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Consumers' knowledge and use of nutritional information on food labels

Conhecimento e uso de rótulos nutricionais por consumidores

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Abstract

Food labelling is important to communication between food producers and consumers. For consumers to have greater autonomy in terms of their food choices, it is important to facilitate a correct interpretation about what is on a food label. This paper assessed consumers' knowledge and use of nutritional information on food labels. Cross-sectional exploratory quantitative, "blind" research carried out in 2018 in a public university in Brazil, with 415 consumers aged 18 years or older. A structured questionnaire with a score ranging from 0 to 24 was applied. Descriptive analysis, Spearman correlation coefficient, the Kruskal-Wallis test and the Mann Whitney test were employed. Participants were individuals aged 21.02 ± 2.89 years, of which 58.31% were female. Many consumers reported they read food labels frequently (56.39%). The mean score was 14.99 ± 4.12 . The knowledge score mean was affected by age ($p = 0.039$) and income ($p = 0.020$). Participants who used nutritional claims as a criterion for purchase ($p = 0.004$) had higher scores. The biggest issues in interpreting nutritional labels were related to mandatory nutrient claims and the terms "trans-fat free (0%)", "functional food", "diet" and "light". Food label regulation is a process currently under review in Brazil, so research on the use and knowledge of nutritional information on food labels by young adult consumers becomes important. It will contribute to the discussion of the revision of legislation, as well as helping professionals guide consumers in the interpretation of labels.

Keywords: Nutritional Facts. Food Labelling. Nutritional Labelling. Knowledge.

Resumo

A rotulagem de alimentos é importante para a comunicação entre produtores e consumidores. No entanto, para ajudar os consumidores a ter maior autonomia em suas escolhas alimentares, é importante interpretar corretamente a rotulagem dos alimentos. Assim, esta pesquisa avaliou o conhecimento e o uso das informações nutricionais apresentadas nos rótulos dos alimentos. Pesquisa quantitativa, exploratória e transversal, realizada em 2018 em uma universidade pública no Brasil, com 415 consumidores com 18 anos ou mais. Para avaliar o conhecimento, aplicouse questionário estruturado com pontuação de 0 a 24. Os dados foram analisados por meio de análise descritiva, correlação de Spearman e teste de Kruskal-Wallis e Mann Whitney. Participaram indivíduos com idade de $21,02 \pm 2,89$ anos, dos quais 58,31% eram do sexo feminino. Muitos consumidores liam frequentemente os rótulos dos alimentos (56,39%). A pontuação média de conhecimento foi de $14,99 \pm 4,12$. A média do escore de conhecimento foi afetada pela idade ($p = 0,039$) e renda ($p = 0,020$). Os participantes que utilizaram alegações nutricionais como critério de compra ($p = 0,004$) obtiveram maiores pontuações. Os maiores problemas na interpretação dos

rótulos nutricionais estavam relacionados às reivindicações obrigatórias de nutrientes e aos termos "zero gordura trans (0%)", "alimento funcional", "*diet*" e "*light*". Considerando que a regulamentação dos rótulos de alimentos está em processo de revisão no Brasil, torna-se importante pesquisar seu uso e conhecimento por consumidores adultos jovens. Isso contribuirá para a discussão da revisão da legislação, além de ajudar os profissionais a orientarem os consumidores na interpretação dos rótulos.

Palavras-chave: Informação nutricional. Rotulagem de Alimentos. Rotulagem Nutricional. Conhecimento.

INTRODUCTION

Food labels are the main means of communication between food producers and consumers.¹ General, nutritional and safety information on food labels give consumers greater autonomy in terms of their food choices.²⁻⁴ In addition, information about nutrition yields healthier and more conscious food purchases.^{5,6} Nutritional labelling is considered a consumer right by international bodies,¹ many European countries,⁷ the United States,⁸ Chile⁹ and Brazil.¹⁰

Food labels influence food choices and eating behavior, besides providing nutrition information.^{6, 11-14} The correct interpretation of information provided is a decision-making instrument for food purchase that takes into account the relationship between nutrition and health.^{5,15} However, even if nutritional information is provided on food labels, consumer awareness of what this means is not guaranteed.^{3,12,16-19} This indicates that there may be a need for changes in the way nutritional information is presented on food labels.²⁰

