

ORIGINAL ARTICLE

Penetration of nutrition information on food labels across the EU-27 plus Turkey

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Objectives: The European Union (EU)-funded project Food Labelling to Advance Better Education for Life (FLABEL) aims to understand how nutrition information on food labels affects consumers' dietary choices and shopping behaviour. The first phase of this study consisted of assessing the penetration of nutrition labelling and related information on various food products in all 27 EU Member States and Turkey.

Methods: In each country, food products were audited in three different types of retailers to cover as many different products as possible within five food and beverage categories: sweet biscuits, breakfast cereals, pre-packed chilled ready meals, carbonated soft drinks and yoghurts.

Results: More than 37 000 products were audited in a total of 84 retail stores. On average, 85% of the products contained back-of-pack (BOP) nutrition labelling or related information (from 70% in Slovenia to 97% in Ireland), versus 48% for front-of-pack (FOP) information (from 24% in Turkey to 82% in the UK). The most widespread format was the BOP tabular or linear listing of nutrition content. Guideline daily amounts labelling was the most prevalent form of FOP information, showing an average penetration of 25% across all products audited. Among categories, breakfast cereals showed the highest penetration of nutrition-related information, with 94% BOP penetration and 70% FOP penetration.

Conclusions: Nutrition labelling and related information was found on a large majority of products audited. These findings provide the basis for subsequent phases of FLABEL involving attention, reading, liking, understanding and use by consumers of different nutrition labelling formats.

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Introduction

In light of the growing prevalence of diet-related diseases, governments, retailers and food companies promote nutrition labelling to help the consumer make healthy, informed

food choices. In addition, the World Health Organization includes nutrition labelling as part of its global strategy on diet, physical activity and health (World Health Organization, 2004). Nutrition labelling aims at highlighting essential information about the nutritional value and composition of products. Currently, such information is not compulsory in the European Union (EU) unless a nutrition or health claim is made (EC, 1990, 2006).

According to a recent review (Grunert and Wills, 2007), consumers showed widespread interest in nutrition information on food packages, though this interest varied across situations and products. Most consumers reported good subjective understanding of the most common signposting formats, which is supported by findings showing reasonable objective understanding (Malam *et al.*, 2009; Grunert *et al.*, 2010). On the other hand, virtually no insight exists as to how labelling information is, or will be, used in a real-world

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Contributions: SSgB co-designed the audit, devised the data analysis methodology and wrote the first draft of the paper. LFC coordinated the research, co-designed the audit, and critically reviewed the paper. AL and SE collected the data in the countries, encoded them electronically and helped with the analysis. JMW collected parts of the data, provided input on the methodology and critically reviewed the paper. CH and MMR contributed to the audit design and data collection, and provided comments on the paper. Received 30 October 2009; revised 14 May 2010; accepted 18 May 2010; published online 1 September 2010

shopping situation, and how it affects consumers' dietary patterns (Cowburn and Stockley, 2005; Grunert and Wills, 2007).

Food Labelling to Advance Better Education for Life (FLABEL) is an EU-funded project which has been set up to elucidate whether the use of nutrition labelling on food products impacts on consumers' dietary choices and shopping habits. Fundamental to this objective is the assessment of current exposure of consumers to nutrition information on food labels. At present, data on the penetration of nutrition information on food labels in Europe are scarce, with previous studies reporting an average prevalence of tabular nutrition information of 56% (European Advisory Services, 2004). However, that audit involved only a subset of countries, considered only tabular nutrition information, and did not look at all products within a product category. On the other hand, two surveys from the United States, where nutrition labelling became mandatory in 1994, reported virtually complete labelling of pre-packaged foods from a broad range of product categories (Brecher *et al.*, 2000; Legault *et al.*, 2004).

To our knowledge, the results presented in this paper constitute the first EU-wide study to give a real-life insight into current exposure of consumers to nutrition information on food labels.

