REVISTA O MUNDO DA SAÚDE

Nutritional information in restaurants: a study of pictogram comprehension

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Abstract

Nutritional information in food services is relevant to food choices, in addition to being a way of respecting the consumer's right to choose. However, it is necessary that this information to be easily understood by the diners. Thus, the aim of this study is to propose a pictorial model of nutritional information, which warns of the presence of gluten, milk, eggs, and meat in a public university restaurant based on the perception of consumers and the knowledge of nutrition and the information design. The quali-quantitative study, with a cross-sectional design and exploratory character, was carried out in Curitiba, Paraná, with adult students from a public institution. Through a self-answered questionnaire, the comprehension of pictograms with and without a label that represented the presence of gluten, milk, meat, and egg, the relevance of the information presented, and the preference of the place where the nutritional information was made available were evaluated. 131 consumers participated with an average age of 21.3 ± 2.6 years, 73.3% of whom were female. A good perception of the proposed pictograms was observed, and was better understood with labels, which represented “contains egg” and “contains meat”. Regarding the presence of milk, the bottle pictogram was the most accepted. The preferred location for viewing the information was at the buffet, with interest mainly in the name of the meal and the list of ingredients. The proposed pictograms models were shown to be adequate according to consumers, reaching the objective of the study, making the information easily understood, and favoring the consumers' right to choose.

Keywords: Nutritional information. Nutrition labeling. Food services. Universities. Students.

INTRODUCTION

Eating outside the home has become a habit for many Brazilians[1,2,3], such as workers and students. Among the places to have meals outside the home, there are University Restaurants (UR), which are of great importance for students of public academic institutions, because in addition to having a reduced cost, they contribute to greater consumption of fruits and vegetables, promoting healthy food habits[4,5].

At the same time, it is observed that the increase in the frequency of meals taken outside the home results in a growing concern with the quality of the population's diet[2,5], as well as in guaranteeing the right to information[6]. Therefore, the availability of

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nutritional information on the preparations offered can assist consumers in their food choices[7,8,9,10], as it allows diners to know what they are consuming. In addition, there is evidence that consumer beliefs related to health favor the use of nutritional information in restaurants[11].

In Brazil, there is still no federal legislation that regulates the provision of nutritional information in food services; there are only specific laws in some states and municipalities that require its availability[12,13,14,15]. Although it is mandatory in some places, there is no standard graphic format for presenting the information, demonstrating the need for further studies on new models that make it possible for consumers to understand nutritional information. Thus, the use of pictograms is one of the possible applications in restaurants[16].

Moreover, in the design of information it is common to develop and use pictograms to facilitate the understanding of information. Pictograms are considered graphic representations of visual synthesis[17] that allow a quick understanding of information about objects, concepts, orientations, or instructions[18]. Thus, the pictograms allow synthesizing and facilitating the communication and understanding of information by a wide audience, with different levels of literacy and language[18,19,20,21]. In addition, for a good understanding of the pictograms it is important that in their development aspects of the users are considered, such as visual perception, familiarity, memory, cultural aspects, and graphic aspects, such as size, style, use of shapes and colors[17,18, 22,23,24].

In restaurants, the use of pictograms tends to be well accepted since consumers prefer qualitative information over numerical information[17]. However, few studies have evaluated the use of pictograms on displays, in food services, to facilitate the identification of foods associated with restrictive diets[18]. Therefore, it is necessary to carry out studies that evaluate the feasibility of using pictograms from the population's understanding, aiming to favor the awareness of food choices outside the home in a more conscious way. In addition, it is essential that research for this purpose has a multidisciplinary approach, making it possible to elaborate and evaluate pictograms based on specific protocols and knowledge in the health area. Thus, the objective of this study is to propose a pictorial model of nutritional information, which warns of the presence of gluten, milk, eggs, and meat in a university restaurant at a public institution based on the perception of consumers and the knowledge of nutrition and information design.

MEDOTOLOGY

This pictogram comprehension field study was qualitative and quantitative with a cross-sectional design and exploratory character and was carried out in May and June 2018. The study was approved by the Research Ethics Committee (CEP) of the Federal University of Paraná (CAAE no. 45215315.8.0000.0102).

