s) are shown in Table 2. Five of the eight foodservice establishments showed an increase in the absolute change in menu item sales. Among these five foodservice establishments, the change varied from an increase between 43 to 235 healthy menu items sold over a 4 week period. The remaining three foodservice establishments showed a decrease in the absolute change in menu item sales, ranging from a decrease between 2 to 25 healthy menu items sold. Overall, the absolute change in menu item sales showed a non-significant trend towards an increase in healthy menu item selections ( $z = -1.680, p = 0.093$ ). Furthermore, there was no association between the type of foodservice establishment and the percentage change in labelled menu item sales ( $p = 0.143$ ).

**Table 2:** Effects of Icon-Based Menu Labels on Consumer Food Choice, by Foodservice Establishment

Food Establishments	Sales of Tracked Menu Items						Absolute Change <sup>a</sup>	% Change <sup>b</sup>
	Pre-Menu Label			Post-Menu Label				
	Labelled Items	All Items	% Labelled	Labelled Items	All Items	% Labelled		
<b>Café/coffee shop</b>								
A	543	1863	29	518	1819	28	-25	-1
D	120	4350	3	279	5158	5	159	2
F	534	1370	39	516	1284	40	-18	1
Total café/coffee shop	1,197	7,583	16	1,313	8,261	16	116	0
<b>Restaurants</b>								
B	1172	7219	16	1407	9850	14	235	-2
C	960	2136	45	1003	2208	45	43	0
E	441	2066	21	439	2166	20	-2	-1
H	436	436	100	534	534	100	98	0
Total restaurant	3,009	11,857	25	3,383	14,758	23	374	-2
<b>Pub restaurant/bar</b>								
G	201	996	20	267	1,171	23	66	3
<b>Grand total<sup>c</sup></b>	<b>4,407</b>	<b>20,436</b>	<b>22</b>	<b>4,963</b>	<b>24,190</b>	<b>21</b>	<b>556</b>	<b>-1</b>

<sup>a</sup>Absolute change is post-labelled menu item sales minus pre-labelled menu item sales.

<sup>b</sup>Percentage change is (post-labelled items ÷ post-all items) – (pre-labelled items ÷ pre-all items). Using the Wilcoxon signed-rank test, none of these items were statistically significant.

<sup>c</sup>Grand Total is the sum of the sales in all foodservice establishments.

## Discussion

In the current study, a total of 46 menu items from eight foodservice establishments were allocated one or more of the icon-based menu labels. The absolute change in labelled menu item sales showed a trend towards an increase. However, there was no significant difference between pre-award versus post-award menu item sales, nor for each of the five different menu icons. The findings of this study are consistent with those of Hoefkens and colleagues<sup>59</sup> who showed that nutrition information by using a star-rating system in combination with a descriptor of the non-complying nutrients did not significantly change meal choices and nutrient intakes. Other studies examining menu items sales have reported mixed results when comparing sales before and after labelling heart healthy menu items.<sup>60,61,62</sup> More recent research has focused on calorie menu labelling, although there have been relatively few studies that have investigated menu item sales. Studies that have been done found no significant difference in menu item sales between periods with and without calorie posting.<sup>63,64</sup>

In the current study, over 75% of the menu items (excluding beverages and side-orders) offered by foodservice establishments were not classified as heart healthy and therefore not allocated menu icons. Increasing the proportion of labelled menu items may provide consumers with an increased awareness of heart healthy menu options, reinforce the importance of eating these foods and increase the probability of consumers selecting heart healthy menu items. In a recent review, Gardner and colleagues<sup>65</sup> recommended the positioning and promotion of healthier food items should match or exceed that of less healthy items. However, additional research on the right balance of icon versus non-icon menu items on consumer choice would be useful.

The limited effect of menu labelling on food choice may also be related to consumer familiarity with the menu label type. Research has shown that food labelling enables consumers to make the healthy food choices as long as the consumers notice, understand and trust the labelling.<sup>66</sup> Moreover, Lachet and Tseng<sup>67</sup> argue that the public must be educated on how to use whatever labelling system is in place. In the present study, the menu icon design was not widely implemented and consumers may not have noticed or understood this menu label type.

Menu labelling should be considered in conjunction with wider initiatives (e.g. reformulation, portion sizes, pricing strategies, health promotion and education) to make it easier for consumers to make healthier choices out-of-home.<sup>4</sup> A study by Thorndike and colleagues<sup>68</sup> assessed the impact of a two phase labelling system on sales of food and beverages in a large hospital cafeteria. Phase one consisted of a traffic light labelling system, followed by phase two which was the addition of a choice architecture intervention (i.e. product placement). The authors found that sales of red light items significantly decreased and sales of green light items significantly increased. This effect was enhanced by a choice architecture intervention that improved the visibility and convenience of healthy items<sup>68</sup>.