Materials and methods

Auditing period, setting and product categories

The audit period lasted from September 2008 to April 2009 and data collection was carried out in all 27 EU Member States and Turkey. In each country, three types of food retail stores were selected with an emphasis on broad coverage of different product manufacturers: a food retailer from the top five in terms of market share, a consumer cooperative (or national retailer if a consumer cooperative was not available), and a discounter (hard discounter if possible). All products within the following five categories were examined: sweet biscuits, breakfast cereals, pre-packed chilled ready meals, carbonated soft drinks and yoghurts. The criteria for choosing these product categories were that they were pre-packaged foods, both foods and beverages, both meal and snack items, and foods consumed at different times and in different contexts. The five different food categories were defined as follows:

- (1) Sweet biscuits—main ingredients flour, sugar, fat; including chocolate coated, with jam, in bags, packs, so on.
- (2) Breakfast cereals—cereals to be eaten at breakfast time (with milk), excluding cereal bars.
- (3) Pre-packed chilled ready meals—fresh ready meals stored at 2–8 °C, ideally containing a carbohydrate source (rice, pasta, potatoes), a protein source (meat, poultry, fish) and vegetables. This includes vegetarian varieties, and dishes that constitute a meal (even if not containing the three elements above).

- (4) Carbonated soft drinks—non-alcoholic fizzy drinks that people drink as refreshment, in cans or bottles.
- (5) Yoghurts—fermented milk products containing the word 'yoghurt' on the pack, natural or fruit flavoured, single pack or multipack, also drinkable yoghurt.

Data collection process

Two data collection grids were developed for use in the stores, a product and a nutrition information grid. The product grid was used to record the product name, brand name, manufacturer, pack size, and if applicable, variety. The nutrition information grid was used to record the nutrition information found on each food package, such as the type of labelling scheme (for example, traffic lights, guideline daily amounts (GDA), health logo, nutrition table), the format of the schemes (that is, horizontal, vertical, tabular), the presence of nutrition information (for example, 'Big 4' (that is, energy, carbohydrates, protein, fat) or 'Big 8' (that is, 'Big 4' plus sugar, saturated fat, fibre, sodium)), or the presence of nutrition or health claims as defined by current European law (EC, 1990, 2006).

In this study, logos on food packages were considered as 'health logos' if their use was restricted to food products that fulfilled certain nutrient criteria (which may vary from logo to logo and may consider dietary guidelines) and as such represented a healthier option in that category.

Information was considered as front-of-pack (FOP) if it was displayed in the principal field of vision (EC, 2008), which in turn was guided by the placement of product name and brand. The remaining area was defined as back-of-pack (BOP).

Data analysis

Descriptive statistics (percentages, minima, maxima, means) and graphs were computed using Microsoft Excel 2003 SP 3.

Results

Penetration of nutrition information by country

In total, 37365 products from five food and beverage product categories were audited (Table 1) in 84 individual retail stores across all 27 EU Member States and Turkey (Table 2). The vast majority of stores were located in capital or big cities, with the exact choice guided by easy access from the nearest airport or major train station. An average of 85% (range 70–97%) of these products displayed on the back of the pack one or more of the items considered, versus 48% (range 24–82%) for FOP penetration (Figure 1). Countries at the top end of the range for provision of BOP information were Ireland, UK and The Netherlands, whereas Slovenia and Cyprus represented the bottom end. For FOP information, the leading countries were the UK and Ireland, while Turkey showed the lowest penetration.

Table 1 Number of products audited per category per country

Country	Sweet biscuits	Breakfast cereals	Ready meals	Carbonated soft drinks	Yoghurts	Total
Austria	318	213	86	222	298	1137
Belgium	562	218	245	348	267	1640
Bulgaria	567	137	0	196	221	1121
Cyprus	624	333	0	238	206	1401
Czech Republic	632	325	26	143	454	1580
Denmark	249	152	11	173	161	746
Estonia	282	230	15	138	251	916
Finland	465	339	230	229	475	1738
France	742	199	243	252	312	1748
Germany	459	283	175	124	542	1583
Greece	350	128	40	190	455	1163
Hungary	338	178	34	138	274	962
Ireland	399	280	158	177	249	1263
Italy	593	117	0	227	359	1296
Latvia	313	164	10	151	401	1039
Lithuania	372	196	5	134	326	1033
Luxembourg	427	157	129	285	384	1382
Malta	784	416	0	205	379	1784
The Netherlands	440	134	171	294	273	1312
Poland	685	249	11	220	566	1731
Portugal	477	180	1	156	418	1232
Romania	284	99	0	155	241	779
Slovakia	788	361	47	243	667	2106
Slovenia	615	271	40	136	442	1504
Spain	493	160	86	294	278	1311
Sweden	316	376	101	342	401	1536
Turkey	300	97	9	217	282	905
UK	360	283	293	239	242	1417
Total	13234	6275	2166	5866	9824	37365

