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Food-allergic consumers' labelling preferences: a cross-cultural comparison

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Background: Recent changes in European food safety legislation have resulted in the implementation of statutory requirements regarding the traceability and labelling of 12 food allergens. This article describes research conducted to establish if current food labelling practices are perceived to be adequate by food-allergic consumers, and whether further policy changes need to be implemented in order to optimize consumer protection. **Methods:** A total of 40 food-allergic consumers were recruited in both the Netherlands and Greece. Participants were people suffering from one or more of the three most common food-allergies, milk, egg, and/or peanut or tree nut. In a retail environment, participants were given a list of 15 potentially problematic food products which they were asked to buy as if for their own household. The participants were observed during the course of product selection and questioned about specific problems they experienced, as well as information preferences for food allergy information. **Results:** Participants reported many problems linked to the readability of the label (e.g. font size, contrast). Not all packages contained relevant allergy information, and many participants reported that the ingredients list was insufficient for their needs. Personal experience of particular products was an important factor in the selection process. Dutch participants reported frustration regarding frequent changes in recipes of products available in the supermarket. **Conclusions:** In general, food-allergic consumers were not satisfied with the current labelling practices. Information was thought to be unclear or insufficient, which resulted in personal stress and feelings of insecurity. Further research is needed to identify how best allergy information might be provided.

Keywords: consumers, food allergy, food products, labels

The prevalence of food allergy is around 5–8% in children[1] and 1–2% in adults,[2,3] although self-reported food allergy is higher and runs at ~25% of the population.[4] Complete avoidance of all foods containing the problematic allergen is the only way to manage food allergy.[5–10] As a consequence, effective labelling of food and ingredients is an essential element of health protection,[5,6] and must be accurate, complete and presented in a form which can be accessed in the retail environments used by food-allergic consumers. In contrast, consumers with other food-related concerns tend to rely on a broader range of sources than those used by food-allergic consumers.[11,12]

On the 25th of November 2005 the new European Union (EU)-directive (EU directive 2003/89/EC amending 2000/13/EC) was applied, which required the food industry to list 12 potential allergens on food labels if food products contained them. The directive underlines the principle that all potentially allergenic ingredients should be labelled, regardless of the quantity contained in the finished product. Although there are some exceptions to this rule, there is no requirement for ingredients to be specified if the ingredient is a compound with a composition defined in EU legislation and constituting <2% of a product. If, however, the product contains important allergens, information about the allergen content must appear on the label.

Despite the new labelling legislation,[13] there is evidence to suggest that some stakeholders are unconvinced that sufficient allergy information will be provided to food-allergic consumers.[14] For example, uncertainty regarding product safety could be caused by fear of cross-contamination, the continued availability of unlabelled products (for example those which are not packaged) and difficulties in understanding or interpreting information contained on labels. Novel foods represent another potential source of concern about food allergy.[15–17] Novel foods are defined as foods or food ingredients that have no history of safe use in the EU.[16]

There is some evidence to suggest that food-allergic consumers perceive there to be a lack of information specifically about the inclusion of potential allergens in food products.13,[18–20] Against this, the total amount of food-related information is perceived by many consumers, including those suffering from a food allergy, to be overwhelming in terms of quantity,[13,18,20] an observation confirmed by research into other forms of food-related information provision.[21] To improve the situation, the labels should be comprehensive regarding consumer information needs, and maximize the food-allergic consumer's ability to interpret the implications for their own allergy.[22]

Previous analysis has indicated the need for a targeted communication strategy focusing on the information needs of food-allergic consumers.[14] As food-allergic consumers rely on food labels to manage their food allergy,[13] producers have to take into account the different information needs of different allergic consumers. For example, products developed for consumption by children may require clearer and different labelling compared to products aimed at adult consumers. Food-allergic and food-intolerant consumers report that they spend more time on grocery shopping in order to find safe products.[23,24] Spending more time on grocery shopping may not be negative *per se*, as the provision of more information may give the food-allergic consumer the opportunity to make better and safer food choices. However, recent research shows that the time spent on grocery shopping has a potential

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negative impact on quality of life and economic functioning of food-allergic consumers.[25]

Social activities may be problematic, because food-allergic consumers cannot eat outside of the home without making special arrangements with caterers or social contacts.[3] More specific allergen information must be provided if food-allergic consumers are to be able to engage in normal social activities, and to experience improved quality of life.