Despite this scientific evidence, few studies in Brazil have evaluated consumer awareness related to nutritional labelling.^{2,14,15,21} The Brazilian Institute of Consumer Protection has assessed the knowledge, perception, behavior and preferences of consumers in relation to nutritional labelling in the country and concluded that consumers have difficulties in understanding and using the information provided.²¹ In addition, consumers were reported to have little knowledge about nutrition facts, which makes it difficult for them to make healthy food choices.¹⁴

Although there are some studies about public understanding of nutritional labelling in Brazil,^{14,15,21-23} governmental agencies in the country have requested more scientific evidence on this nutritional labelling, in order to support changes in food labelling. In 2017, the assessment of the population's understanding of nutrition labelling was determined as one of the research priorities for the management of the National Food and Nutrition Policy in Brazil.²⁴ Additionally, the indication of further evidence on the subject was also provided in the public consultation on nutritional labelling held in 2018. Thus, this study aimed to evaluate consumer knowledge and use of nutritional labelling, and to associate this understanding with sociodemographic, health and physical activity characteristics.

METHODS

Sample Size and Ethics Committee

This is a cross-sectional, exploratory, and quantitative blind study, carried out between April and May 2018 in a public university in the south of Brazil. The research was approved by the Ethics and Research Committee of the Federal University of Paraná, under document no. 1294619.

Sample size was determined from the annual report provided by the university on the number of undergraduate and graduate students enrolled and the number of staff members (N = 34,202). A confidence level of 95%, a margin of error of 5% and an unknown prevalence of 50% were considered, resulting in a minimum sample of 380 participants.

Inclusion criteria for participation in the research were: individuals aged 18 years or older, university-connected (students or employees), who were accustomed to or planned to purchase food products, and who agreed to participate in the research by signing an informed consent form (TCLE).

Research Instrument

The research instrument was based on the results of a comprehensive review, carried out in 2016, in the databases Scielo, Scopus, Pubmed, Lilacs, Cochrane Library, and Food Science and Technology Abstract, as well review of the Brazilian legislation and other official documents related to nutritional labelling.^{2,10,16,17,19,24-34}

The questions were elaborated aiming at: 1) the use of Portuguese grammar correctly; 2) the reduction of participant ignorance on the subject; 3) the avoidance of the use of technical terms that might be unclear to the target population; 4) the provision of adequate answer options, in order not to confuse the interviewees; and 5) the formation of simple and clear questions.³⁵

The questionnaire was reviewed with the aid of two food professionals. The final version was composed of 36 questions divided into three sections: 1) Sociodemographic data (9 questions): age, sex, income, profession, region of residence, self-reported weight and height, level of physical activity and health problems; 2) Use of nutritional information presented in food labels (3 questions): frequency of use, nutritional claims used; 3) Knowledge about nutritional labelling (24 questions): meaning of the claims "contains gluten", "trans-fat free", "functional food", "light food", "diet food", "high-fiber food", "fortified food"; interpretation of information about nutritional value, carbohydrates, cholesterol, proteins, iron, total, saturated and trans-fat, calcium, iron, dietary fiber and vitamins; interpretation of the ingredients list and portion size/nutrient content (Chart 1).

The answers used to evaluate the consumers' knowledge were through multiple-choice and true or false options, as recommended by Di Iorio.³⁵ "I do not know" was included among the alternatives.

Chart 1. Structure of the questionnaire used to assess knowledge, together with the questions used and the answer options.

Team	Question	Answer option ¹
Nutritional indication		
"Contains gluten"	<i>In relation to food labelling, by reading the claim "Contains gluten" on the front label of a product, you understand that:</i>	(a) The product contains gluten, a protein, present in food products of animal origin, and when consumed can cause allergic reactions. (b) The product may contain gluten, a protein, present in products of plant origin, and when consumed, it may cause allergic reactions. (c) The product contains gluten, a protein, present in cereals and when consumed, can cause allergic reactions.
"Trans-fat free"	<i>On the front label of a food, when there is the claim "trans-fat free (0%)" it can be said that the product is totally free of trans fat.</i>	() True () False
"Functional food"	<i>When reading on a "Functional Food" label, you understand that:</i>	(a) The product prevents specific diseases, such as Arterial Hypertension. (b) The product may produce physiological effects beneficial to health. (c) The product may have beneficial health effects, but it is not scientifically proven.
Mandatory nutritional information		
<i>According to Brazilian legislation, some nutrients are mandatory to be included in the table of nutritional information on food labels. Check if the declaration is mandatory or not, according to the legislation:</i>		
Energy	Energy (kcal and kJ)	() Mandatory () Not mandatory
Carbohydrates	Carbohydrates (g)	() Mandatory () Not mandatory
Cholesterol	Cholesterol (mg)	() Mandatory () Not mandatory
Protein	Protein (g)	() Mandatory () Not mandatory
Iron	Iron (mg)	() Mandatory () Not mandatory
Total fat	Total fat (g)	() Mandatory () Not mandatory
Saturated fat	Saturated fat (g)	() Mandatory () Not mandatory