The most widespread format across all countries was BOP tabular or linear listing of nutrition content (84% average penetration), highlighting either the 'Big 4' (34% penetration) or the 'Big 8' (49% penetration), the remainder being made up of other combinations or just the energy content (1% penetration) (Figure 2). The ratio of 'Big 8':'Big 4' was 1.4 across all products, ranging from 0.7 for yoghurts to 5.2 for breakfast cereals.

The GDA system was the most prevalent form of FOP nutrition information, ranging from 2% in Turkey to 63% in the UK and averaging 25% across all countries (Figure 3).

Whereas penetration of FOP nutrition claims ranged from 12% in Estonia to 37% in Ireland and Portugal, with a European average of 25% (Figure 4), health claims and health logos were used on very few products (data not shown). The average penetration of health claims was 4% BOP (from 0.5% in Spain and Czech Republic to 8% in Ireland) and 2% FOP (from <0.5% in France, Portugal and Spain to 6% in Finland), whereas the average penetration of health logos was 1% on the BOP (from 0.1% in Portugal and Latvia to 9% in The Netherlands) versus 2% on the FOP (from 0.1% in Portugal and Latvia to 12% in Sweden and The Netherlands). In the following seven countries, none of the audited products bore any health logos: Cyprus, Czech Republic, France, Germany, Poland, Romania and Slovakia. In contrast, health logos peaked at 47% on breakfast cereals in Sweden and at 27% on yoghurts in The Netherlands.

Depending on the product category, Austria, Denmark, Estonia, Finland, Greece, Ireland, Slovenia and the UK exceeded a level of 5% penetration for health logos, with varying emphasis on FOP or BOP labelling.

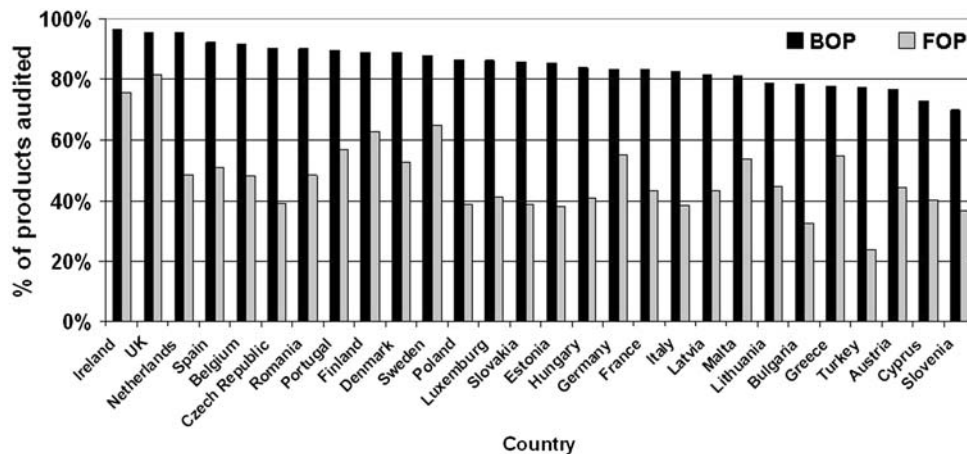
Traffic light labelling was only encountered on products audited in Spain (3% FOP, 3% BOP) and the UK (3% FOP, 2% BOP) (data not shown).

