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The Association between Nutrition Facts Label Utilization and Comprehension among Latinos in Two East Los Angeles Neighborhoods

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ABSTRACT

Background The Nutrition Facts label can facilitate healthy dietary practices. There is a dearth of research on Latinos' utilization and comprehension of the Nutrition Facts label. **Objective** To measure use and comprehension of the Nutrition Facts label and to identify correlates among Latinos in East Los Angeles, CA.

Design Cross-sectional interviewer-administered survey using computer-assisted personal interview software, conducted in either English or Spanish in the participant's home.

Participants/setting Eligibility criteria were: living in a household within the block clusters identified, being age 18 years or older, speaking English or Spanish, identifying as Latino and as the household's main food purchaser and preparer. Analyses were based on 269 eligible respondents.

Statistical analyses performed χ^2 test and multivariate logistic regression analysis assessed the associations among the main outcomes and demographics. Multiple imputations addressed missing data.

Results Sixty percent reported using the label; only 13% showed adequate comprehension of the label. Utilization was associated with being female, speaking Spanish, and being below the poverty line. Comprehension was associated with younger age, not being married, and higher education. Utilization was not associated with comprehension.

Conclusions Latinos who are using the Nutrition Facts label are not correctly interpreting the available information. Targeted education is needed to improve use and comprehension of the Nutrition Facts label to directly improve diet, particularly among males, older Latinos, and those with less than a high school education.

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THE NUTRITION FACTS LABEL WAS MANDATED BY the Nutrition Labeling and Education Act (NLEA) of 1990, requiring nutrition labeling on most packaged foods.¹ The label was modified to facilitate consumer use in 1993.² In March 2014, the Food and Drug Administration (FDA) proposed substantial changes to the Nutrition Facts label for the first time since it was created more than 20 years ago.³ The proposed changes were motivated by findings in nutrition science that have advanced our understanding of how diet impacts health as well as by data documenting trends in dietary practices and chronic disease in the United States.³ The proposed changes, explained in detail elsewhere,² are intended to improve both the content provided and the presentation of the information to aid consumers' interpretation of the nutritional quality of the food item.³

The original purpose of the Nutrition Facts label, however, remains the same: to provide information about the nutritional characteristics of foods^{1,3} to facilitate healthy dietary

choices.^{3,4} Research has demonstrated that utilization of the label is associated with healthier dietary habits,^{1,2,5,6} including reduction of fat and overall energy intake⁴ and an increase in fruits and vegetables.⁷ Yet rates of utilization of the information on the label are low and limited comprehension of the label is the most commonly cited barrier to using it.⁷ Moreover, levels of utilization and comprehension are lower among vulnerable subgroups, including ethnic minorities, low-income populations, and people who have not completed high school.⁸⁻¹¹

A study comparing utilization among ethnic groups found Latinos the least likely to use the label than their white and African-American counterparts.⁶ Thus, there is a need to better understand utilization and interpretation of the label among Latinos, both immigrants and native-born, considering that they are the fastest growing minority group in the United States and are disproportionately affected by obesity and chronic diseases.^{5,6,12,13} Yet overall there is a dearth of research about how the Nutrition Facts label is used and

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understood within minority and immigrant populations. The limited research available on label use and interpretation among immigrants, however, suggests low levels of awareness of the labels as well as language barriers that hinder comprehension.¹⁴

The purpose of this study is to measure both utilization and comprehension of a Nutrition Facts label and to identify their correlates among Latinos in East Los Angeles, CA, a community in which 96% of the residents identify as Latino/Hispanic and almost half are foreign-born (48.7%).¹⁵ Although it has been asserted that Latinos have difficulty interpreting and using the label,¹⁶ this is the first study of which the authors are aware that measures both utilization and comprehension within the same study of Latinos. Furthermore, this study uses a validated, objective measure of comprehension, the Newest Vital Sign (NVS), whereas most studies have been largely based on subjective measures^{2,17} including perception questions.