Sample design

The research was carried out with the university population of a public institution in the city of Curitiba, Paraná, Brazil, of both sexes, aged 18 years or older, and who ate meals in the UR. The sample was determined by non-probabilistic means, with at least five

individuals per item on the scale[25]. Therefore, the questionnaire contained 20 items that would be used on a scale of understanding of the pictograms used in the proposal. Based on this, the study sample was at least 100 people, which is in accordance with international recommendations for analyzing the comprehension of pictograms (ISO 9186-2014) that indicate a sample of at least 50 people[24].

Study of the preparation of the proposal for the provision of nutritional information

The study was carried out in two parts: A) Study on the comprehension of food pictograms; B) Study on the format of the nutritional information availability.

A) Study on comprehension of food pictograms

Initially, a review of the literature was carried out to define which foods would be used in the new proposal with pictogram. Additionally, the Collegiate Board Resolution (CBR) No. 26 of July 2, 2015, which establishes the foods with the highest prevalence of allergies[26]; Law No. 17604 of June 19, 2013, which provides for the mandatory specification and disclosure of the amount of calories, the presence of gluten and lactose in the menus of bars, restaurants, hotels, fast foods chains, and the like[15]; restrictive diets related to lifestyle (vegetarians and strict vegetarians), and UR characteristics were used. Thus, the selected pictograms represented the presence of gluten (intolerance and/or allergy), milk (intolerance, allergy and/or animal origin), meat (animal origin), and egg (animal origin and/or allergy).

After the review was carried out, the warning pictograms proposed in the work of Loepert *et al.*[22] were decided upon, with authorization, to compose the model of nutritional information. The authors carried out, in the field of information design for the health area, a study for the creation of applied pictograms in the form of stamps, in order to provide the identification of dietary characteristics for restrictive diets, focusing on the graphic development of the pictograms and their evaluation[22].

Thus, to represent the presence of milk, gluten, and meat, the pictograms proposed by Loepert *et al.*[22] were used as a basis. For the presence of milk, in addition to the one proposed by Loepert *et al.*[22], another pictogram elaborated by a designer for this study was also used to verify if there would be an improvement in the consumers' comprehension of the pictogram associated with cow's milk (pictogram that referred to a bottle of milk - model 2). This action was performed since in the study of the previous authors[22] the understanding of the pictogram, which indicated the presence of milk (pictogram referring to the cow animal - model 1), was lower than the other analyzed pictograms. Finally, the egg presence pictogram was also prepared by a professional designer.

Moreover, to assess the self-explanatory capacity of the pictograms and the understanding of the individuals in relation to the information they wanted to pass on, two ways of presenting the nutritional information were analyzed, the first with only pictograms (pictorial language) and the second with pictogram accompanied by labels (pictorial and verbal language), (Chart 1).

The pictograms were used in black with hollow designs in white. In the case of the texts, these were arranged in white background balloons with black outline, with the term "COM + the ingredient" (COM = WITH) in black, both in upper case (capital) letters without a serif, following ISO 700128

and Formiga[18] guidelines to ensure contrast and readability. This proposal was also adapted to the current model of the Food and Nutrition Unit (FNU), since in the UR there was only a monochromatic printer.

In the questionnaire, the pictograms were applied to an image simulating the acrylic display in the restaurant that included the name of the meal along with the respective pictograms that indicated the restrictive ingredients present (Figure 1).

Through an open questionnaire, the interviewee reported what they understood about each pictogram investigated.

B) Study on the format of the nutritional information availability

In order to provide nutritional information, the consumers' preferred location was evaluated which would make the information available, considering the reality of the FNU. For this evaluation, what was already done in the UR (fixing the information at the entrance of the FNU, next to the menu), the places that the FNU included information for the consumer (fixing it on an information wall), places close to the serving of the meals (next to the trays), and places where restaurants commonly provide their information about the preparation (availability next to the buffet and the trays) were all considered. In addition, the importance of nutritional information being made available was assessed in order to reflect on the format that most met expectations of the consumers.