Penetration of nutrition information by category

Among the five categories of products audited, breakfast cereals showed the highest penetration of items considered in this audit, providing BOP information on 94% of products (from 79% in Bulgaria to 100% in France, Ireland and The Netherlands) and FOP information on 70% of products (from 43% in Turkey to 93% in France and Germany) (data not shown). Typically, the minimum information provided was the BOP nutrition table (94%), mostly containing the 'Big 8' (78 versus 15% 'Big 4'). On the other hand, sweet biscuits had the lowest penetration of nutrition-related information (76% BOP, 25% FOP), and the split for the BOP nutrition table (76% penetration) was even between 'Big 8' and 'Big 4' at 38% each. Yoghurts were the only product category where the 'Big 4' were more prevalent than the 'Big 8' (51 versus 36%, total BOP nutrition table 88%). At the same time, yoghurts showed the highest penetration of health claims, reaching up to around 30% (BOP) in Ireland and Bulgaria,

Table 2 List of retail stores and locations by category and country

Country	Top 5	Location	Cooperative/ national retailer	Location	Discounter	Location
Austria	Interspar	Vienna	Billa (Rewe group)	Vienna	Hofer	Vienna
Belgium	Carrefour	Brussels	Delhaize	Brussels	Colruyt	Brussels
Bulgaria	Billa	Sofia	Coop	Sofia	Kaufland	Sofia
Cyprus	Carrefour	Limassol	E&S Coop	Limassol	Shop right	Limassol
Czech Republic	Tesco	Prague	Coop	Prague	Kaufland	Prague
Denmark	Bilka	Copenhagen	Irma	Copenhagen	Netto	Copenhagen
Estonia	Rimi hypermarket	Tallinn	Maksimarket	Tallinn	Säästumarket	Tallinn
Finland	Citymarket (K-group)	Helsinki	S-market (S-group)	Helsinki	Alepa	Helsinki
France	E.Leclerc	Lille	Rond Point (Coop-Alsace)	Strasbourg	Ed	Lille
Germany	Real	Cologne	Rewe	Cologne	Penny-Market (Rewe group)	Cologne
Greece	Carrefour	Athens	Sklavenitis	Athens	Dia	Athens
Hungary	Tesco	Budapest	Coop	Budapest	Aldi	Budapest
Ireland	Tesco	Dublin	SuperValu	Dublin	Aldi	Dublin
Italy	Carrefour	Rome	Ipercoop	Rome	Dico	Rome
Latvia	Rimi hypermarket	Riga	Prisma (S-Group)	Riga	CENTO	Riga
Lithuania	Rimi hypermarket	Vilnius	IKI	Vilnius	CENTO	Vilnius
Luxembourg	Delhaize	Alzingen	Coopérative des Cheminots	Luxemburg	Aldi	Mersch
Malta	GS (Carrefour)	Naxxar	Chain	Fgura	Shopwise	Qormi
The Netherlands	Albert Heijn (Ahold)	Amsterdam	Supercoop	Hoofddorp	Aldi	Ossendrecht
Poland	Tesco	Krakow	Jubilat	Krakow	Kaufland	Krakow
Portugal	Feira Nova (Jeronimo Martins)	Lisbon	Pluri Coop	Pinhal Novo	Mini Preço (Dia)	Sao Domingos de Rana
Romania	Billa	Bucarest	Mega Image	Bucarest	Penny-Market (Rewe Group)	Bucarest
Slovakia	Tesco	Bratislava	Coop Jednota	Bratislava	Kaufland	Bratislava
Slovenia	Interspar	Ljubljana	Mercator	Ljubljana	Hofer	Lukovica
Spain	Carrefour	San Sebastian	Eroski	San Sebastian	Maxi Dia	San Sebastian
Sweden	ICA Maxi	Solna	Coop Forum	Sollentuna	PrisXtra	Stockholm
Turkey	Tesco	Bodrum	Migros (Coop)	Bodrum	Bim	Bodrum
UK	Tesco	Weybridge	The co-operative	Guildford	Aldi	Camberley

**Figure 1** Penetration of nutrition labelling and related information across five product categories in EU-27 and Turkey.

and around 20% in the UK, Romania, Denmark, Belgium, Malta and The Netherlands. Of note, no ready meals fitting the criteria the FLABEL consortium defined for this category were found in the following five countries: Bulgaria, Cyprus, Italy, Malta and Romania. However, these countries do have chilled ready meal-type foods that are available unlabelled and unpackaged over the deli counter.