Chart 1. Structure of the questionnaire used to assess knowledge, together with the questions used and the answer options. (continues).

Team	Question	Answer option ¹
Mandatory nutritional information		
<i>According to Brazilian legislation, some nutrients are mandatory to be included in the table of nutritional information on food labels. Check if the declaration is mandatory or not, according to the legislation:</i>		
Calcium	Calcium (mg)	<input type="checkbox"/> Mandatory <input checked="" type="checkbox"/> Not mandatory
Trans fat	Trans fat (g)	<input checked="" type="checkbox"/> Mandatory <input type="checkbox"/> Not mandatory
Edible fiber	Edible fiber (g)	<input checked="" type="checkbox"/> Mandatory <input type="checkbox"/> Not mandatory
Vitamins	Vitamins (mg or mcg)	<input type="checkbox"/> Mandatory <input checked="" type="checkbox"/> Not mandatory
Fiber-rich foods		
<i>For a food to be considered rich in fiber it must have at least 6g of fiber in 100g of the solid product (6g / 100g). Which food (s) meets the fiber-rich food claim:</i>		
Cassava flour	Cassava flour (6.4g/100g)	<input type="checkbox"/> Meets the claim <input type="checkbox"/> Does not meet the claim
White rice	White rice (1.75g/100g)	<input type="checkbox"/> Meets the claim <input checked="" type="checkbox"/> Does not meet the claim
Lentils	Lentils (5.86g/100g)	<input type="checkbox"/> Meets the claim <input checked="" type="checkbox"/> Does not meet the claim
Brown rice	Brown rice (2.72g/100g)	<input type="checkbox"/> Meets the claim <input checked="" type="checkbox"/> Does not meet the claim
Meaning and interpretation		
Ingredient list	<i>On the list of ingredients on food labels, check the correct alternative.</i>	(a) The ingredients are presented in descending order, that is, the first ingredient is the one that is in the highest quantity and the last one, in the least quantity in the product. (b) The ingredients are presented in ascending order, that is, the first ingredient is the one that is in the least quantity in the product and the last one, in the highest quantity. (c) For the description of the ingredients, the manufacturer randomly selects the arrangement of the ingredients from the list on the product label.
Preparation instructions	<i>The preparation instructions on the food labels refer to the appropriate way of preparing the product, which may include reconstitution, heat treatment or cooking and / or thawing procedures which must be carried out by the consumer, for the consumption of the product.</i>	<input type="checkbox"/> True <input type="checkbox"/> False
Protein content (cheese)	<i>If you wanted to eat more protein at a meal and could eat a single slice of cheese, you would choose *:</i> Product 1 - cheese 1 Portion 30g (2 slices) Energy value: 94 Kcal = 391 kJ, % VD = 5 Proteins: 5.8g, % DV = 8 [...] Product 2 - cheese 2 Portion 30g (1 slice) Energy value: 116 Kcal = 479 kJ, % VD = 6 Proteins: 6.1g, % DV = 8 [...]	(a) Product 1 (b) Product 2 (c) Either, as both have the same protein content.
Diet food	<i>When reading on a package claiming that the food is diet, you would understand that:</i>	(a) The expression diet on food packaging necessarily means that the product does not contain sugar. (b) Diet products are the same as light foods. That is, there is no added sugar and fat. (c) Diet foods are those intended for nutrient-restricted diets, which may be carbohydrates, fats, proteins or sodium.
Light food	<i>"Light" foods are those that are reduced in calories only.</i>	<input type="checkbox"/> True <input checked="" type="checkbox"/> False

Chart 1. Structure of the questionnaire used to assess knowledge, together with the questions used and the answer options.(continues).

