IDENTIFICATION OF LABELLING ERRORS AND CONCERNS ABOUT SPECIFIC CATEGORIES OF SOUTH AFRICAN PROCESSED FOODS THAT MAY AFFECT FOOD-SENSITIVE INDIVIDUALS

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ABSTRACT

Certain food product ingredients can cause adverse reactions in sensitive individuals. Food ingredients should be clearly indicated in a product ingredient list as this is the only way food-sensitive individuals can identify if a product is safe for them to consume. The aim of this study was to determine the labelling errors and concerns that occurred in specific categories of South African processed foods that may affect food-sensitive consumers. Randomly obtained product labels (*N* = 246) were evaluated that represented the selected categories of processed foods (*N* = 7), namely: breakfast cereals (9%), savoury snacks (13%), sweet snacks (29%), non-refrigerated meals (7%), refrigerated meals (9%), soups and sauces (25%) and convenience desserts and baked goods (8%). A pre-tested checklist was used to evaluate each label according to the food-labelling areas that could affect food-sensitive individuals. The current South African labelling regulations, the draft regulations revision, and the further proposed draft regulations were taken into consideration. A real concern was the listing of ingredients of unknown origin with allergenicity potential (80% of products). There is scope for food-labelling improvement, specifically in the areas of ingredient and allergen identification, and allergen- and additive-free claims, but labelling overload as a consequence needs to be considered.

INTRODUCTION

Eight foods (milk, egg, fish, shellfish, soy, peanuts, tree nuts and molluscs) account for the majority of documented food allergies worldwide, but there is a longer list of other foods and food ingredients associated with allergic reactions in sensitive individuals.[1] Allergic reactions to foods represent an increasing problem in clinical medicine[1,2] and a problematic issue food manufacturers need to confront.[3]

In reports of death of persons who ingested foods to which they were highly allergic,[4] a 'hidden' allergenic ingredient is often the cause. Allergens may be hidden in numerous ways, including contamination of a safe food and if an ingredient is added for a specific food application and labelled under its category or an uncommon name (e.g. egg used as emulsifier).[5] The food industry must take precautions to minimise food allergy risk and allergen cross-contamination of their products.[3,6]

Food-sensitive individuals need to avoid foods containing offending ingredients. Sufficient, clear and correct ingredient indication on labels is the only approach in food legislation to protect individuals against adverse reactions and the only way for them to identify if products contain problematic ingredients.[7,8] This means that food-sensitive consumers must sustain a lifestyle of vigilance to ensure that what they buy and eat is free from problematic ingredients.[7,9] They have to overcome obstacles such as difficulties with the interpretation of food labels and ever-present concerns about incorrectly or incompletely labelled foods.[10]

The aim of this study was to determine labelling errors in and concerns about specific categories of South African processed foods that may affect food-sensitive individuals. The regulations currently applied[11] were used to identify the labelling errors. These regulations are currently being revised – a draft revision published in the *Government Gazette* (in August 2002)[12] is also being revised.[13] Labelling applications that did not meet the regulations of these drafts and/or problem areas identified that were not addressed in the regulations were considered labelling concerns.

METHODS

Processed food category selection

The categories selected (Table I) were based on workplace experience as products from these categories were most often received for labelling evaluation. A convenience-food buyer of a major supermarket chain (de Jongh, 2007) confirmed that these categories make up the majority of available processed foods.

Product sampling

The assumption was made that the products stocked by a large urban supermarket in each category would be representative of the available processed foods in each category. Owing to logistic and resource constraints, the survey was conducted in a Cape Town-based supermarket known for carrying a variety of processed foods. A total of 1 559 South-African-manufactured processed foods representing the selected categories were counted in the supermarket and the available products per food category listed for the product sampling.

Stratified random sampling was used to divide the population (available products in selected food categories, *N* = 1 559) into homogeneous subgroups (food categories, *N* = 7). A random sample was then obtained within each subgroup. Statistically it was determined that 246 labels had to be evaluated to provide a sample representative of the population and smaller subgroups. The sample was divided between the food categories, according to the market size of each category, as indicated in Table I.