Discussion

This study provides a realistic picture of the penetration of nutrition labelling and related information on food packs in Europe. The main finding is that tabular/linear nutrition information as defined in Nutrition Labelling Directive 90/496/EEC was present on a large majority of products audited

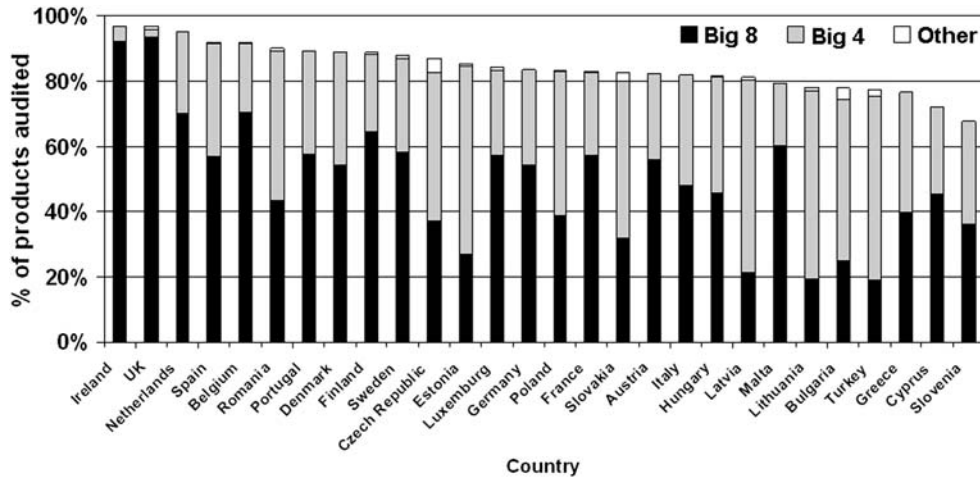


Figure 2 Tabular/linear nutrition content information on the back of pack (BOP) across five product categories; Big 4 = calories, carbohydrates, protein, fat; Big 8 = Big 4 plus sugar, saturated fat, sodium and fibre.

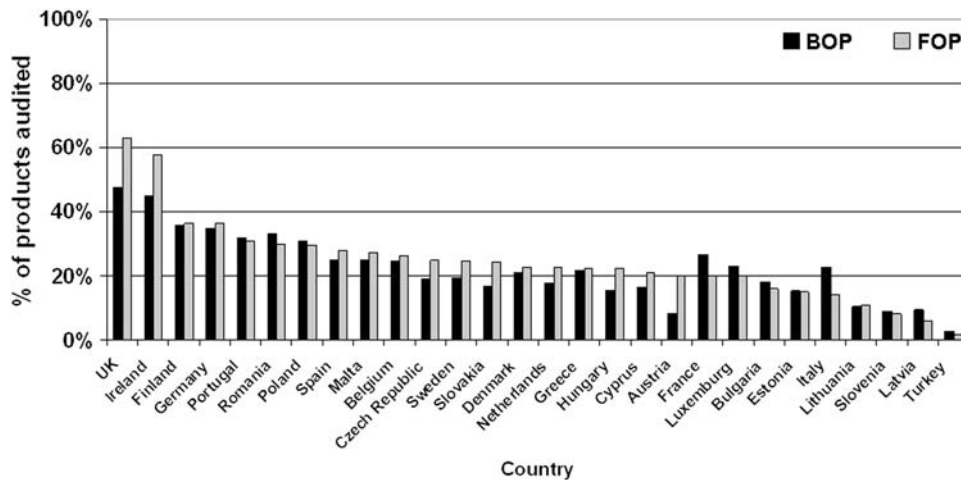


Figure 3 Penetration of GDA information on the FOP and BOP across five product categories.

