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Factors Related to the Reading Nutritional Labels by Consumers

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Abstract

This study aimed to evaluate the features related to consumers' reading nutritional labels in a city in the interior of the São Paulo State, Brazil. A questionnaire was answered by 100 consumers of a supermarket chain, sociodemographic information and data related to label reading habits were collected. Tables with percentage values and bar graphs were used. Chi-square tests and logistic regression models were performed to verify the association between the variables and the label reading habits. The factors that showed significant associations with the reading labels were gender, ease to understand the labels and access to their information ($p < 0.10$). People who had already read labels reported to have more difficulty to understand the information contained on them, and people who had already received instructions on the labels were three and a half times more likely to read the instructions contained on them than those who hadn't received any guidance. This study points to the need to expand the disclosure to consumers about the contents present on the labels, through more accessible language, so that the labels fulfill their role to instruct consumers in their choices.

Keywords

Association Tests, Label, Logistic Regression

1. Introduction

The product label refers to any inscription, caption, image or descriptive or graphic material, written, printed, stamped, engraved, embossed or lithographed or pasted on a package [1]. It displays information such as list of ingredients, expiry date, origin and batch [2], with date of expiration as one of the most im-

portant information by consumers [3].

Brazilian nutritional label is regulated by the Directors' Collegiate Resolutions 429/20 of the Brazilian Health Regulatory Agency. This legislation was recently modified in order to ensure more clarity, objectivity and consistency for the consumer, which included changes in the information on the nutritional table and nutritional claims, in addition it presents a frontal labeling [4].

The main goal of nutritional label is to benefit the consumer by serving as a guide to indicate the quality of the product [5], and it helps consumers select a balanced diet, which can lead to the reduction of health problems associated with poor eating habits, to avoid the risk to develop cardiovascular diseases, certain types of cancer and diabetes among others.

Currently, the constant changes in consumers' eating habits driven by the fast pace of modern life, they are increasingly concerned about food quality and safety, and they also have greater access to information. In this way, surveys that investigate the consumer behavior profiles hold significant value as they help identify their needs. This, in turn, enables companies to achieve greater customer satisfaction and the success of their products in an extremely competitive market [6].

Thus, the purpose of this study is to analyze the factors related to consumers' reading labels habits in a small city in the interior of the São Paulo State, Brazil.

2. Methodology

Data come from a cross-sectional study carried out with consumers of a supermarket chain in the city of Pirassununga, São Paulo, Brazil. The study includes adults aged 18 years or older.

The sample size was calculated using the formula $n = z_{\alpha/2}^2 p(1-p)^2 / \varepsilon$, where n represents the minimum number of participants, z = 1.96 (corresponding to a 95% confidence interval from a standard normal distribution), ε the maximum allowable error, set at 10% in this study, and p the proportion of people who had the reading labels habits, since this proportion was unknown, a conservative estimate of 50% (0.50) was used. According to this calculation, a minimum of 96 people should have been interviewed. The study included 100 participants.

The data collection occurred during March and April of 2022, on different days and times of the week. Customers of a supermarket were invited to participate in the study after making their purchases; participants were who voluntarily agreed to take part in the research. Each participant was presented a free informed consent, which was read aloud, and a copy was provided. They then proceeded to complete a questionnaire with multiple choice questions through an interview.

The questionnaire used in this study was developed based on the research of Cassemiro *et al.* [7] and Cavada *et al.* [8]. It received approval from the Com-

mittee on Ethics in Research with Human Beings of the Faculty of Animal Science and Food Engineering on two occasions: first on December 11, 2020, under protocol number 4,458,414, and then on August 30, 2021, under protocol number 4,941,983.

For the sample description, the variables gender, age, marital status, education level and family's income were collected, as well as information about physical activity habits and whether they had already received some instruction on healthy eating. Some questions related to the theme were also asked. These questions inquired whether participants had the habit to reading labels, what kind of information they sought on these labels, and their reasons for doing so. In addition, participants were asked about their ease of understanding about the contents of the labels. Furthermore, the survey addressed whether participants had previously received instructions on label contents and if they desired such guidance. And, the research explored factor that influence participants' product purchase decisions. The questionnaire is showed in supplementary material.