Previous research has shown that consumers may need repeated exposure to menu labels in order for behaviour changes to take place.<sup>69-72</sup> In the present study, sales data were collected four weeks post-labelling. A longer follow-up period may have captured a more accurate reflection of the impact of the icon-based menu labels on consumer food choice. However, studies that have included a longer follow-up period post calorie menu labelling have found no significant change in calories purchased.<sup>64, 73, 74</sup> Furthermore, sales data were not obtained from the same period in the previous year and across the whole year to

eliminate the possibility that the increase in absolute change in menu item sales, although not statistically significant, was not a natural fluctuation in monthly sales.

In the current study, sales data for desserts, beverages and side-orders were not obtained. Previous research has shown that consumers are more likely to underestimate the calorie content of main dishes and to choose higher-calorie side dishes, drinks, or desserts when restaurants claim to have healthy menu options.<sup>75</sup> Similarly, the study did not obtain information on what time of day the sale of food occurred, whether it was a weekday or weekend, and whether alcohol was sold at the time the food was purchased. Overall, further research is needed to determine the roles and interaction of these diverse factors in menu labelling usage.

The current study did not measure consumption patterns which may have changed with the introduction of menu labelling. This is important since consumers might respond to menu labelling by changing the amount they eat rather than the amount they order. Two recent studies found, however, that overall, consumers did not differ significantly in the number of calories they consumed by menu type i.e. with and without calorie listings<sup>70,76</sup>; however, both studies were conducted in laboratory settings.

Health literacy is another important factor to consider when examining the impact of menu labels on consumer food choice. Limited health literacy has been associated with less participation in health-promoting activities and riskier health choices.<sup>77,78</sup> Findings from the first European Health Literacy Survey reveal that 12% of all respondents have inadequate general health literacy and 35% have problematic health literacy.<sup>79</sup> The survey found literacy levels among Irish 16 to 65-year-olds were below average, giving a rank of 15 out of 24 countries.<sup>79</sup> As there are potential health benefits from the introduction of menu



labelling, it will be important to ensure that those with lower health/general literacy, numeracy and those living in less supportive environments also benefit.

### *Strengths and Limitations of the Study*

The current study is important because it is the first to examine the impact of icon-based menu labels on consumer buying behaviour in Ireland, in a real-world setting and with a control comparison using an objective outcome measure. To date, the majority of menu labelling studies have focused on calorie information rather than other display formats, and have been conducted in either controlled laboratory settings or in fast food establishments. Moreover, menus from each foodservice establishment were analysed using standardised software by qualified dietitians.

Despite its advantages, this study has several limitations. Firstly, the lack of randomisation makes it difficult to rule out confounding variables and introduces new threats to internal validity. Therefore, confounding variables such as the price of menu items may have explained the non-significant results observed in this study. Secondly, the sales data cannot capture consumption patterns (i.e. if consumers shared or did not consume the entire menu item) which may have changed with the introduction of menu labelling. Moreover, the study only considered single menu items as opposed to meal combinations (i.e. no sales data were obtained on side dishes, desserts and beverages). This is an important distinction because the study may not reflect the whole picture. Finally, the study included a small convenience sample of foodservice establishments and the applicability of these results to other foodservice establishments is unclear.

## **Conclusion**

This study provides preliminary evidence that icon-based menu labelling does not promote healthier food selection in foodservice establishments. Given the limited amount of research that examines alternative menu labelling formats in real-world settings, more studies are necessary to confirm these results. Menu labels may need to be coupled with additional strategies (i.e. product placement, price promotions etc.) to improve food choice on a population basis. Future research should evaluate how individual differences in socio-demographics, health values, and pre-existing nutrition knowledge may impact the effectiveness of icon-based menu labels. One population of particular interest may be those with limited health literacy, because this population may require assistance on how to interpret and use menu labels. Overall, further research will improve understanding of what works in this area, so that implementation of calorie and/or other menu labelling formats are evidence-based.

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**Conflict of interest:**

Francis M. Finucane has received honoraria, travel grants and has served on advisory boards for Novo Nordisk, Eli Lilly, Pfizer Inc., Sanofi-Aventis, Astra Zeneca, Merck-Serono, BoehringerIngelheim and Novartis. None of these activities directly relate to this manuscript. Other listed authors have no conflicts of interest to declare.

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**Ethical Approval:**

In the current study, sales data were collected rather than involving participants per se and thus ethical approval was not required.

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