Team	Question	Answer option ¹
Meaning and interpretation		
<i>Enriched food</i>	<p>Regarding "Enriched Foods" and "Nutrient Replacement Foods", observe the front label of the product and mark the correct alternative*:</p> <p>Information on the label:</p> <p>FORTIFIED</p> <p>Iron and Vitamins - C, D, A</p> <p>(the hypothetical front label of a powdered milk was presented)</p>	<p>(a) It is a "Food with Nutrient Replacement", in which the amount of iron, vitamins A, C and D that were already present in the product was naturally restored.</p> <p>(b) It is both an "Enriched Food" and a "Food with Nutrient Replacement", in which iron, vitamins A, C and D were added, and were already present in the product naturally.</p> <p>(c) It is an Enriched Food, in which iron, vitamins A, C and D have been added to enrich the nutritional value of the product.</p>

*An illustrative image of a label, designed for research, was presented for the consumer to analyze and to respond.

¹The alternative in bold corresponds to the correct alternative answer to the question. All questions also had the option of answering with the alternative "I do not know".

Data Collection

The data collection was by convenience. Data were collected by trained collaborators from April to May 2018. Participants were approached randomly on the university's campus. Those who agreed to participate and signed the TCLE were included in the research.

Data Analysis

In the knowledge analysis, each correct answer was assigned a score of 1 point. Incorrect and "I do not know" answers received a score of zero. The sum of the correct answers was computed in order to obtain the total score of each participant's knowledge,³⁵ in a range between 0 and 24. Additionally, the "I do not know" option was analyzed by means of simple frequency.

The nutritional status of the participants was evaluated by Body Mass Index (BMI), obtained from their self-reported weight and height. Participants were classified accordingly as underweight (BMI ≤ 18.49 kg/m²), eutrophic (BMI ≥ 18.50 and ≤ 24.99 kg/m²) and overweight (overweight and obesity) (BMI ≥ 25.00 kg/m²).^{36,37}

The results were analyzed by the Statistical Analysis System (SAS), version 9.2. Descriptive statistical measures were calculated for quantitative variables and frequency tables were constructed for categorical variables. The assumption of data normality was verified by the Shapiro Wilk Test. The correlation between the knowledge score and the variables age, weight, height and BMI was obtained by calculating the Spearman correlation coefficient. Statistical differences between knowledge scores as a function of sociodemographic variables, health, physical activity, and use of nutritional labeling were calculated by the Mann Whitney or Kruskal-Wallis test (supplemented by the DMS test). The significance level employed was 5%.

RESULTS

As shown in Table 1, the 415 participants had a mean age of 21.02 ± 2.89 years, surpassing the sample calculation. Most participants were female (58.31%), with a monthly income of 3 to 10 times the minimum wage (41.45%), were students (96.87%) and practiced physical activity (60.48%).

Table 1. Mean knowledge about nutritional information by consumers in a public institution, according to sociodemographic characteristics, health and physical activity practice (n = 415). Curitiba, Paraná, Brazil, 2018.

Variables	Description	Frequency		Mean \pm SD of Knowledge score	p-value*
		n	%		
<i>Gender</i>	Female	242	58.31	15.33 \pm 3.79	0.132
	Male	173	41.69	14.49 \pm 4.51	
<i>Age</i>	Up to 20 years	223	53.73	15.42 \pm 3.98 ^a	0.039*
	21-25 years	165	39.76	14.50 \pm 4.18 ^b	
	\geq 26 years	27	6.51	14.37 \pm 4.62 ^{ab}	
<i>Profession</i>	Student	402	96.87	15.00 \pm 4.14	0.669
	Other	6	1.45	13.16 \pm 5.03	
	Both	7	1.69	15.57 \pm 1.90	
<i>Income</i>	Up to 3 MW	149	35.90	14.33 \pm 4.42 ^a	0.020*
	More than 3 to 10 MW	172	41.45	15.16 \pm 4.03 ^{ab}	
	More than 10 MW	48	11.57	16.47 \pm 3.30 ^b	
	Not declared	46	11.08	14.86 \pm 3.86 ^{ab}	
<i>Nutritional condition</i>	Underweight	38	9.16	15.23 \pm 3.48	0.999
	Eutrophic	289	69.64	14.94 \pm 4.19	
	Overweight	88	21.20	15.02 \pm 4.20	
<i>Physical activity</i>	Yes	251	60.48	15.13 \pm 4.38	0.100
	No	164	39.52	14.75 \pm 3.68	
<i>Health problems</i>	Yes	125	30.12	15.28 \pm 4.01	0.346
	No	290	69.88	14.85 \pm 4.16	

n = number of consumers; MW = minimum wage; % = percentage of consumers; * $p < 0.05$, Statistical difference by the Mann-Whitney or Kruskal-Wallis test; Different letters in a column present results that are significantly different ($p < 0.05$)