The main objective of the research presented here was to test consumers' preferences regarding food labelling in a realistic shopping environment. Consumer behaviour regarding package-size, quantity and brand-choice can be better predicted in the retail environment compared to that observed in a laboratory or 'artificial' context.[26,27] In particular, the research aimed to elicit *understanding of the preferences of food-allergic consumers regarding labelling of potentially problematic ingredients*. A second aim was to identify *differences in information needs and formats*, and how these might *differ across countries* with different culturally determined dietary preferences. Finally, the research aimed to identify variation in consumer labelling preferences according to the *severity of the potential allergic reaction*, and other social circumstances associated with patient needs.[28]

Methods

The study was conducted in the Netherlands and Greece. Participants were recruited through advertisements in several local newspapers, Internet advertisements on patient group websites, electronic mail advertisements and printed advertisements in university campuses and workplaces.

Three allergies were selected from the EU-list of the 12 potential food allergies (EU directive 2003/89/EC amending 2000/13/EC): milk, egg and (pea)nuts. These were chosen because in children the most common food allergy is to milk and egg, and in adults the most common allergy is (pea)nuts. Participants were selected on the basis of their self-reported allergy (or allergies), or their children's allergy (or allergies), and the severity of these allergy or allergies. Thus participants were included in the study if they reported that they (or their children) had one or more of the selected food allergies, necessitating avoidance of one or more problematic foods. Female respondents predominated in the study, because in the Netherlands and in Greece they are mostly responsible for food shopping. Half of the sample in each country consisted of parents of food-allergic children, the other half of adults with a food allergy. In total 20 participants were recruited in each country. Table 1 shows the demographic characteristics of the study populations in the Netherlands and Greece.

The participants were interviewed and observed in a supermarket during the course of their shopping. Whilst it cannot be guaranteed that the presence of the interviewer had no effect on the actions of the consumers, the face validity of the results would suggest that the information obtained in the study reflected consumer's experiences and preferences. The study design is summarized in table 2. This was to examine differences in consumer problems according to whether they were in a *familiar* or *unfamiliar* shopping environment, and whether the participants were *food-allergic consumers* themselves, or responsible for *food-allergic children*. Low, middle and high priced supermarkets were included in the study, although participants were asked to visit the type of supermarket they usually used with respect to the cost of the different retail environments.

A shopping list containing 15 potentially problematic food products was given to the participants at the start of the study. The shopping list (Appendix 1) was developed together with a dietician who specialized in food allergy, and included products aimed at different meals (breakfast, lunch and dinner) as well as snack foods. The participants were instructed to try to purchase all of the items mentioned on the shopping list, and interviewed during the course of their shopping (Appendix 2).

Before the actual study took place, a pilot study was conducted to test whether the proposed research design was appropriate. The results of the pilot study ($n = 4$ food-allergic consumers) indicated that the shopping list was appropriate, and demonstrated that the study design worked well.

The interviewers did not help the participants with the shopping task, but only observed and interviewed them in the course of their shopping activities. Once all items from the list had been selected, the participant went to the cash desk. Unbeknown to the participants at the outset of the study, the groceries were paid by the interviewers and the participants could take them home afterwards.

Although no time limits were set, the interviews took approximately 1 h to complete and were audio-taped.

Table 1 Demographic characteristics of the study population

Characteristics	Category	Netherlands *N* (%)		Greece *N* (%)	
Gender	Male	6	(30)	6	(30)
	Female	14	(70)	14	(70)
	Total	*20*	*(100)*	*20*	*(100)*
Age	18–24	3	(15)	5	(25)
	25–34	5	(25)	2	(10)
	35–44	8	(40)	11	(55)
	45–54	2	(10)	1	(5)
	55–64	2	(10)	0	(0)
	>65	0	(0)	1	(5)
	Total	*20*	*(100)*	*20*	*(100)*
Working status	Full-time	4	(20)	9	(45)
	Part-time	4	(20)	3	(15)
	Unemployed	0	(0)	0	(0)
	Pensioner	1	(5)	1	(5)
	Student	2	(10)	5	(25)
	Homemaker	5	(25)	2	(10)
	On disability allowance	2	(10)	0	(0)
	Different	2	(10)	0	(0)
	Total	*20*	*(100)*	*20*	*(100)*
Education level	Low	2	(10)	1	(5)
	Medium	9	(45)	4	(20)
	High	9	(45)	15	(75)
	Total	*20*	*(100)*	*20*	*(100)*
Allergy[a]	Milk	10	(50)	11	(55)
	(pea)Nuts	13	(65)	13	(65)
	Egg	9	(45)	4	(20)
Household Income	<750 Euro per month	0	(0)	3	(15)
	750–1500 Euro per month	4	(20)	2	(10)
	1500–2250 Euro per month	6	(30)	4	(20)
	2250–3000 Euro per month	5	(25)	6	(30)
	>3000–3750 Euro per month	4	(20)	5	(25)
	undisclosed	1	(5)	0	(0)
	Total	*20*	*(100)*	*20*	*(100)*