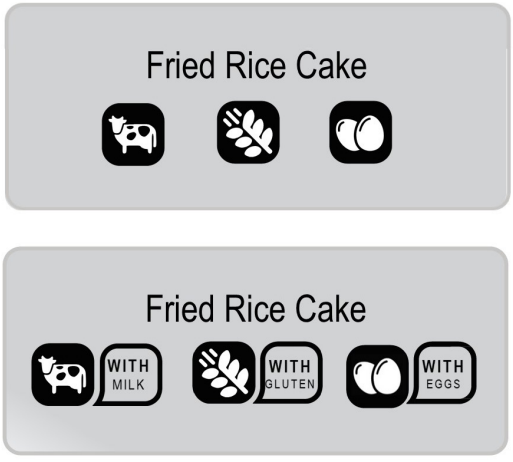

Image source: pictogram adapted from Loepert *et al.*[22] and authors.

Figure 1 – Example of models used in the questionnaire to assess comprehension and preference, with pictorial and verbal pictorial information of the limiting ingredients contained in a meal. Curitiba, Paraná, Brazil, 2018.

Study questionnaire

The research questionnaire was structured in four parts, with the help of design researchers. For the elaboration of the instrument, an initial study carried out in the institution's UR was considered, in which the format for making nutritional information available and the difficulties faced on a daily basis to make it available to consumers were observed[28]:

Part I - Socioeconomic data: age, sex, monthly household income, and major at the

institution.

Part II - Nutritional information made available in the UR: questions related to the identification and use of nutritional information made available by the UR, whether the individual used the information (yes or no) and what it was (menu, calories per serving, presence of lactose, presence gluten, presence of products of animal origin), and, if not used, for what reason (I did not know they were available; I am not interested; I do not understand the information; the information is not in an easy place to see; others).

Part III - Food restriction: signs of food restriction, indicating the reason for this restriction (health; religious; lifestyle; other).

Part IV - Analysis of the pictogram model and nutritional information model in the UR: a) the interviewee's understanding of the proposed nutritional information model with the application of the pictograms, without and with a label, using a 5-point scale (1- strongly disagree: 5-strongly agree). Considering that the questionnaire would be self-answered, instead of pictograms the term "symbol" was used, since the term is more widely known among the research participants. So the evaluation was carried out with the statements: "the symbols call my attention", "the symbols are easy to understand", "the symbols suggest a warning", "these symbols would help me in the choice of what I can eat", "these symbols would help me follow my diet"; b) understanding of pictograms without and with labels, by observing them and providing their meaning; c) analysis of the milk pictogram, indicating the preference option; d) opinion about the place where the information is made available - "at the entrance", "at the buffet", "on the wall", "next to the trays" -, listing the alternatives from 1 to 4, according to preference; e) importance of making nutritional information available - "name of the meal", "list of ingredients", "calories per serving", "warning of the presence of gluten in the meal", "warning of the presence of milk in the meal", "warning of the presence of products of animal origins in the meal", "warning of the presence of egg in the meal"-, enumerating the alternatives from 1 to 7, according to the importance considered; f) evaluation of the usefulness of the new model when it comes to food choices, compared to the one currently available, using a 5-point scale (1-it would not be useful at all, when compared to those already used: 5-it would be much more useful, compared to those already made available).

Data collection

Data collection was carried out by trained academics from the Nutrition course, in the months of May and June 2018, using a convenience sample. The individuals were approached on the premises of a public university, on four different campuses, located in the city of Curitiba, Paraná. Participation in the study took place after reading and signing the Informed Consent Form (ICF), with the application of a semi-structured self-answered questionnaire.

Data analysis

To analyze the comprehension of the pictograms, the participants' responses were transcribed by two independent researchers. Subsequently, the results were demonstrated using a word cloud, using the Wordle® program. The word cloud highlights the frequency with which words appear in responses29. For the elaboration of the word clouds presented in herein, articles, numerals, prepositions, adverbs, and pronouns were filtered, as well as other elements, which would have limited symbolic value as to the relevance of content.

Quantitative data were tabulated, by double typing in Microsoft® Excel® 2010 and analyzed by Predictive Analytics Software (PASW Statistics) version 20.0 SPSS, through descriptive statistical analysis and frequency.