A total of 42.41% of the consumers had eventually used the nutrition information on a package label at the time of purchase of a packaged or canned food, while 13.98% reported always using it. The most used food labelling information were the claims "trans-fat free" (42.17%), "source of vitamins and minerals" (36.87%) and "rich in fiber / fiber source" (34.70%), followed by "lactose free" (14.46%) and "gluten free" (11.08%), as shown in table 2.

Table 2. Mean knowledge about nutritional information by consumers of a public institution, according to use of nutritional information (n = 415). Curitiba, Paraná, Brazil, 2018.

Variables	Description	Frequency		Mean \pm SD of Knowledge score	p-value*
		n	%		
Frequency of use	Never	38	9.16	12.78 \pm 4.48 ^a	<0.001*
	Rarely	143	34.46	14.05 \pm 3.99 ^a	
	Sometimes	176	42.41	15.81 \pm 3.90 ^b	
	Always	58	13.98	16.20 \pm 3.85 ^b	
Use of nutritional indications	Yes	309	74.46	15.44 \pm 3.68	0.004*
	No	106	25.54	13.66 \pm 4.98	
Use of indication "trans-fat free"	Yes	175	42.17	16.04 \pm 3.38	<0.001*
	No	240	57.83	14.22 \pm 4.44	
Use of indication "gluten free"	Yes	46	11.08	14.89 \pm 3.61	0.451
	No	369	88.92	15.00 \pm 4.18	
Use of indication "lactose free"	Yes	60	14.46	14.93 \pm 3.81	0.645
	No	355	85.54	14.99 \pm 4.18	
Use of indication "rich in fibre/source of fibre"	Yes	144	34.70	15.76 \pm 3.42	0.023*
	No	271	65.30	14.57 \pm 4.40	
Use of indication "source of vitamins and minerals"	Yes	153	36.87	15.57 \pm 3.51	0.065
	No	262	63.13	14.64 \pm 4.41	
Use of nutritional information for the purchase of milk and dairy products	Yes	175	42.17	15.24 \pm 3.80	0.541
	No	240	57.83	14.80 \pm 4.34	
Use of nutritional information for the purchase of canned food and sausages	Yes	165	39.76	15.52 \pm 3.71	0.076
	No	250	60.24	14.63 \pm 4.34	
Use of nutritional information for the purchase of diet and light products	Yes	114	27.47	16.39 \pm 3.70	<0.001*
	No	301	72.53	14.45 \pm 4.15	
Use of nutritional information for the purchase of breads and crackers	Yes	140	33.73	15.42 \pm 3.80	0.188
	No	275	66.27	14.76 \pm 4.26	
Use of nutritional information for the purchase of biscuits and snacks	Yes	186	44.82	15.53 \pm 3.66	0.061
	No	229	55.18	14.54 \pm 4.42	

n = number of consumers; % = percentage of consumers; *p < 0.05, Statistical difference by the Mann-Whitney or Kruskal-Wallis test; Different letters in a column present results that are significantly different ($p < 0.05$).

The mean number of correct answers with regard to the knowledge on nutritional information was 14.99 \pm 4.12.

The knowledge score mean was affected by age ($p = 0.039$) and income ($p = 0.020$). People with a monthly income higher than 10 minimum wages obtained greater scores than those who earn up to 3 minimum wages (table 1). In addition, there was an inversely proportional correlation between the knowledge score and the consumers' age: the older the age, the lower the score ($p = 0.027$, $r = -0.10889$). There was no correlation between knowledge score and consumers' weight ($p = 0.447$), height ($p = 0.317$), BMI ($p = 0.734$), physical activity ($p = 0.100$) or health problems ($p = 0.346$).