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Table I. Product sample representation per selected processed food category

Selected processed food category	Approximate number and percentage of food items in category (*N* = 1559) *		Number and percentage of food items selected for evaluation in category (*N* = 246)	
	N	%	*N*	%
A Breakfast cereals	123	8	21	9
B Savoury snacks	218	14	31	13
i. Savoury biscuits	93		12	
ii. Chips, pretzels, etc.	125		19	
C Sweet snacks	469	30	72	29
i. Sweet biscuits	96		18	
ii. Chocolates	146		21	
iii. Sweets	227		33	
D Refrigerated meals	108	7	23	9
E Non-refrigerated meals	93	6	17	7
F Soups and sauces	411	26	62	25
i. Soups	159		24	
ii. Sauces	252		38	
G Convenience desserts and baked goods	137	9	20	8
i. Baked goods	71		12	
ii. Desserts	66		8	
Total	1 559	100	246	100

* Obtained 3 months prior to survey in selected large retail food store

Food label evaluation

A checklist was constructed and pretested to collect and evaluate the label information that might affect food-sensitive persons. The checklist was used to collect information on label ingredient listing and claims. The information gathered was evaluated against the regulations and requirements indicated in the current South African labelling regulations,[11] the draft regulations revision,[12] and the further proposed draft regulations[13] for ingredient listing, i.e. allergen and compound ingredients, and claims, i.e. allergen- and additive-free claims. The regulations and requirements were indicated in the checklist to facilitate the evaluation of the labels. The evaluation procedures used to identify the labelling errors and concerns are described below.

Allergen labelling

The current regulations stipulate that if an ingredient derived from egg or milk is used in a product the words 'egg' or 'milk' must be indicated in parenthesis behind the name of the ingredient or they can form part of the name of the ingredient.[11] If known egg or milk ingredients were not identified in the ingredient list, it was considered a labelling error. Not adhering to the allergen-derived ingredient identifications, i.e. fish, crustacean and molluscs, peanuts, soybeans, or tree nuts, indicated in the draft regulations[12] was considered a labelling concern. Only these listed ingredients were considered in the allergen labelling evaluation, and no other allergenic ingredients, such as wheat, that are not listed in the 2002 draft regulations.[12] However, wheat and gluten were respectively captured in the identification of ingredients of unknown origin with allergenicity potential and allergen-free claims.

Allergen-free claims

Any allergen-free claim made was indicated in the checklist. The allergens as indicated in the labelling regulations were used as reference.[12] If a product did not claim to be free of an allergen, the information on the label was further evaluated to determine if it could have carried an allergen-free claim. Allergen advisory statements are provided for in the draft regulations.[12] If the product did not contain an advisory statement for a specific allergen, or the allergen could not be identified in the ingredient list, it was assumed that the product did not contain that specific allergen and that it could have claimed to be allergen-free.

Food manufacturers can produce products free of a specific allergen and some products already claim to be 'free of' a specific allergen. A number of countries are in the process of implementing regulations to control use of such claims. One regulation is that an allergen-free claim must be supported by obligatory analysis regarding allergenic properties.[8]

Compound ingredients

A compound ingredient is composed of two or more component ingredients, which must be listed individually when a compound ingredient is used.[11] It is a labelling error if component ingredients are not identified.

Additive-free claims

A number of additives, especially preservatives, dyes and flavouring agents, induce adverse reactions in sensitive individuals.[14] The presence of any preservative, the colourant tartrazine, and the flavourant monosodiumglutamate (MSG), must, according to the regulations, be identified in the ingredient list.[11] If the words 'preservative', 'tartrazine' or 'MSG' were not indicated, it was assumed that the product did not contain these and that the product could carry this particular additive-free claim. If a label contained the words 'colourant' and/or 'flavourant', it was also assumed that the product was free of tartrazine and/or MSG as the regulations require that these be identified by their chemical names.[11] If a product did not indicate any colourants or flavourants, and did not identify tartrazine or MSG in the ingredient list, it was assumed that the product could have made a tartrazine- or MSG-free claim.

The consumer will probably interpret a product label with an 'additive-free' claim and/or no listing of an additive in the ingredient list as an indication that the product does not contain the additive – even if the additive is not normally used in the product (i.e. a 'no-MSG' claim used on a label of a sweet product). The products were evaluated taking the way a consumer might interpret the list into consideration. Such 'additive-free' claims were considered a labelling concern as the use of additive-free claims is not addressed in the regulations and the food categories for making such claims are not specified. The exception was MSG, which is a monohydrate sodium salt used in flavour enhancers.[15] As MSG is salt-based, it is associated with enhancing the flavour of salty/savoury snacks and not with sweet products. It was therefore not considered appropriate to note MSG-free claims that could have been made in Categories A (breakfast cereals), C (sweet snacks) and G (convenience desserts & baked goods).