a: Multiple allergies in one person are calculated as separate cases

Table 2 Study design

	Parents	Adults	Total
Familiar shop	5	5	10
Unfamiliar shop	5	5	10
Total	10	10	20

Afterwards, all interviews were transcribed and translated into English. Atlas Ti was used to facilitate qualitative analysis of the qualitative transcripts. First, several interviews were read and codes were attached to all relevant remarks and answers to the questions. Second, the codes were tested in a few more interviews. If codes were attached to more than two quotations, the code was kept in the coding system for all interviews analysed.

A cross-check for coding was performed by comparing the codes attached in the same transcript by different researchers. The actual interviews were conducted between Mondays and Saturdays in January and February 2006.

Results

All participants reported problems regarding both the readability and the visibility/accessibility of information on the label. Participants found the terminology used on the label problematic. In particular, terminology used to describe the ingredients was reported to be difficult to understand, and resulted in confusion and misinterpretation. Labelling of E-numbers and vegetable fats was also reported to be problematic, because of lack of specificity. Participants indicated that they could not find the essential allergy information they needed, in part because they perceived that they were 'overloaded with information', particularly in the context of information presented using unfamiliar terminology or scientific jargon. Many comments were made about the appearance of the labels. Font sizes were mentioned as being too small, and problems associated with the colour contrast of the label and problems with reading glossy or very shiny materials were also reported.

In the Netherlands, specific allergy information is provided on some products. Whilst participants expressed a positive view regarding this practice, they also indicated that they would like this information placed *above* the ingredients list, to avoid searching the whole package. Greek participants also indicated that they would like allergy information presented in this form, although it is not yet common practice to label products in this way.

Most Dutch participants liked the inclusion of symbols on the package which indicate whether or not an allergen was present in the product. However, they expressed a preference for textual allergen information to be included in addition to symbolic presentation of allergen information. Some symbols were reported to be ambiguous, resulting in lack of clarity regarding whether the specific allergen was, or was not, contained in the product. At present, symbolic labelling is not applied to Greek products. However, Greek participants indicated that they would like such an approach introduced, albeit in conjunction with the normal ingredients list.

The number of languages which must be used on a label was reported to be a source of irritation to the participants. This is a direct consequence of regulations which state that products marketed in several countries should label in all languages of the targeted countries. In Greece, inconsistencies between the information given in different languages were experienced (for example an ingredient was not mentioned in the Greek text, but it was mentioned in the English text on the same label), which was both annoying and potentially dangerous.

Since the new EU labelling legislation was introduced (November 2005), many producers use precautionary warnings such as 'may contain traces of nuts', or 'made in a factory where nuts are processed'. Many participants indicated that these messages limited their food choices. In cases of severe food allergy, the participants would not take the risk and avoided products with 'may contain' labels. In addition, participants expressed the view that they would not contact the shop personnel if they needed more information about the ingredients contained in a specific product. This was because they did not perceive that people working in the retail environment possessed sufficient knowledge to provide reliable information about potential allergens in foods. If doubtful about the ingredients of a specific product, participants were more likely to contact the producer (by phone or e-mail). Dutch participants were more likely to apply the strategy of contacting the producer directly. Greek participants reported that they would only contact a producer 'if really necessary'.

Changes in recipe and changes in the assortment of products was a problem specifically mentioned in the Netherlands. Dutch participants found it annoying that specific products' ingredients were changed quite frequently. Respondents reported that they *always* had to pay attention to the packaging of food products and that a changed recipe was often associated with a changed label, although specific products were not mentioned in this context. Another problem is the change in product assortment. In the Netherlands, supermarkets frequently replace products by other brands or by different types of products. This makes shopping more complicated and more time consuming for food-allergic consumers.