The average knowledge of consumers about what nutritional labelling meant was higher among those who used nutritional information as a purchasing criterion more often (sometimes and always) ($p < 0.001$). Participants who used nutritional claims at the time of food purchase obtained higher mean scores ($p = 0.004$) (table 2). Moreover, consumers who used information about "trans-fat free" ($p < 0.001$) and "rich in fiber /source of fiber" ($p = 0.023$) also obtained higher mean scores. Additionally, people who used dietary information to buy diet and light foods had a higher mean knowledge score than those who did not ($p < 0.001$), according to table 2.

Finally, there was considerable knowledge about the mandatory presence of energy value (89.16%) and macronutrient information ($\geq 75.18\%$), including saturated fat content (80.00%). Nearly half of the individuals knew the meaning of the nutritional claim "contains gluten" (51.57%), while less than half understood the meaning of the other information "trans-fat free" (47.71%) and "functional food" (38.31%) (table 3).

Table 3. Knowledge on nutritional information (n=415). Curitiba, Paraná, Brazil, 2018.

Question	Correct answer		Incorrect answer		No answer	
	n	%	n	%	n	%
Nutritional claim						
"contains gluten"	214	51.57	141	33.98	60	14.46
"trans-fat free (0%)"	198	47.71	127	30.60	90	21.69
"functional food"	159	38.31	109	26.27	147	35.42
Mandatory nutritional information						
Energy	370	89.16	11	2.65	34	8.19
Carbohydrates	353	85.06	12	2.89	50	12.05
Cholesterol	154	37.11	152	36.63	109	26.27
Protein	312	75.18	34	8.19	69	16.63
Iron	169	40.72	116	27.95	130	31.33
Total fat	355	85.54	10	2.41	50	12.05
Saturated fat	332	80.00	29	6.99	54	13.01
Calcium	188	45.30	92	22.17	135	32.53
Trans fat	198	47.71	127	30.60	90	21.69
Edible fiber	189	45.54	119	28.67	107	25.78
Vitamins	131	31.57	185	44.58	99	23.86
Fibre rich foods						
Cassava flour	378	91.08	8	1.93	29	6.99
White rice	359	86.51	16	3.86	40	9.64
Lentils	333	80.24	41	9.88	41	9.88
Brown rice	350	84.34	26	6.27	39	9.40
Meaning and interpretation						
Ingredient list	218	52.53	81	19.52	116	27.95
Preparation instructions	281	67.71	36	8.67	98	23.61
Protein content (cheese)	303	73.01	90	21.69	22	5.30
Diet food	144	34.70	204	49.16	67	16.14
Light food	184	44.34	138	33.25	93	22.41
Enriched food	199	47.95	98	23.61	118	28.43

n = number of consumers; % = percentage of consumers.

DISCUSSION

From the mean score of correct answers, an average knowledge about nutritional labelling was observed among the participants. Individuals who actually read and used nutritional information as a criterion for food purchase had greater knowledge about nutritional labelling.

Most consumers understand that preparation instructions and the list of ingredients must be presented in descending order.²⁶ However, more than 20% were not able to answer this question. It should be noted that understanding these two concepts is important as it is this list of ingredients that makes it possible to evaluate the food composition and identify the presence of specific nutrients.^{3,26} In addition, the list of ingredients indicates the presence of specific ingredients (e.g. salt, sugar and fat) that can cause harm to the consumer's health when consumed in excess.³

Consumers who reported using nutritional information on a label obtained a higher knowledge score, although the knowledge level was average. In contrast, few consumers understood the meaning of the information "contains gluten", "trans-fat free" and "functional product".

The indication "trans-fat free" may mislead consumers, because, according to Brazilian legislation, when the food contains up to 0.1 g of trans fat,²⁵ the label can specify "does not contain" or "free" in the nutrition labelling. This does not mean that this food is exempt or free from "trans-fat", but only that the amount in this food is not considered significant enough for the use of other terminology. Therefore, the need to revise this guideline is evident. Moreover, the possibility of misleading the consumer was made evident in this study by the fact that there was no significant difference between the knowledge of the meaning of the "trans-fat free" claim and the use of this claim as a reason to purchase one food over another.