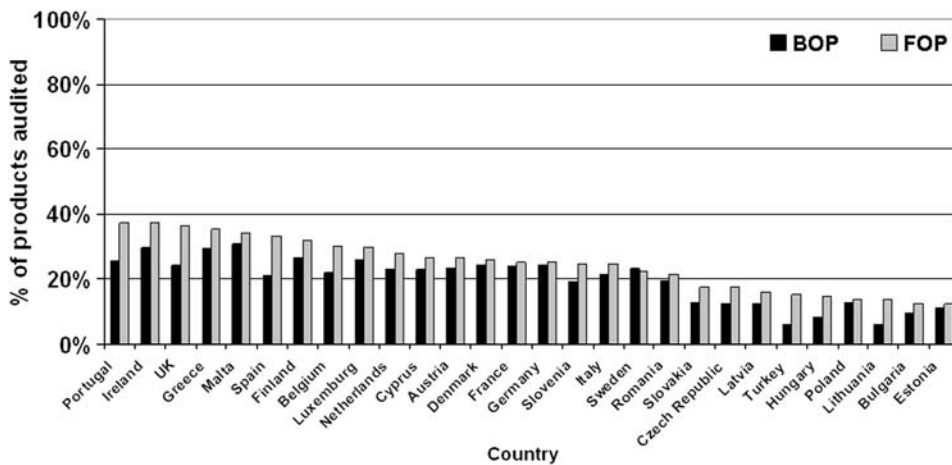


Figure 4 Penetration of nutrition claims on the FOP and BOP across five product categories.

despite the fact that the provision of this information is a voluntary practice in Europe in the absence of nutrition or health claims (EC, 1990, 2006). To our knowledge, this audit is the first to assess the penetration of nutrition labelling across all 27 EU Member States and Turkey. A previous, smaller-scale study (European Advisory Services, 2004) recorded the presence of tabular nutrition labelling ('Big 4' or 'Big 8') on 2954 products from 51 product categories in the four EU Member States Germany, Poland, Spain and the UK, and reported an average penetration of 56%. This lower figure is probably explained by two factors: (1) food labelling practices are continuously evolving and the number and penetration of labelling systems has increased since 2004, and (2) product categories such as spices, chewing gum, tea and coffee were included, which rarely carry the tabular nutrition information audited for. Additionally, not all products in each of the 51 categories were audited, so that the real penetration per category may have been different.

Survey data from the United States, where mandatory nutrition labelling was implemented in 1994, showed that in 1997 practically all packages from a representative sample of food products falling under the national labelling regulation had nutrition labels (Brecher *et al.*, 2000). These results were confirmed in a follow-up survey in 2000–2001 (Legault *et al.*, 2004). All products belonging to the categories defined for the FLABEL audit fulfilled the nutrition labelling requirements except for pre-packed chilled ready meals, which had 90–99.9% labelling.

With regard to the extent of nutrition information, in most cases at least the calorie, fat, carbohydrate and protein contents (the 'Big 4') of a specific product were provided, and this information was usually found on the back of pack (BOP 84 versus FOP 3%). However, this high penetration is not explained by the presence of nutrition or health claims, which would render the provision of such information mandatory (EC, 1990, 2006). Research suggests that consumers value the presence of nutrition information on food packs (Gracia *et al.*, 2009), which in turn might drive manufacturers to provide such information voluntarily in order to create a marketing advantage.

More recently, various FOP nutrition labelling schemes have emerged such as the Traffic Lights scheme, GDA, or health logos, to provide consumers with nutrition information that is easy to access while shopping. It is noteworthy that the 1990 Nutrition Labelling Directive 90/496/EEC (EC, 1990) is currently being revised and the new proposal includes mandatory FOP labelling of energy, fat, saturated fat, carbohydrates, sugar, and salt per 100 g/ml (EC, 2008). Ireland and the UK have been very active in nutrition labelling and this is supported by the high penetration of FOP GDA (58 and 63%, respectively). Van Camp (2009) recently reported comparable figures for FOP GDA in the UK and likewise found higher figures for (breakfast) cereals and ready meals than for sweet biscuits. The UK also plays a prominent role in Traffic Lights labelling (for example, Sainsbury's Supermarkets Limited, London, UK; ASDA, Leeds, UK), however, few other countries

have retailers employing such colour-coded systems (for example, Intermarché in France, Eroski in Spain).