Data analysis

The checklist data were coded, entered into Excel spreadsheets and imported into the STATISTICA version 7.1 data analysis software system for analysis. The frequencies and statistics (chi-square test to investigate differences between data categories) presented are only descriptive and exploratory in nature, pointing to possible trends in labelling errors and concerns in the selected food categories. The level of significance used was $p<0.05$.

RESULTS AND DISCUSSION

Allergen labelling

Only one product did not identify ingredients derived from egg. However, 16% of the products contained ingredients derived from milk that were not identified as such in the ingredient list. Casein, whey, caseinate, and cream are examples of ingredients not identified. Figure 1 illustrates the percentage of products per category not identifying ingredients derived from milk, a labelling error.

The United States (US) Food and Drug Administration (FDA) conducted inspections to determine food label accuracy by comparing the raw product ingredients with the finished product labels. When product samples were analysed for egg and peanut allergens, 25% of the products analysed for peanut and 10% of the products analysed for egg tested positive for residual allergen.[10] It was beyond the scope of this study to determine if a label correctly reflected the actual ingredients used.

Allergen-free claims

Only one product in Category A (breakfast cereals) made a wheat-free claim. However, many more products could have made allergen-free claims. This became evident during the ingredient list evaluations by ruling out any ingredients of unknown origin and advisory statements on the labels. This is a concern as it indicates a gap in the market for allergen-free claims.

A high percentage of products (41-85%) in nearly all categories could have shown tree-nut- and peanut-free claims. These products had no such ingredients listed and did not carry any advisory statements. In Category G (convenience desserts & baked goods), 85% of the products could have carried both a peanut- and tree-nut-free claim. In Canada there is pressure on food manufacturers to offer more 'peanut-free' products to decrease allergic consumer dietary restrictions.[7]

Forty-five per cent of the products could have claimed to be egg-free, 31% to be gluten-free and 30% to be wheat-free. Gluten-free claims could have been made on about half of the products in the sweet and savoury snacks categories (50% and 48% respectively). Milk- and soy-free claims could have been made on 28% and 26% of the products respectively. Sixty-two per cent of the breakfast cereals and 47% of the non-refrigerated meals could have claimed to be soy-free. Soy can be used in breakfast cereals and non-refrigerated meals, but may also be present owing to cross-contamination occurring when products are manufactured on the same production lines as soy products.

Compound ingredients

Only 12% of the products did not indicate component ingredients included in compound ingredients, a labelling error. Category E (non-refrigerated meals) had the highest percentage (24%) of products that did not meet the compound ingredient listing regulation, followed by Categories F (soups & sauces) and D (refrigerated meals) (18% and 17% respectively). Category G (convenience desserts & baked goods) had no errors.

Pasta formed part of the ingredient list of products evaluated in categories E (non-refrigerated meals), D (refrigerated meals) and F (soups & sauces). Pasta is a compound ingredient, yet pasta or noodles were not described on 45% of the labels in the 12% group of incorrectly labelled compound products. Biscuits, chocolate chips and muesli were compound ingredients on labels in Category C (sweet snacks) not accompanied by their component ingredients (10%, 3% and 3% respectively). Vegetable powder and cheese powder were other compound ingredients not

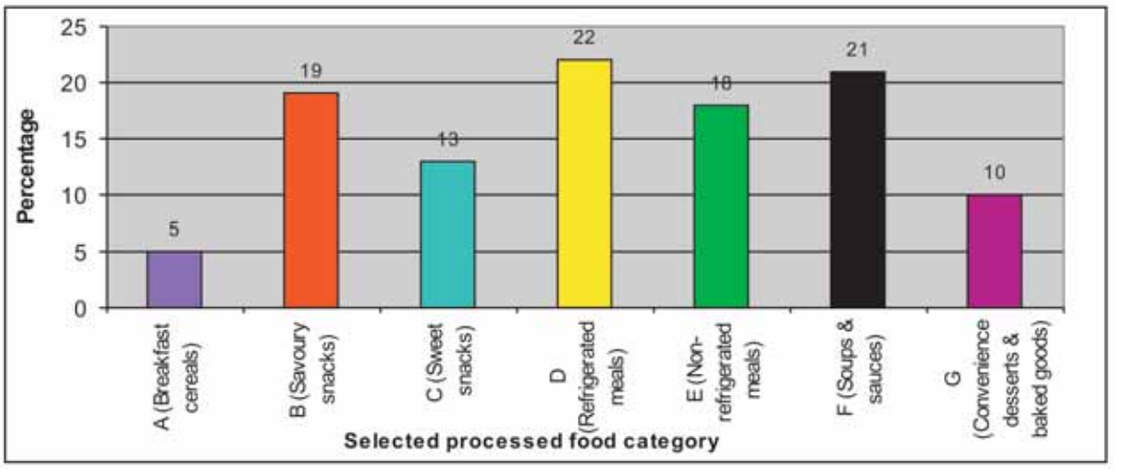

Fig. 1. Percentage of products per processed food category not identifying ingredients derived from milk.

described by their component ingredients (21% and 17% respectively). Yoghurt powder was not described in the ingredient list of a product included in Category A (breakfast cereals).