For results, some questions were grouped and relabeled as follows: age—young adult (participants aged 18 to 30 years old), adult (participants aged 31 to 60 years old) and elderly (participants over 61 years old); marital status—married (included participant who were married or in a stable union) and not married (included participants who were single, separated or widowed); education—until high school (encompassed individuals with education backgrounds ranging from illiterate to complete or incomplete high school) and undergraduate (encompassed individuals with complete or incomplete university education).

For the sample summary, tables with percentage frequencies and bar graphs were constructed, and chi-square tests were performed to verify the significant association between demographic variables and questions directly related to the label reading habits. Chi-square tests analyzed relationships between sociodemographic variables and label reading habits, as well as between health-related questions and label-related queries, both in conjunction with label reading habits. Two logistic regressions were proposed to assess the factors that were significantly associated with the label reading habits: the first included variables found to be significant through the chi-square test, and the second adjusted these same variables while accounting for potential confounding factors such as gender, age and education.

Data organization and statistical analyzes were performed using Excel 2019, R (version 4.2.0.) and SAS (version 9.4) programs. A significance level of 10% was adopted for statistical tests. The Excel was used to organize dataset, in R figures were generated through the ggplot2 package, and tests were performed using proc freq and proc logistic from SAS.

3. Results and Discussion

In the present study, 100 people were interviewed, the majority was women (66%), 57% were between 31 and 60 years, around 54% were unmarried, about

57% had attained undergraduate education (either complete or incomplete) and 40% reported having an income greater than three minimum wages. It is noteworthy that most people who agreed to participate in the research were adults with a high level of education (more than half had at least incomplete undergraduate education) and earned a salary equivalent to or exceeding three minimum wages (59% reported receiving this amount). Additionally, 65% reported having the habit of reading nutritional labels, 89% had received some form of instruction about healthy eating, 66% reported that the information contained on food labels is not easy to understand, and the majority (64%) had previously received instructions about food labels, and 80% of respondents were willing to receive information about the content presented on the food labels. Finally, 61% declared to practice physical activity. **Table 1** presents the sample summary.

In Pinheiro *et al.* [6], a study was carried out to outline the profile of participants and the reading labels habit, in which 65.7% of respondents had incomplete, complete undergraduate or graduate education, and in Procópio *et al.* [9], 50% of them were undergraduates and/or graduates, and in both, women appeared to be the most available to participate in research on food labels, they were 68.5% and 78.7% of the samples, respectively. Additionally, a study carried out on labeling and university students found that 69% had knowledge about healthy eating [10]. So, note that people with at least a good education level, with some instruction about food or with an interest in health-related topics are more predisposed to participate of studies about nutritional labels. In addition, even with changes in the most current scenario of society, in which the women occupy important positions in the labor, they still stand out to be more attentive to what is offered at home to feed the family [11].

To the reading labels, most people have the habits to read the labels, as in Marzarotto and Alves [12], in this study, 70% said to have the reading habit. So, the biggest problem is not the reading habit, but what is the understanding about this information. In this study, although 65% have the reading labels habit, 66% declared to have difficulties to understand what was read, which is corroborated by Silva *et al.* [5], the most of the participants said that the information contained in the labels is not objective, and that there is still a difficulty to regard the size of the letters of their descriptions, which, in general, are very small and difficult for the consumer to read. Additionally, according to Goyal and Deshmukh [13], half of the world's consumers report only "partially" understanding food nutrition labels, with 60% of Asia Pacific citizens leading this lack of understanding, followed by Europeans (50%) and Latin Americans (45%).

About the reasons for reading, 69% read labels to look for the expiration date, 45% to check the list of ingredients that make up a certain product, in order to seek nutritional information with a focus on healthy eating, and 29% read for health reasons, in order to avoid some products associated with any comorbidity that the participant has. The other reasons that were reported by the participants

Table 1. Summary by 100 participants in a supermarket. Pirassununga, São Paulo, Brasil, 2022.