Generally, it was found that Greek participants reported not spending too much time on reading labels, except when buying products which they had not bought before, a direct consequence of having checked the former for safety previously. They perceived that their routine shopping time did not usually exceed that of an average consumer. However, in the Netherlands, most of the participants indicated that they perceived that they spent much more time on shopping compared to people for whom food allergy was not a consideration. This was because participants reported constantly having to check the labels, as well as spending additional time when shopping in order to ensure consumption of a varied diet, which occasionally included the introduction of new products. Participants were unenthusiastic about the amount of time needed to check labels, but thought that the time investment was necessary if their diet was to be safe. The amount of time participants spent checking ingredients was proportional to the severity of the allergy. For example, the interview data suggest that respondents who were allergic to peanuts (which could result in anaphylactic shock), spent longer time reading ingredients labels compared to respondents who had only mild allergic reactions to hazelnuts. Another problem important to food-allergic participants with more severe food allergies were the percentages of potentially problematic ingredients included in the product. Certain potentially allergenic substances may or may not induce an allergic reaction, depending on the type of allergy and the quantity of the substance present in food. For some food allergies (such as peanut allergy), even very small amount may cause an anaphylactic shock.[29] Thus information about percentages of allergenic ingredients is important at least for some severely allergic consumers.

The reduced variety of food products available to participants who suffer from multiple allergies was problematic. This was a consequence of the need to restrict purchases to a very limited number of familiar products. However, most participants in the study reported that they did not experience the limitations of variation in their diets as a burden. In Greece, people make a lot of products by themselves at home, and so this represented less of a problem compared to the Netherlands.

Participants reported feelings of insecurity associated with the consumption of new products, particularly those purchased on behalf of food-allergic children. Participants who have had bad experiences associated with specific types of food products were particularly fearful of a recurrence of the problem, even if an alternative brand name were selected,

or the recipe had changed. Other participants, especially among the young adults and adolescents participating in the study, were more willing to take risks compared to parents of children with a food allergy.

In general, familiarity with a specific shopping environment was not influential in differentiating the amount of time food-allergic consumers spent selecting products. Respondents interviewed in shopping environments with which they were familiar took approximately the same time to complete the tasks as the respondents in a non-familiar shopping environment.

Discussion

In this study, the preferences of food-allergic consumers regarding existing labelling practices and information provision regarding potentially problematic ingredients were investigated. The results show that, in general, food-allergic consumers are not satisfied with current labelling practices, which they find inadequate, inappropriate or difficult to use. In addition, the results provide insights into the information preferences of food-allergic consumers, which is invaluable when considering how best to develop future policy and practice in this area. There is also evidence to suggest that improved information provision would have a positive effect on their quality of life of food-allergic consumers.

The main results concern the label appearance and the content of the ingredient lists. The readability of the label is problematic for some of the food-allergic consumers included in the study. Ingredients lists contain too much information ('information overload') as well as unfamiliar terms, indicating that the current labelling strategy and mode of presentation of information is inappropriate. Even if 'educated' about the meaning of unfamiliar terminology, consumers are still likely to experience difficulties in processing a lot of information about specific products at the same time.[21]

The font size was frequently reported to be too small, and the contrast between the text and the background of the label was not always optimal. This suggests that there needs to be regulations to ensure application of the minimal font sizes, and the minimal percentages of contrast regarding information presentation on the label. However, increasing font sizes may not be possible given the amount of non-allergy information that also has to be provided as a statutory requirement, suggesting alternative information delivery systems would be useful. For example, novel information and communication technology (ICT) approaches has the potential to deliver personalized information to consumers in a form which they prefer, assuming adequate food and ingredient traceability systems can be put into place. New ICT-technologies like Radio Frequency Identification (RFID), bar-coding on foods sold loose could be used to provide information which is more complete and easier to understand, although consumer responses to the use of new ICT approaches such as these is somewhat equivocal.[30] Another option which could be applied in order to enhance the readability could be to clearly enclose the ingredient list and allergen information text in a 'frame', ensuring optimal contrast between text and background.

The large number of languages included on the label were also reported as being problematic. Some of the food-allergic consumers included in this study reported being overwhelmed by the use of multiple languages, as they could not find the right language on the package immediately.[19] However, the multicultural nature of modern societies means that information must be available in the languages of those purchasing products in a particular country. Again, it may be useful to consider how ICT approaches could potentially deliver useful solutions to the need to deliver allergy information in a variety of languages.

At present, the location of allergen information differs between products. To ensure people can find the allergen information fast and easily, a standard location for allergen information on the label is needed, for example in a clearly identifiable place above the ingredient list. In addition, there are no clear rules on 'how' the allergen information should be included on the label. The participants in this study expressed approval of the use of symbols for the allergen information, although they would still like the allergen information to be included as text in the ingredients list. There is a need for universal or internationally harmonized symbols to indicate inclusion of potential allergens on products, and agreement as to whether these indicate inclusion or exclusion of potentially problematic ingredients. A good option might be to place symbols on the front of the product, and written allergen in formation on the back of the package above the ingredient list. This would provide food-allergic consumers with a familiar signpost regarding allergen information.