Chart 1 – Pictograms used to assess the understanding of the presence of gluten, milk, meat, and egg in meals. Curitiba, Paraná, Brazil, 2018.

Expected meaning	Unlabeled pictogram	Pictogram with label
Presence of gluten (intolerance and/or allergy)		
Presence of milk - model 1 (intolerance, allergy and / or animal origin)		
Presence of milk - model 2 (intolerance, allergy and / or animal origin)		
Presence of meat (animal origin)		
Presence of meat (animal origin)		

Image source: pictogram adapted from Loepert *et al.*[22] and authors.

RESULTS

131 students participated in the study, with an average age of 21.3 ± 2.6 years, and a minimum age of 18 years and a maximum age of 30 years. In addition, the majority were female (73.3%), with a family income of approximately 5 to 10 minimum wages (28.2%), and mostly comprising students from the Health Sciences Sector (51.1%), as shown in Table 1.

Regarding the use of nutritional information available in the UR, the most used were the menu with the respective meals (47.3%), calories per serving (13.0%), presence of products of animal origin (13.0%), presence of lactose (6.1%), and presence of gluten (1.5%). Furthermore, 48.9% of respondents reported not making use of the information provided, the main reasons being the lack of knowledge that the information was available (24.4%) and the lack of interest in the information (22.9%). Only 6.9% indicated the fact that the information was not easily accessible, and 3.1% reported the lack of understanding of the information.

Regarding dietary restrictions, the majority reported not having any (79.4%). Those who indicated, specified restrictions on meal preparation: concerning gluten for health reasons (0.8%) and lifestyle (0.8%); milk for health reasons (9.2%) and lifestyle (0.8%); products of animal origin for reasons of health, religious (both with 0.8%), and lifestyle (6.9%); and meals with pork meat for health reasons (0.8%), religion (0.8%), lifestyle (4.6%), and for not liking it (0.8%).

As for the pictograms, in the analysis of

the new proposal for making nutritional information available in the UR, more than 50% of the interviewees agreed that the pictograms, without and with a label, were noteworthy and that they were easy to understand. For the pictograms with labels, 47.3% fully agreed that they drew attention and 60.3% said they agreed that they were easy to understand. About 34% agreed that pictograms without a label suggested a warning, and 43% also agreed with this statement for pictograms with a label. Regarding the statement whether they would help with food choice and following their diet, agreement was also higher for pictograms with labels, compared to those without labels (Table 2).

Table 1 – Sociodemographic data of the interviewees. Curitiba, Paraná, Brazil, 2018.

Variable	Frequency	
	n	%
Sex		
Female	96	73.3
Male	35	26.7
Monthly family income		
Up to 2 minimum wages	14	10.7
2 to 5 minimum wages	52	39.7
5 to 10 minimum wages	37	28.2
More than 10 minimum wages	21	16.0
No declaration/ I would not like to inform	7	5.3
Study major		
Health Sciences student	67	51.1
Student from areas other than health	64	48.9

Note: n = number of participants; % = percentage of response.

Table 2 – Respondent comprehension of pictograms with and without labels. Curitiba, Paraná, Brazil, 2018.

	Degree of agreement n (%)				
Pictogram evaluations	Fully agree	Agree	Indifferent	Disagree	Fully disagree
Unlabeled pictograms					
Draws attention	35 (26.7)	68(51.9)	21 (16.0)	7 (5.3)	0
Easy to understand	31 (23.7)	73 (55.7)	5 (3.8)	20 (15.3)	2 (1.5)
Suggests a warning	7 (5.3)	45 (34.4)	31 (23.7)	41 (31.3)	7 (5.3)
It would help with food choice	32 (24.4)	61(46.6)	29 (22.1)	6 (4.6)	3 (2.3)
It helps for following the diet	23 (17.6)	47 (35.9)	52 (39.7)	7 (5.3)	2 (1.5)
Pictogram with label					
Draws attention	62 (47.3)	59 (45)	10 (7.6)	0	0
Easy to understand	79 (60.3)	48 (36.6)	1 (0.8)	2 (1.5)	1 (0.8)
Suggests a warning	27 (20.6)	57 (43.5)	20 (15.3)	24 (18.3)	3 (2.3)
It would help with food choices	57 (43.5)	51 (38.9)	19 (14.5)	2 (1.5)	2 (1.5)
It helps for following the diet	47 (35.9)	42 (32.1)	38 (29)	3 (2.3)	1 (0.8)

Note: n = number of participants; % = percentage of response.