METHODS

Study Design, Participants, and Recruitment

This study is based on data collected to evaluate a multilevel, community-based health intervention. Participants were selected based on a three-stage sampling plan. First, four block clusters were purposively selected from all blocks in East Los Angeles based on their proximity to corner stores involved in the larger study. Second, 125 households within the given block clusters were randomly selected. Finally, a single individual was sampled within the given household, after a request to speak with the adult household member most involved in food purchasing and preparation. The study purpose and procedures were explained to all potential participants and a \$25 VISA gift card was offered as incentive. All participants provided verbal and written consent after agreeing to participate.

Bilingual interviewers fluent in both English and Spanish were recruited for data collection. The interviewers were trained in both general and specific interviewing techniques, refusal conversion, and confidentiality procedures. At the end of the training session, interviewers conducted mock interviews, and members of the team supervising the data collection evaluated their performance.

Surveys were interviewer-administered using a computer-assisted personal interview (CAPI) software and were conducted in either English or Spanish in the participant's home. Data collection took place between July and October 2011 and lasted approximately 1 hour. The protocol and all English and Spanish data collection materials used for the survey were submitted to, reviewed, and approved by the University of California, Los Angeles (UCLA) Office of the Human Research Protection Program as well as the UCLA Institutional Review Board (IRB) to ensure compliance with ethical standards involving research with human subjects.

Instruments

The survey was developed by the research team by adapting existing instruments that measured nutrition knowledge and dietary behavior including the Behavioral Risk Factor Surveillance System Survey (BRFS) Questionnaire,¹⁸ the National Health and Nutrition Examination Survey (NHANES) Questionnaire,¹⁹ the Los Angeles County Health

Survey,²⁰ and California Health Interview Survey (CHIS).²¹ Additional domains emphasizing corner stores were created by the research team after conducting a thorough literature review comprised of peer-reviewed empirical studies²²⁻²⁴ and gray literature²⁵ that focused on similar studies on improving the food environment in low-income, urban neighborhoods.

The instrument was developed in both English and Spanish and consists of 21 modules that cover a broad spectrum of topics including: participants' food purchasing, preparation, and consumption behaviors as well as a range of other characteristics related to nutrition, health, and demographics. The present study is based on the Nutrition Facts label Module. Staff members of the University of California, Los Angeles/University of Southern California (UCLA/USC) Center for Population Health and Health Disparities pretested the entire survey in both English and Spanish with 10 East Los Angeles residents to test the actual survey content, determine the timing for each module of the instrument, and assess the general reaction and perceptions of respondents to the survey itself and the data collection materials. Participants in the pretesting were provided with \$25 cash incentives. The results of the pretesting prompted revisions to the instrument, including deletion and re-wording of questions to provide more clarity, or specificity, to the respondent. No questions pertaining to the Nutrition Facts label module, the basis of this study, were modified as a result of the pretesting.

A power analysis for the larger study determined that 125 individuals per neighborhood were needed for this survey. To account for the expected response rate, 352 households were considered (eligibility rate: 95% and response rate: 82%). Eligibility criteria were the following: living in a household within the block clusters identified, being age 18 years or older, speaking English or Spanish, and identifying as the main food purchaser or main food preparer in that household. A total of 275 interviews were completed. However, only those who identified themselves as Latinos were included in this study (n=269).

Measures

Dependent Variables: Utilization of the Nutrition Facts Label and Comprehension of the Nutrition Facts Label using the Newest Vital Sign. Participants were asked whether they use the Nutrition Facts label while shopping for food. The 6-item Newest Vital Sign instrument was used to assess comprehension of the label. Developed as a clinical screening tool by Weiss and colleagues at the University of Arizona, the NVS measures patient literacy skills by asking comprehension questions related to an ice cream nutrition label.²⁶ In its original format, the NVS was administered verbally and respondents were asked to give answers without response prompting.²⁶ For the present study, the wording for each of the questions was not changed from the original format, but the NVS was adapted by adding multiple choice responses. See Table 1 for the questions. The responses were developed so that only one response was correct, each response contained the same amount of detail, and incorrect responses were possible through miscalculations or limited comprehension. Responses were classified as correct, incorrect, or "I don't know." A score of 4 or more correct answers almost always indicates adequate