In many cases the terminology used on the label was rated as being 'too difficult' for the participants included in this study to interpret. For example, some consumers did not realize 'whey powder' indicated that milk had been used as an ingredient. This problem will be solved as a consequence of new legislation which requires that all allergens must be listed on the label. Clarity regarding which allergen is referred to will also be required. For example if the milk protein casein is used as an ingredient it must be in the list of ingredients as: *casein (milk)*. There is a need for percentages and/or quantities of potential allergens indicated in the ingredient list to be included. Precautionary labelling (such as 'may contain . . .') was not viewed positively by consumers in this study, as it caused unnecessary restrictions in the diet of food-allergic consumers instead of giving them more security about their food choices.

Some differences between Greek and Dutch food-allergic consumers emerged from this research. In the Netherlands, specific allergy information is provided on many products, whereas in Greece this is not available at present, although Greek participants were enthusiastic about its provision. Dutch participants reported problems associated with changing recipes and assortments, whereas Greek participants did not mention product changes as important, perhaps because producers in Greece tend to change their recipes less often. The more static assortments available in Greek supermarkets might reduce shopping time for Greek food-allergic consumers relative to that spent by the Dutch. Alternatively the Dutch food-allergic consumers may be more risk averse.

While novel information delivery systems need to be developed and implemented if all consumers are to have access to ingredient and process information in a form which they can read and understand, Greek participants reported concerns about novel ICT approaches to information delivery being potentially difficult to use. In both countries, the participants reported being worried that the introduction of novel ICT technologies will be very expensive, and that this will be reflected in increased retail prices.

Some food allergy labelling policies must be applied at a pan-European level (for example, mandatory labelling of potential allergens, together with percentage inclusion). Harmonization of food labelling practices is required given increased mobility across EU member states, and internationally. However, some regional differences may exist (for example, ICT information delivery approaches may be adopted by consumers more readily in some countries compared to others). For this reason, European regulation regarding allergen labelling should provide potential opportunity for local diversification regarding

additional information requirements and information delivery practices, although it is beyond the scope of this study to describe how this might apply across all EU member states. In addition, other factors, such as the failure to remove allergens as a consequence of production processes, also need to be addressed.

In conclusion, despite the new EU-regulations regarding food labelling practices and food allergens, further changes are needed if the health of food-allergic consumers is to be protected. The consequences of suffering a food-allergic reaction can potentially be life-threatening, and effective labelling which meets the needs of food-allergic consumers must be a priority within Europe.[13] In addition, other factors, such as the failure to remove allergens as a consequence of production processes, also need to be addressed. Failure to optimize information provision about potential food allergens in the retail environment may be detrimental to quality of life of food-allergic consumers.

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Key points

- Despite the new labelling legislation, current labelling practices are not sufficient to meet with the needs of food-allergic consumers. Poor labelling practices negatively affect the quality of life of food-allergic consumers.
- This research shows that there is a need for harmonization of labelling policies and practices. In addition, this study indicates that there are only minor differences in labelling preferences between Greece and the Netherlands. Therefore pan-European labelling polices with some national differences are feasible.
- Product labels can only contain limited information due to space limitations. Through new ICT approaches more (personal) information can be obtained on request by food-allergic consumers.

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Appendix 1

Shopping list

(1) Apple pie (second choice other fruit pie)
(2) Biscuits
(3) Bread rolls
(4) Chicken soup (tinned) (for vegetarians: vegetable soup)
(5) Chocolate bar
(6) Cornflakes
(7) Crisps
(8) Margarine
(9) Mayonnaise
(10) Pasta
(11) Ready meal Asian food
(12) Readily prepared schnitzel coated with breadcrumbs (for vegetarians: corn burger)
(13) Spaghetti sauce (instant)
(14) Sandwich spread
(15) Vanilla ice cream

Appendix 2

Interview questions used during the shopping investigation

(1) Did it cost you a lot of effort to find this product?
(2) Why did you choose this specific product?
(3) What kind of information did you look for?
(4) Did you find the information you were looking for? What did you miss?
(5) What do you think of the way the information was presented?
(6) Do you trust the information that was given on the label?
(7) In what way should the information be presented to be useful to you?
(8) If you can't find the product, would you ask the personnel to help you?
(9) Would you trust the information the personnel gives you?
(10) Are you satisfied with the variety of products for this specific product concerning your allergy?
(11) Are you willing to pay more to buy allergen-free products? Do you pay more for you food groceries?

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