Ingredients of unknown origin with allegenicity potential

A number of ingredients were identified that could be derived from an allergen, but the ingredient origin was not indicated on the label. It therefore cannot be stated with certainty that these ingredients are derived from allergens, but the possibility does exist and it would be a concern for consumers wanting or needing to avoid certain ingredients. For example, there is a wide range of emulsifiers and lecithins; these are made from a number of ingredients that can include soy and egg,[16] both of which are major allergens.[1] Allergic consumers could use these products not knowing that they contain allergens. Table II indicates the percentage of products per selected category that contained an ingredient derived from an unknown origin. In most categories, nearly 80% or more of the products contained such ingredients. The highest percentages of these products were found in the subcategories chocolates (Category C sweet snacks) (95%), soups (Category F soups & sauces) (95%) and desserts (Category G convenience desserts & baked goods) (100%) and the lowest (52%) in breakfast cereals (Category A).

The three ingredients, emulsifier, starch and vegetable fat, were present in all categories without their origin identified. Thirty per cent of the products in Category G (convenience desserts & baked goods) did not identify the origin of the emulsifier, followed by Categories F (soups & sauces) and C (sweet snacks), with 26% and 25% respectively. One product in Category G (convenience desserts & baked goods), one in Category A (breakfast cereals) and three in Category C (sweet snacks) did not identify the lecithin used. Although the number may be low in some cases, this non-identification can be problematic for an egg- and/or soy-allergic consumer. In the new proposed draft regulations, emulsifier and lecithin are indicated as ingredients that could possibly contain hidden allergens, e.g. could indicate the presence of egg protein.[17]

Table II. Number and percentage of products per processed food category which listed ingredients of unknown origin

Processed food category	*N*	*n*	*%*
A Breakfast cereals	21	11	52
B Savoury snacks	31	27	87
i. Savoury biscuits	12	10	83
ii. Chips, pretzels, etc.	19	17	89
C Sweet snacks	72	57	79
i. Sweet biscuits	18	17	64
ii Chocolates	21	20	95
iii. Sweets	33	20	60
D Refrigerated meals	23	20	87
E Non-refrigerated meals	17	13	76
F Soups and sauces	62	52	84
i. Soups	24	23	95
ii. Sauces	38	29	76
G Convenience desserts and baked goods	20	16	80
i. Baked goods	12	8	67
ii. Desserts	8	8	100
Total	246	196	80

About 29% (29.4%) of the products in Category E (non-refrigerated meals) did not identify the starch used in the product, followed by 24% in Category F (soups & sauces). Starch is almost always made from corn, but the possibility exists that it can be from another source, and therefore its source must be indicated on the label. Maltodextrins are dextrins derived from starch in varying degrees, and are used for various applications such as thickeners and carriers for flavourings in products such as soups and dry mixes.[16] About a third of the products in Categories F (soups & sauces) (44%) and G (convenience desserts & baked goods) (30%) contained maltodextrin with the source not identified. Approximately a third of the products in Categories D (refrigerated meals) (35%) and G (convenience desserts & baked goods) (30%) contained dextrose with its origin not indicated. Dextrose forms part of glucose and the commercial manufacture of glucose is through hydrolysis of starch.[15]

Stabilisers are used in food formulations to prevent separation, with hydrocolloids an example of a stabiliser.[15] Hydrocolloids are from animal, plant or microbial origin. The possibility therefore exists that they could be derived from soy, wheat or egg,[15] all major allergens.[1] Thirty-five per cent of the products in Category D (refrigerated meals), 29% in Category E (non-refrigerated meals) and 20% in Category G (convenience desserts & baked goods) did not identify the stabiliser used.