Table 1. Responses to the adapted Newest Vital Sign questions administered among Latinos in East Los Angeles, CA (n=269)^{abc}

	n	%
Q1. If you eat the entire container, how many calories will you eat?		
Correct answer	60	22.3
Incorrect answer	151	56.1
"Don't know"	58	22.6
Q2. If you are allowed to eat 60 g of carbohydrates, how much ice cream should you have?		
Correct answer	124	46.1
Incorrect answer	57	21.2
"Don't know"	88	32.7
Q3. You usually have 42 g of saturated fat each day, which includes one serving of ice cream. If you stop eating ice cream, how many grams of saturated fat would you be consuming each day?		
Correct answer	18	6.7
Incorrect answer	126	46.8
"Don't know"	125	46.5
Q4. If you usually eat 2,500 calories in a day, what percentage of your daily value of calories will you be eating if you eat one serving of ice cream?		
Correct answer	16	6.0
Incorrect answer	123	45.7
"Don't know"	130	48.3
Q5. Pretend you were allergic to penicillin, peanuts, latex gloves, and bee stings. Is it safe for you to eat this ice cream?		
Correct answer	138	51.3
Incorrect answer	68	25.3
"Don't know"	63	23.4
Q6. If answer to Q5 is correct, explain why.		
Correct answer	69	50.0
Incorrect answer	53	38.4
"Don't know"	16	11.6

^aScores were based on the guidelines developed by Weiss and colleagues.²²

^bThe study team adapted the Newest Vital Sign by including multiple choice response options (response options not shown here).

^cTable 1 shows that, overall, the majority of respondents either did not respond to the question(s) correctly or responded with "Don't know."

literacy, or adequate comprehension of the Nutrition Facts label for the purposes of this study.²⁶ A score less than 4 suggests limited literacy or limited comprehension of the Nutrition Facts label.²⁶ The reliability and validity of the NVS has been shown among both English and Spanish speakers with limited literacy.²⁶

Two dichotomous outcomes were analyzed: (a) Nutrition Facts label utilization while shopping for food (yes or no), and (b) Nutrition Facts label comprehension, based on the results from the NVS scoring.

Independent Variables. Sociodemographic characteristics were collected as part of the survey, including sex, marital status (single, married, or other), race (white Latino or nonwhite Latino), age group (18-34, 35-49, or >50 years), educational level (less than high school, high school graduate, or more than high school), main language spoken at home (Spanish, English, or both), household annual income, household size, and country of origin.

Households were classified as being above or below the poverty level using household income and household size based on federal government guidelines. All participants were asked about their country of origin, and answers were dichotomized into United States–born or other (Mexico, El Salvador, Puerto Rico, and Guatemala). Given the focal research question focusing on Latinos, only those who identified themselves as Latinos were included in this study. Latinos were asked to identify themselves with a race. Answers were dichotomized into white or nonwhite (black, Asian, American Indian or Alaska Native, other, and "don't know").

Data Analysis

The SAS package, version 9.2 (2008, SAS Institute Inc), was used for all statistical analyses. χ^2 tests were run to evaluate associations between the outcomes of interest. Two logistic regression models were fitted, one for each binary outcome. The models included predictor indicators for each category of the following variables: age, sex, marital status, race, education level, main language spoken at home, poverty level, and country of origin.