Variables	Percentual (%)
Sex	
Male	34
Female	66
Age	
Young adult (from 18 until 30 years old)	30
Adult (from 31 to 60 years old)	57
Elderly (greater than 61 years old)	13
Marital State	
Married	46
Not married	54
Education level	
Elementary	5
High School	38
Undergraduate	57
Income	
From 1 to 2 minimum wages	22
From 2 to 3 mininum wages	19
Greater than 3 mininum wages	40
Prefer not to inform	19
Reading label habits	
Yes	65
No	35
Have you ever received any guidance on healthy eating?	
Yes	89
No	11
Do you find the information on food labels easy to understand?	
Yes	34
No	66
Have you received any instructions about the nutritional components on food labels?	
Yes	64
No	36
Would you be interested in receiving more information about food labels?	
Yes	80
No	20
Practice physical activity	
Sometimes	13
Yes	61
No	26

were: curiosity (24%), weight gain (10%), diet (14%); other (1%) and 11% declared not to read nutrition labels. Figure 1 illustrates these results.

In Silva *et al.* [5], 40% of the participants stated that the expiration date was the most relevant information on nutritional labels, and in Weber *et al.* [11], information such as price, expiration date and nutritional information were the most read by participants.

46% of the participants sought information about sodium, followed by sugar (44%), fat (36%), calories (35%), protein (32%) and cholesterol (29%). Other related nutritional information included vitamin C (21%), fiber (21%), calcium (16%), other (2%) and 20% did not read nutritional labels at all. In a study conducted by Vieira *et al.* [14], the calories and the percentage of fat were the information most frequently sought after by the participants, in our study these pieces of information were also among the most commonly reported by the participants. Figure 2 presents the most sought-after nutritional information on labels listed by the 100 participants.

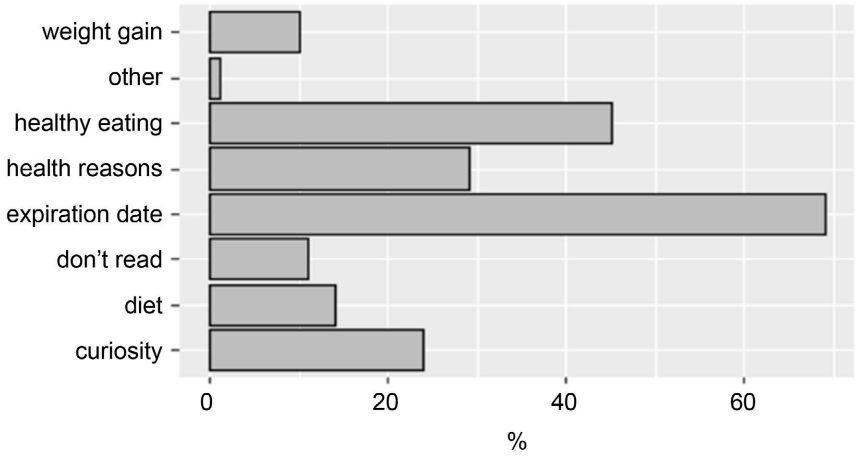

Figure 1. Reasons to read labels reported by 100 consumers. Pirassununga, São Paulo, Brazil, 2022.

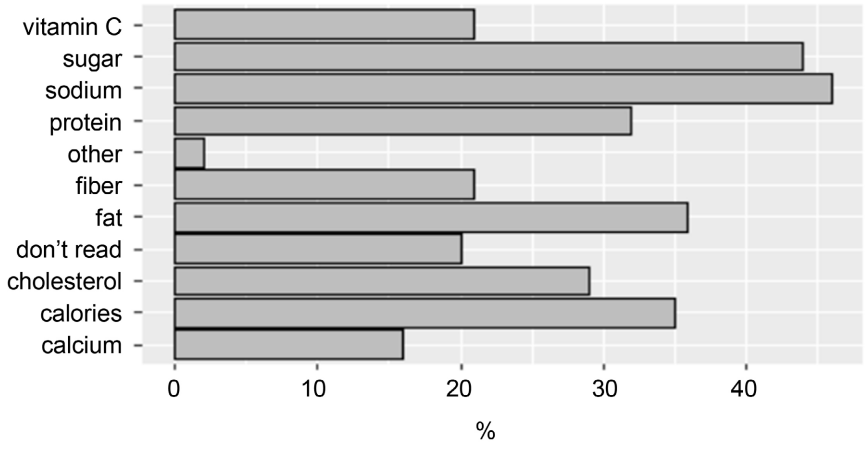

Figure 2. Nutritional information most sought after on labels by 100 consumers. Pirassununga, São Paulo, Brazil 2022.