Carrillo et al.²⁹ interviewed 200 Spanish consumers regarding functional foods, and found that 65% considered these foods to be beneficial to their health, while 32% did not know what their benefits were. The authors concluded that functional foods were more easily recognized by consumers as beneficial to health when the word "enriched" appeared on the label. In contrast, our study showed that few people understood that the term "functional food" indicates a food with beneficial health effects. Regarding the mandatory items in food labelling, energy value and macronutrients were correctly identified by the participants, possibly because these are the most sought after nutritional information by consumers.^{22,38}

The awareness about the meaning of energy value was also observed by Sinclair et al.³⁹ when interviewing 639 adults: 71.5% answered questions about energy value correctly. These results are positive because the energy value information is a widely used strategy to combat obesity.⁴⁰ In addition, this information is frequently used in the media and is associated with weight gain and health conditions such as diabetes and cardiovascular diseases.¹⁸

Most individuals correctly identified foods that were high in fiber. This result is similar to that found by Carrillo et al.,²⁹ who reported that 94% (n = 188) of their interviewees were able to recognize the fiber content in the nutritional information on food labels. Nevertheless, the fiber content of a food should be used along with further nutritional information, since high-fiber foods may contain excessive amounts of certain ingredients (e.g. fat and sodium) and may be processed (e.g. ultra-processed food).

The interviewees' understanding of the terms "*diet*", "*light*", "enriched" was low in the present study. In another research carried out in Brazil among university students, Hipólito et al.²³ reported that the nutritional attributes "*light*", "*diet*", "enriched" and "source of vitamins" exerted an average influence at the time of purchase. Although half of the participants claimed to understand these attributes, according to the researchers, these terms were actually unclear to the vast majority.

According to the Brazilian legislation, the term “light” comprises a reduction of at least 25% of a nutrient when compared to the traditional product, while the term “diet” indicates insignificant amounts or total absence of a certain nutrient.²⁵ It should be noted that these terminologies are defined in Brazilian legislation, but many consumers are still unaware of the meaning of each term^{41,42} and/or or may not know how to differentiate a light food from a diet food.⁴³

In this study, a greater awareness of nutritional labelling was observed in younger individuals, which may be related to the fact that the research was carried out in a university. In a study of 14,230 French adults aged between 18 and 65 years or more, even though there were only 2,121 participants aged between 18-30 years compared to 12,109 participants aged between 30-65 years or more, the authors demonstrated that there was greater knowledge about nutritional labelling among younger participants, and those with a higher educational level and incomes.⁴⁴

The relationship between knowledge about nutritional labelling/ or the use of information provided on food labels tend to increase with the increase of income and education level.^{38,39,45-47}

Finally, although the consumers’ awareness of nutritional labelling was found to be average in this research, a need for greater clarification around nutrition facts to the population is indicated. Similar results had already been identified in a national survey conducted by IDEC, which detected the need for nutritional information on food packaging to be simpler and clearer, in order to help consumers make healthier food choices.²¹

It is worth mentioning that currently, there are proposals to improve nutritional rotation in Brazil, following the example that occurs in Chile,^{48,49} with an emphasis on the use of layouts with fewer numbers, more colors and/or symbols,^{5,18,39,50-52} which will ensure clearer and more legible information that not open to errors of interpretation and in this way, can promote greater understanding, interest and motivation on the part of the population. Although the change in nutrition labelling has not yet been legislated in Brazil, it has already been well accepted by Brazilians.⁵³

Finally, although this study achieved its objective, there are some limitations, such as the fact that the research was carried out only in an city with a non-probabilistic sample. As the data may not reflect the reality of consumers in other regions, the results cannot be generalized to other contexts. In addition, because the research was carried out at a higher education institution, it is possible that some students had studied nutritional information or food labelling content in their course curriculum, which may have contributed to greater knowledge on the subject. The study showed, however, even having greater access to information on food labelling, consumers still need clarification about what the information means.

CONCLUSIONS AND IMPLICATIONS

Although most interviewees make use of nutritional labelling, for many the basic information difficult to understand. There was greater knowledge about the mandatory presence of energy and macronutrient information and the interpretation of the fiber content and trans-fat free. However, the meaning of certain terms, such as “diet” and “light”, was unclear to many people.

A greater awareness of nutritional labelling was observed in younger individuals and who had higher income. There was, however, no correlation between knowledge score and consumers’ weight, height, BMI, physical activity and health problems.

This study has implications for the area of Nutrition and Public Health while contributing to the increase of scientific evidence that supports the need for greater clarification about nutritional labelling for the general

population. At the time of discussion about changes in food labelling in Brazil, the assessment of popular understanding on about this subject in different contexts is relevant. Such changes are important to enable consumers to choose their foods more consciously.

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Contributors

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