Health claims, on the other hand, were much less widely spread in this study (4% BOP, 2% FOP), and mainly occurred on breakfast cereals and yoghurts. A similar situation has been observed outside Europe. For example, nutrient content and health claims in the US had an average penetration of 34 and 4%, respectively (Legault *et al.*, 2004), with large differences between product categories. Two Australian studies that focused entirely on the presence of claims on pre-packed foods reported 36% of the audited products to bear a nutrient content claim (Williams *et al.*, 2003) and 14% to carry a health-related claim (Williams *et al.*, 2006). Again, large variations were observed depending on the product category, but energy or sports drinks and (breakfast) cereals frequently appeared among the top categories.

The high numbers for health logos in some product categories in Sweden and The Netherlands are largely explained by the use of the Swedish Keyhole (Swedish National Food Administration, 2007), the Choices logo (Choices International Foundation, 2007), and the own brand logo 'Healthy Choice Clover' by the Dutch retailer Albert Heijn included in this audit, respectively. The Swedish Keyhole[®] was developed by the Swedish National Food Administration and applies to products that contain less fat, sugar, and salt and more fibre (depending on the category) than a comparable product, and as such represent a healthier option within a product category. The Choices logo is a FOP logo on food products that also fulfil a set of qualifying criteria, based on international dietary guidelines, and is currently used by around 130 companies around the globe. The Albert Heijn logo 'Healthy Choice Clover' considers the contents of saturated fat, trans fat, sugar and salt of foods and highlights a 'healthy choice' or an 'informed choice' depending on the product category. It has been speculated that health logos based on international consensus may be a simple way to brand healthier food options, especially for young children (Cinar and Murtomaa, 2009).

Limitations of the study

The physical audit had to be restricted to a select number of stores for reasons of feasibility, and store choice was partly governed by retailer permission to conduct the research in their stores. This means that not all of the existing nutrition labelling schemes in a country (for example, colour-coded labelling in France) were taken into account. However the major aim of this audit was to map the penetration of nutrition information irrespective of format.

Food products in supermarkets are usually organized and grouped by aisle, and we audited all the food products present in the corresponding product category aisle in the different retail stores. However, products belonging to any of the five product categories audited but placed elsewhere in the store (for example, in an organic aisle, or a specific discount area) were not included. The impact of this

omission is likely to be small, though, as for example products on promotion are usually also found in the main category aisle, and specialty products (such as 'organic' range or 'diabetic' products) are not necessarily singled out on separate shelves elsewhere in the store. Additionally, in both cases the number of products tends to constitute a small fraction of the total in that product category.

Finally, Tesco as a partner in the FLABEL consortium, provided store access in 7 of the 28 countries. Tesco uses GDA labelling on its own brand products, which may have resulted in an overrepresentation of GDA labelling in the study. Nevertheless, Tesco is not the only retailer using the GDA system in Europe and Tesco brand products represented only a fraction (2.7%) of all the food products audited. On the other hand, many of the branded goods manufacturers use GDA labelling on their brands in categories such as breakfast cereals, carbonated soft drinks and yoghurts, thus leading to the overall high penetration figures for GDA across countries.

Conclusion

Taken together, a large majority of the more than 37000 products audited carried tabular/linear nutrition information, which is at present voluntary in the absence of nutrition or health claims. These findings provide the basis for subsequent studies involving attention, reading, liking, understanding and use by consumers of different nutrition labelling formats, which will be explored in the next phases of the FLABEL project. Major outcomes of FLABEL will be best practice guidelines for research into nutrition labelling as well as a research-based best practice proposal for nutrition labelling, tested in a real-world store environment.

Conflict of interest

The authors declare no conflict of interest.

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