Eighty-four per cent of the products in Category B (savoury snacks) did not identify the vegetable oil used. About half of the products in Categories C (sweet snacks) (54%) and F (soups & sauces) (52%) and more than a third of the products in Categories E (non-refrigerated meals) (41%) and D (refrigerated meals) (35%) did not identify the vegetable fat or oil used. In South Africa, mostly palm, sunflower or canola vegetable fats and/or oils are used. According to a food technologist of a major food retailer (Carstensen, 2004) these ingredients can be derived from either soy or peanut in imported products. Both these ingredients are allergens that, according to the draft regulations, need to be labelled.[12]

Additive-free claims

Forty-three per cent of South African consumers look for additive information when purchasing a product.[18] With consumers wanting to avoid additives for different reasons, including adverse reactions,[2] it is important that these ingredients are correctly identified in an ingredient list. It is also of concern that not more manufacturers are making additive-free claims on their products. In SA and the USA there are no official food labelling guidelines for making an additive-free claim. A 'no additive', or, for example, 'no artificial colourants' claim could be meaningful for a consumer, as it indicates that the product was not enhanced with natural or artificial ingredients.[19] Additive-free claims were indicated on between 3% (for artificial flavourants) and 8% (for preservatives and artificial colourants) of the products, while a further 20% (for MSG) and up to 93% (for tartrazine) of the products could have carried such claims.

Two per cent of all products listed tartrazine. Desserts had the highest percentage of products indicating they contained tartrazine (13%), followed by savoury biscuits (8%). Five per cent of the products overall claimed to be tartrazine-free, compared to the additional 93% that could have claimed to be **tartrazine-free** ($p < 0.001$). The lack of tartrazine-free claims is a concern as tartrazine is commonly used as a food colourant, and can if consumed cause adverse reactions in sensitive individuals.[20]

No products in Categories A (breakfast cereals), D (refrigerated meals), E (non-refrigerated meals) and F

(soups & sauces) made tartrazine-free claims, although all products in Categories A, D and E and 98% of the products in Category F could have made this claim as they did not list tartrazine in the ingredient list. The subcategory chips and pretzels of Category B (savoury snacks) made tartrazine-free claims on 26% of the products, as did 25% of desserts, a subcategory of Category G. Tartrazine could be used as a colourant in almost any product so indicating that a product is tartrazine-free would be of great assistance to individuals wanting to avoid it.

There is a significant difference between the products that made an **MSG-free** claim (7%) and that could have made this claim (20%) overall (p <0.05). Although Category D (refrigerated meals) contained the most 'no added MSG' claims of 39%, an additional 52% of the products in this category could have carried it. Category B (savoury snacks) carried the claim on 10% of the products while a further 29% could have carried it. In Categories F (soups & sauces) and E (non-refrigerated meals), 6% of the products made this claim while an additional 34% and 35% of the products respectively could have carried it. This is of concern as consumers are not able to easily identify if a product contains MSG; easy indentification would be of benefit to those sensitive to MSG who develop adverse reactions on consumption.[21]

The FDA stipulates that MSG must be indicated on the product label if it is added directly or indirectly as part of another ingredient. This creates a loophole for manufacturers of foods that contain other sources of free glutamates, but do not have to declare their presence. For example, free glutamates can be added to food in the form of hydrolysed vegetable protein. The presence of the free glutamates does not have to be declared. It has been proposed that a 'no MSG' claim may only be allowed on labels in cases where the product contains no other sources of free glutamates. In Canada, claims that a product is free from or has no added MSG while the product contains other sources of free glutamates are considered misleading.[6]

Forty per cent of people globally check for the presence of preservatives in products, and 36% check for colourants and other additives.[18] The claims **'preservative-free'** and **'no artificial colourant'** were the additive-free claims made most often, and comprised 8% each. The claim **'no artificial flavourant'** was made on 3% of the products. Products in Categories A (breakfast cereals), B (savoury snacks) and F (soups & sauces) carried the claims 'preservative-free', 'no artificial colourants' and 'no artificial flavourants'. These claims could have been made for a number of products in all categories, which did not list preservatives, artificial colourants or flavourants in the ingredient list. A consumer could correctly interpret the absence of these additives from the ingredient list to indicate that the product does not contain them. The products were, as indicated, evaluated in the same way as a consumer might interpret the label.

Category D (refrigerated meals) carried the most **preservative-free** claims (30%) with no products in Categories C (sweet snacks) and G (convenience desserts & baked goods) carrying the claim. A further 65% of the products in all the categories could have carried it. In Category G (convenience desserts & baked goods), 95% of the products could have carried the claim. The difference between the claims made (8%) and the claims that could have been made (45%) for the categories covered was significant (p <0.001) for the absence of preservatives. According to an AC Nielsen study,[18] 44% of South African consumers and 40% of consumers globally look for preservative information on food labels. It is of concern that not more food manufacturers are providing this information on their product labels.