To address the 25% of missing data on poverty level, multiple imputation was used based on the observed values for the remaining variables. Ten different complete datasets were created to reflect the uncertainty inherent in predicting unknown values. Then, logistic regression analyses were done in each data set. The results were combined using PROC MIANALYZE, with final estimates being averages of the estimates for the 10 different datasets and the corresponding standard errors accounting for within-imputation and between-imputation variance. Variance inflation factors (VIFs) were assessed in all of the models using a cutoff value of 2.5 suggested for logistic regression.²⁷

RESULTS

Table 2 includes demographic characteristics of the participants. Overall, Latinos in the sample were predominantly female (78%), nonwhite (63%), born in Mexico or other (65%), between the ages 18 to 35 years (31%), married (43%), had less than a high school degree (80.8%), lived below the poverty level (64%), and used both languages at home (51%).

Table 2. Sociodemographic characteristics of Latino respondents in East Los Angeles, CA, who identified as their household's primary food purchaser and preparer (n=269)

	n	%
Age (y)		
18-34	82	30.5
35-49	84	31.2
>50	103	38.3
Sex		
Female	211	78.4
Male	58	21.6
Marital status^a		
Single	62	23.4
Married	115	43.4
Other	88	33.2
Race		
White Latino	101	37.6
Nonwhite Latino	168	62.5
Education^a		
High school or less	214	80.8
More than high school	51	19.2
Language spoken at home		
English	32	11.9
Spanish	99	36.8
Both	138	51.3
Poverty level^a (%)		
Above	71	36.4
Below	124	63.6
Country of origin		
United States	93	34.6
Mexico or other	176	65.4

^aTotals do not add up to 269 due to missing values.

Nutrition Facts Label Utilization

Among all respondents, 60% (n=161) reported using the Nutrition Facts label while shopping for food. In the logistic regression model, the statistical significance variable positively associated with Nutrition Facts label utilization was being female, whereas the significant variables negatively associated with the outcome were using English as the main language at home, identifying themselves as white, and being above the poverty line (Table 3). Additional analyses excluding the variables that contain missing values demonstrated that multiple-imputation analysis and complete-case analysis yielded similar findings.

Nutrition Facts Label Comprehension

Among all respondents, only 2% (n=5) of participants were able to correctly answer all six questions, and 29% of

participants had a score of 0. Overall, only 13% (n=33) had adequate levels of health literacy based on the NVS scoring rules. Furthermore, a substantial number of participants expressed not knowing how to answer the Nutrition Facts label comprehension questions (Table 1). In the first question, 22% of participants reported not knowing how to answer the question and by the fourth question the proportion increased to almost half (48%). However, in the fifth question it decreased to 23%. The sixth question was only asked to those who answered correctly the fifth question.

In the logistic regression analysis, the statistical significance variable positively associated with adequate comprehension of the Nutrition Facts label was having more than a high school education, whereas the significant variables negatively associated with comprehension were being older than 35 years, a marital status other than single (married or other), and identifying themselves as white (Table 3).

Nutrition Facts Label Utilization and Comprehension

Of the 161 people who reported some degree of utilization of the Nutrition Facts label, only 13% (n=21) had adequate levels of comprehension. Furthermore, Nutrition Facts label utilization and adequate comprehension were not statistically associated ($P=0.64$).

DISCUSSION

To the authors' knowledge, this paper is one of the first to measure, using a population-based sample, both the utilization and comprehension of the Nutrition Facts label among Latinos. Other studies have looked at either Nutrition Facts label use or comprehension among Latinos, within a specific subgroup including women⁷ and caretakers⁶ or have disproportionately focused on subjective self-assessment of their understanding.^{2,17}

The present study found no statistically significant association between Nutrition Facts label utilization and adequate comprehension. In other words, those who reported using the Nutrition Facts label more often did not have a higher performance of reading and interpreting the label correctly. These findings diverge from prior studies in which more frequent Nutrition Facts label use was associated with higher levels of adequate comprehension.²⁸ The results suggest that community health and nutrition programs should emphasize not only increasing the utilization of the label but equally focus on appropriate interpretation of the information provided.