Participants were also asked about the factors that influenced their product purchasing decisions. 91% stated that product quality is the most important factor, followed by price (71%) and nutritional value (41%). 31% also reported that taste plays an important role, while 30% consider the brand and 13% are influenced by packaging.

Table 2 presents the results of the association tests between sociodemographic and other variables related to reading labels habits.

The participants' gender, ease to read the label and the fact that they had already received information about it showed significant associations with the participants' reading habit ($p < 0.10$). Women tend to read the labels more frequently than men, and those who declared that they read the labels were the ones who reported to have more difficulty to understand. Additionally, participants who had already received prior instruction about labels contents also showed a greater tendency to read labels. In the study by Bueno *et al.* [15], factors associated with a higher interest in reading labels included being female, having at least an undergraduate education, being older and engaging physical activity.

Table 3 presents the logistic regression models for the variables that were found to be significant in the chi-square tests. Two models were proposed: Model 1 displays the adjustment results only with the significant variables, and Model 2 presents the results of the same variables adjusted by gender, age and education.

Models 1 and 2 presented similar odds ratio (OR) results, which indicates the absence of confounding factors in the model. This observation holds true whether the variables were considered in the model such as gender, age and education (Model 2) or not (Model 1), the variables that showed significance with the response remained consistent.

It is noted that the understand to read the labels presented an odds ratio (OR) lower than 1. This indicates that people who tend to read the labels are those who find it more difficult to understand the information. This is feasible because who attempt to read labels often have more knowledge about the information contained on them and perceive that the information is not always written in an objective manner for the consumer. A study carried out with undergraduates revealed that technical names (45.2%), comprehension of nutritional information (22.6%) and font size (16.1%) were the factors highlighted as the main difficulties among students to read of food labels [16].

To have access of the information contained in the labels resulted in an odds ratio (OR) greater than 3.5. This means that individuals who have received prior instruction about the labels are three and a half times more likely to read the information contained therein compared to those who have not had such access. In Miller *et al.* [17] points out that prior knowledge about nutritional information contained on food labels can have direct effects on eating behavior. Prior knowledge enables consumers to be more attentive to essential information on

Table 2. Association between sociodemographic and other variables with the reading habit reported by 100 consumers of a supermarket. Pirassununga, Sao Paulo, Brazil, 2022.

Variables	Reading habit		
	No n (%)	Yes n (%)	p value
Sex			
Female	19 (54.29)	47 (72.31)	0.0696
Male	16 (45.71)	18 (27.69)	
Marital State			
Married	14 (40.00)	32 (49.23)	0.3770
Not married	21 (60.00)	33 (50.77)	
Age			
Young adult (from 18 until 30 years old)	13 (37.14)	17 (26.15)	0.5266
Adult (from 31 to 60 years old)	18 (51.43)	39 (60.00)	
Elderly (greater than 61 years old)	4 (11.43)	9 (13.85)	
Education level			
Until high school	18 (51.43)	25 (38.46)	0.2116
Undergraduate	17 (48.57)	40 (61.54)	
Income			
From 1 to 2 minimum wages	9 (25.71)	13 (20.00)	0.9024
From 2 to 3 mininum wages	6 (17.14)	13 (20.00)	
Greater than 3 mininum wages	13 (37.14)	27 (41.54)	
Prefer not to inform	7 (20.00)	12 (18.46)	
Have you ever received any guidance on healthy eating?			
No	5 (14.29)	6 (9.23)	0.5094
Yes	30 (85.71)	59 (90.77)	
Do you find the information on food labels easy to understand?			
No	19 (54.29)	47 (72.31)	0.0696
Yes	16 (45.71)	18 (27.69)	
Have you received any instructions about the nutritional components on food labels?			
No	17 (48.57)	19 (29.23)	0.0546
Yes	18 (51.43)	46 (70.77)	
Would you be interested in receiving more information about food labels?			
No	9 (25.71)	11 (16.92)	0.2945
Yes	26 (74.29)	54 (83.08)	
Practice physical activity			
Sometimes	6 (17.14)	7 (10.77)	0.3447
No	11 (31.43)	15 (23.08)	
Yes	18 (51.43)	43 (66.15)	