Thirty per cent of the products in Category D (refrigerated meals) carried the claim **'no artificial colourants'** closely followed by Category A (breakfast cereals) with 29%. None of the products in Category G (convenience desserts & baked goods) and one product in Category C (sweet snacks) carried it compared with the 40% and 39% respectively that could potentially have carried it. The difference between the claims made (8%) and the claims that could additionally have been made (36%) overall was also significant (p <0.001) for this claim.

Category A (breakfast cereals) carried the claim **'no artificial flavourant'** on 29% of the products while an additional 43% of the products could have carried it. None of the products in Categories D (refrigerated meals), E (non-refrigerated meals) and G (convenience desserts & baked goods) carried it compared with 48%, 29% and 20% respectively that could have carried it. The difference between the claims made (3%) and the claims that could additionally have been made (22%) overall was significant (p <0.05) for this claim as well.

CONCLUSIONS AND RECOMMENDATIONS

Although a high number of compound ingredients were listed, all the labels, as was expected, did not meet this regulation, constituting a labelling error. Nearly a quarter of the non-refrigerated meals evaluated contained a compound ingredient not identified in the ingredient list. It was further discovered that some compound ingredients not identified contain components that have an allergy risk, such as wheat.[1] The lack of allergen identification could be seen as the presence of 'hidden allergens'. Although ingredients derived from egg were mostly indicated, a number of the products did not identify ingredients derived from milk in the ingredient list, another labelling error. A number of the products listed ingredients, but did not indicate if they were derived from an allergen, as required by the draft regulations. The concern here again was wheat not being indicated. These are major obstacles for food-sensitive individuals who rely on clear and correct labels for protection against adverse food reactions.

A further major concern identified in most of the categories was the high percentage of products containing an ingredient of unknown origin, which in most cases could have been derived from gluten/wheat or soy, which are allergens[1] and need to be identified in the ingredient list. This is another major obstacle for food-allergic individuals or other consumers wanting to avoid a specific ingredient.

Specific allergen-free claims could also have been made on a third to half of the products, but only one product carried an allergen-free claim. The lack of allergen-free claims is a concern for consumers suffering from food allergies. Any 'free from' allergen claim will be helpful for an allergic consumer when making food choices. It will be especially helpful for foods with an obvious connection with the allergen such as biscuits that could have been in contact with peanuts.[3] Currently in SA there are no labelling guidelines for making 'free from' allergen claims. The draft labelling regulations stipulate regulations for making a gluten-free claim.[12]

Besides the 'free from' allergen claims, many food products could have carried a variety of additive-free claims to differentiate the product and to provide such information in a user-friendlier format to consumers. Such additive-free claims are important to South Africans as 44% check for preservative information on labels, 38% for colourant information and 43% for general additive information.[24] The indication of certain

additive-free claims, such as tartrazine-free and MSG-free, may be beneficial to consumer health as many sensitive consumers are avoiding them owing to food intolerance.[22,23] The food label is often the consumers' only source of information about the product they want to buy. Legislators should duly consider 'free from' claims, whether allergen- or additive-free, as food manufacturers don't want information overload on their labels, but they should provide the consumer with as much product information as possible.

More studies of this nature should be conducted to highlight possible loopholes in the labelling regulations and the improvements that could be made by legislators and food manufacturers. The lack of studies of this nature restricted the discussion of this study. A similar study could be conducted once the new proposed draft labelling regulations are published and reach their implementation date. Other food categories not covered in this study could also be included in future evaluations.

Through accurate labelling that clearly indicates product composition, the food industry can help to manage the risk of adverse food reactions. This will assist a consumer, sensitive to a certain food or food ingredient, to avoid eating the product in question.[1] Food allergy prevention is the responsibility of the allergic consumer and the food manufacturer.[3] Research is ongoing to define threshold levels of allergens able to trigger a reaction together with validated testing methods for the detection of food allergens. This is essential to implement effective hazard control procedures and address the problems of allergen cross-contamination in the food industry. This will assist the efforts to provide the consumer with valuable and trustworthy food label information.[7]

Declaration of conflict of interest

The authors declare no conflict of interest. This was an institutional study with no involvement from the corresponding author's employer in terms of the execution, funding and reporting of the research. The research proposal for her Master's thesis was approved, the checklist compiled and the product selection finalised before she took up her current employment.

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