When dealing with pictograms without a label for "contains gluten", 37.4% of the interviewees had a good understanding of the meaning. Meanwhile for the information "contains milk - model 2", 74.1% understood correctly, in contrast for "contains milk - model 1" only 41.2% of the individuals understood the information. This last pictogram was understood by many to indicate the presence of ingredients of

animal origin, mainly meat (24.5%). For the "contains egg" pictogram, 94.7% interpreted the concept well and for the "contains meat" pictogram, 78.6% understood the information as proposed.

Regarding the pictograms with labels, the contents were better understood if compared to those without labels. The pictogram "contains gluten" was understood by 85.5%. For the pictogram "contains milk - model 2" 98.4% understood correctly, and for the pictogram "contains milk - model 1" 93.1% of the individuals understood the information.

For the pictogram "contains egg" almost 100% knew how to say the proposed information. In relation to the pictogram "contains meat", 93.1% of the interviewees assimilated the concept. Figure 2 shows the interviewees' comprehension of the pictograms, the most prominent words were those that appeared most frequently in the responses.

The majority of respondents (96.2%) showed a preference for pictograms with labels. In relation to the "contains milk" pictograms, the preference was for the one containing the milk bottle (56.5%) instead of the other.

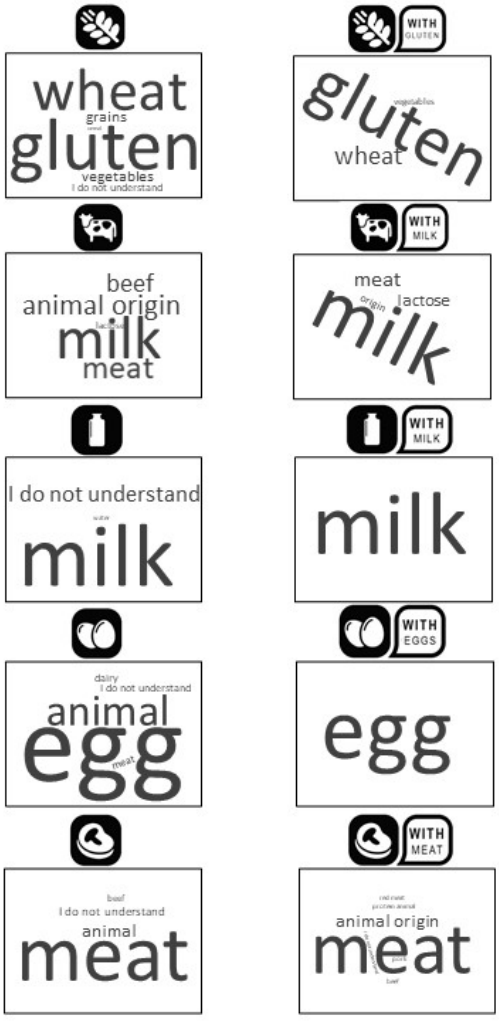

Figure 2 – Consumer comprehension in relation to pictograms, based on word clouds. Curitiba, Paraná, Brazil, 2018.

Table 3 – Respondents' preferences regarding the location of availability and use of nutritional information in the university restaurant. Curitiba, Paraná, Brazil, 2018.

Variable	Frequency	
	n	%
Evaluation of whether the new information model would be useful		
It would be very useful	42	32.1
It would be useful	71	54.2
Indifferent	17	13
It would not be useful	1	0.8
Most important information		
Meal name	80	61.1
Ingredient list	22	16.8
Calories per serving	6	4.6
Presence of gluten	9	6.9
Presence of milk	6	4.6
Presence of products of animal origin	7	5.3
Presence of eggs	1	0.8
Location preference of information availability		
At the entrance	37	28.2
At the buffet	74	56.5
On wall (inside the establishment)	6	4.6
Next to trays	14	10.7

Note: n = number of participants; % = percentage of response.