Table 3. Multiple logistic regression for the dependent variable reading labels habit. Pirassununga, Sao Paulo, Brazil, 2022.

	Model 1	Model 2
Parameters	OR CI (90%)	OR CI (90%)
Do you find the information on food labels easy to understand?		
Yes	0.264 (0.112; 0.621)	0.324 (0.127; 0.827)
No	1.00	1.00
Have you received any instructions about the nutritional components on food labels?		
Yes	3.863 (1.657; 9.004)	3.576 (1.476; 8.660)
No	1.00	1.00

Model 1—without adjusted; Model 2—adjusted by sex, age and education.

food labels and to disregard less relevant details. This facilitates their understanding of labels contents, and helps them more effective food choices for a healthier lifestyle.

4. Conclusions

People that tend to read labels are often those who report to have more difficulty understanding the contents. This is reasonable because their ability to assess information is typically better than those who do not read labels, and they recognize how much of the information on labels can still be unclear. Additionally, people who have already had some form of instruction about labels are more inclined to read them than those who have never done so. Most respondents expressed a willingness to receive more information about the label contents.

Therefore, even though a new labeling is in effect, further changes are still needed to enhance consumer access, and the information regarding label contents should be expanded.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Supplementary Material—Questionnaire

1) What is your gender?
( ) Male
( ) Female
( ) Prefer not to disclose
2) What is your marital status?
( ) Single
( ) Married
( ) Stable union
( ) Separated
( ) Widowed
3) What is your age?
( ) 18 to 30 years
( ) 31 to 40 years
( ) 41 to 50 years
( ) 51 to 60 years
( ) 61 to 70 years
( ) 71 to 80 years
( ) 81 years or older
4) What is your educational level?
( ) Illiterate (Cannot read and write)
( ) Incomplete Elementary School (1st to 5th Grade)
( ) Complete Elementary School (1st to 5th Grade)
( ) Incomplete Middle School (6th to 9th Grade)
( ) Complete Middle School (6th to 9th Grade)
( ) Incomplete High School
( ) Complete High School
( ) Incomplete University Education (Incomplete College)
( ) Complete University Education (Completed College)
5) What is your family's income?
( ) Less than 1 minimum wage
( ) 1 to 2 minimum wages
( ) 2 to 3 minimum wages
( ) More than 3 minimum wages
( ) Prefer not to disclose
6) Have you received any guidance on healthy eating?
( ) Yes
( ) No
7) Do you engage in physical activity?
( ) Yes
( ) No
( ) Sometimes
8) Which of the following information influences your choice of a product?

( ) Price
( ) Quality
( ) Nutritional value
( ) Taste
( ) Packaging
( ) Brand

9) Do you usually read nutritional labels?
( ) Yes
( ) No

10) Do you have any reasons that lead you to read labels?
( ) Don't read
( ) Health reasons such as hypertension, high cholesterol, diabetes
( ) Diet
( ) Weight gain
( ) Healthy eating
( ) To check for expiration dates
( ) Curiosity
( ) Other

11) What nutritional information do you frequently look for on food labels?
( ) Don't read
( ) Calories
( ) Fat
( ) Cholesterol
( ) Fiber
( ) Protein
( ) Calcium
( ) Sugar
( ) Sodium
( ) Vitamin C
( ) Other

12) Do you find the information on food labels easy to understand?
( ) Yes
( ) No

13) Have you received any instruction about the nutritional components on food labels?
( ) Yes
( ) No

14) Would you be interested in receiving more information about food labels?
( ) Yes
( ) No