As shown in Table 3, more than 50% of respondents claimed that these new pictograms would be useful when compared to information already used by the UR. Moreover, the nutritional information considered most important was the name of the meal, followed by the list of ingredients. Regarding the place where this information would be made available, 56.6% preferred it at the buffet, followed by making it available at the entrance way.

DISCUSSION

This study proposed a pictorial model to provide nutritional information, which warns of the presence of gluten, milk, eggs, and meat, in the UR, aiming to serve an audience of young adults. It was observed that although the UR already provided some nutritional information, its use by the participants was still low, and among the reasons listed, the lack of knowledge about the availability of information and the lack of understanding of the information presented stood out. These results reinforced the need to conduct a study with the target audience, to test the comprehension of the information made available, thus favoring their effective use for communication[24].

It should also be noted that the interviewees considered the name of the meal as the most important information, followed by the list of ingredients, and the presence of gluten and animal products. Similar results were observed in the study by Oliveira *et al.*[16], with Brazilian and English university consumers, who identified that the list of ingredients was important, especially for Brazilians, as well as the provision of warning information to assist the vegetarian public. Additionally, in another study carried out in Brazil, with consumers from Minas Gerais in an à la carte restaurant, it was observed that the description of the ingredients was the most relevant and determinant item for choosing the dish to be consumed in these establishments[30].

However, based on studies and legislation[7,8,10,12,13,14,31,32], there is an emphasis on the provision of quantitative nutritional information in food services, such as the supply of the amount of calories and/or macronutrients. This type of information can be difficult to understand by consumers, including food services, as they do not know how to interpret and use them[33]. Furthermore, qualitative and pictorial information favors comprehension as well as is preferred by consumers, as assessed in the work by Oliveira *et al.*[16]. In the results found in herein, 60.3% of respondents agreed that this type of information is easy to understand.

Based on the findings, the use of pictograms as a proposal for qualitative nutritional information proves to be effective. Formiga[18] addresses the importance of the singularity of understanding that the pictograms provide. These graphic elements tend to be coded and memorized more easily than words, in addition to, in some situations, being instruments of facilitated communication for other languages and cultures[17,18,22,23,24].

At the time of data collection, the UR used pictograms that were not considered easy to understand by the students in this study. Furthermore, it is not known how they were created or chosen, whether they took into account aspects of design or the consuming public and whether there was a previous study on their comprehension before their use. It is worth mentioning that the choice or development of pictograms must be carried out considering the profile of the consumers, because, although people can learn meanings or conventions present

in the pictorial language, memorizing the meaning of the pictogram requires greater cognitive effort by the user[18]. Therefore, pictograms that meet fundamental aspects, such as being simple, with graphic elements that are easy to identify, with colors that contrast the figure and the background - in order to promote their visualization -, and are made up of drawings familiar to the user, have better result of understanding[17,18,19,21,23].

The review carried out by Fernandes *et al.*[8] also reinforces the results of this study, since it was observed that the use of nutritional information in restaurants with symbols and colors, is more easily understood and influential when choosing healthy foods. However, it, as well as that of Oliveira *et al.*[16], highlights that the use of colored symbols was investigated, while herein the use of black pictograms with hollow drawings in white were proposed. This is due to the fact that in the public service, such as the UR, equipment for color printing is limited, which could make it difficult to use a colored pictogram in these places. In addition, it was not possible to identify whether Oliveira *et al.*[16] considered the knowledge of information design and the reality of food services, regarding the availability to print nutritional information, when considering the use of colored pictograms.

Regarding the understanding of the pictograms proposed in this study, the results obtained indicated that the majority understood the message, indicating that for the interviewees the pictograms used were efficient in communicating, conveying a clear and objective message. Additionally, when comparing pictograms without and with labels, it was observed that the understanding was better in those with labels. This is due to the fact that writing reinforces the meaning of the pictogram or clarifies any doubts, since the pictorial and verbal modes of representation have different roles, which complement each other in the processing of a message[17,18,27]. In this case, the effectiveness of the communication depends on the type of information represented. For example, if the information is more abstract (i.e. gluten) the label can help more in understanding than the pictogram, but if the information is more concrete (i.e. wheat) pictorial representation can be more effective[17]. Furthermore, limitations such as literacy level and readers' familiarity with the pictograms and the competence of each type of language (verbal and pictorial) can also influence comprehension. For example, in a study of understanding cartoons by community health agents, the use of visual rhetoric (i.e. metaphor or metonymy) to represent abstract concepts of food (i.e. in natura) with drawings of concrete foods (i.e. strawberry and banana), without a label or introduction to the term, made it difficult for low literacy participants to understand the concepts[34].

As for the "contains milk" pictogram, most of the interviewees assimilated the information better with the bottle pictogram (66.4% without label and 93.1% with label), in contrast to the cow pictogram (26% without label and 80.9% with label), this can be explained by the fact that there are many products derived from this animal that are not limited to milk but are mainly derived from meat. This difference should be considered, since misinterpreted information can result in damage to the health of individuals, such as if consumers with allergies to cow's milk protein or lactose intolerance consume meals with milk because they interpreted this as having beef.

Moreover, a Canadian study showed the preference of using symbols on food labels to inform the presence of an allergenic food, by an allergic population or those who lived with someone who was allergic[35]. The authors concluded that the current Canadian food allergen labeling regulation could be improved by applying the use of

standardized warnings and pictograms, combined with public education on the use of these symbols[35]. Therefore, the importance of taking this information to food services is highlighted, since it is extremely relevant information for diners with food restrictions due to allergies and a need for further studies in this line of research is reinforced.

In addition to the identification of foods associated with allergies and intolerances, the identification of ingredients of animal origin is essential, due to the growth of vegetarians in recent years[36], as well as the interest of consumers with this information[16]. Due to this need, there are some symbols used on labels to identify foods free of products of animal origin, with standards for their use. Although this reality is different from the UR, the presence of products of animal origin as meal ingredients, reinforces the importance of informing UR consumers about their presence, thus, the use of pictograms may prove to be effective.

It is emphatic that, although the percentage of people who have dietary restrictions is lower compared to those who do not, it is necessary to provide information that enables the identification of the meal ingredients, providing the consumer's right6 and the Human Right to Adequate Food (HRAF)[37]. It is worth mentioning that HRAF, as a human right, is also the responsibility of civil society[38]. Thus, food service managers can act in harmony by providing quality meals, in addition to enabling conscious food choices for all, through the information presented.

As for the place to display the nutritional information, there is a need to change it from the current location, since many interviewees admitted that they did not use the existing information because they did not know that it was available or because they considered the place difficult to view. From this study, it was found that the most preferred place for consumers to have nutritional information available was the buffet. This preference could be attributed to the fact that the other places (entrance, wall) were not conducive for the consumer to stop and read the information, as they are points of entry and payment with a constant flow. Thus, at the buffet, the information could be visualized at the same time that the diners would be helping themselves, as a way of identifying the meal or food being chosen.

Despite the results obtained, it is necessary to take into account the limitations of the study. Since the sample was not probabilistic and the research was carried out in only one public institution, this data may not reflect the perception of students from other institutions of higher education. However, despite these limitations, it is believed that the results presented herein are relevant, making information available in a more beneficial and profitable way for UR consumers.

CONCLUSION

The use of pictograms in the proposed model to identify the presence of milk, gluten, meat, and egg was well accepted by university students who consume in the UR, and the pictogram model with a label was the most well understood and preferred by the research participants. In addition, it is recommended that when proposing a new model, the bottle pictogram be used to signal the presence of milk in the meal, and that the provision of nutritional information be made available at the buffet and at the entrance to the UR, by means of a display and poster, respectively.

Furthermore, although this new model

has been evaluated with UR consumers at a public university in Curitiba, it is believed that this type of information may be useful for other food services. Finally, as future research, investigating the use by consumers of nutritional information using the pictograms proposed in this study, in the practice and daily activities of the UR.

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