The current study included analyses of sociodemographic characteristics commonly associated with either Nutrition Facts label utilization or interpretation. After adjusting for other potential factors, the results have elements that were both consistent and inconsistent to existing studies. For example, in accordance with other studies, higher levels of education were associated with adequate comprehension.⁶ The effects of education are mixed, as indicated by other studies.²⁸ The results do not suggest an association between age, education level, and utilization, as reported in other studies,²⁹ but are consistent with the only published study that objectively measured utilization via an eye-tracking device.¹⁷

Prior studies have tested general nutrition knowledge among Latinos^{6,13,30}; however, the current study reflects a

Table 3. Logistic regression models measuring the association between Nutrition Facts label utilization and comprehension with sociodemographic variables among Latinos in East Los Angeles, CA (n=269)^{ab}

	Nutrition Label Utilization		Nutrition Label Comprehension	
	AOR ^c	(95% CI)	AOR	(95% CI)
Age (y)				
18-34	1.0	—	1.0	—
35-49	1.1	(0.5, 2.1)	0.6	(0.2, 1.6)
>50	1.0	(0.5, 2.0)	0.1**	(0.0, 0.5)
Sex				
Female	1.0	—	1.0	—
Male	1.0	(0.5, 1.8)	1.3	(0.5, 3.5)
Marital status				
Single	1.0	—	1.0	—
Married	2.1*	(1.1, 4.2)	0.8	(0.3, 2.4)
Other	1.2	(0.6, 2.5)	0.7	(0.3, 2.2)
Race				
Nonwhite Latino	1.0	—	1.0	—
White Latino	0.6	(0.3, 1.1)	0.3	(0.1, 1.1)
Education				
High school or less	1.0	—	1.0	—
More than high school	1.7	(0.8, 3.6)	4.0**	(1.5, 9.2)
Main language spoken at home				
Spanish	1.0	—	1.0	—
English	0.4	(0.2, 1.2)	1.1	(0.5, 4.4)
Both	1.6	(0.9, 2.9)	1.4	(0.3, 4.9)
Poverty level (%)				
Below	1.0	—	1.0	—
Above	0.4*	(0.2, 0.9)	1.3	(0.5, 4.0)
Country of origin				
Mexico or other	1.0	—	1.0	—
United States	1.1	(0.6, 2.3)	2.2	(0.8, 6.1)

^aIn the first logistic regression model, the outcome is Nutrition Facts label utilization. The model includes indicators for all the sociodemographic variables listed. The variables that yielded a statistically significant association with Nutrition Facts label utilization are: marital status and poverty level. The outcome for the second logistic regression is Nutrition Facts label comprehension. The variables that yielded a statistically significant association with Nutrition Facts label comprehension are: age and level of education.

^bMissing data were addressed using multiple imputation.

^cAOR=adjusted odds ratio.

* $P < 0.05$.

** $P < 0.01$.

more tailored effort to measure Nutrition Facts label comprehension among Latinos. The low level of correct responses to questions assessing interpretation of the information among those who use the label is a source of substantial concern, with only 13% performing at what the NVS considers to be an adequate level of health literacy. This finding is consistent with a study focusing on Latinos.⁶ These findings can help explain not only the limited relevance and applicability of the Nutrition Facts label but also the

underlying mechanisms behind the purchasing patterns of unhealthy food items. Similar to previous findings,^{2,7,31} education was positively associated with higher levels of adequate comprehension, suggesting that those people with more education are more equipped to interpret and, therefore, benefit from, nutritional health information provided. This is important to consider in light of the role education plays as a social determinant of health and in existing health disparities.³²

A strength of this study was the objective measure of comprehension using the Newest Vital Sign as opposed to relying on subjective, perceived self-assessment. Nonetheless, the results suggest the incompatibility of the NVS within the specific subpopulation of Latinos in East Los Angeles. The high rate of responses of not knowing how to answer for the first four questions can be explained by the low educational levels (more than half did not have a high school diploma) and overall limited numeracy skills (Table 1). However, the rates of respondents reporting not knowing how to answer the question decreased by the fifth question, which is likely due to the fact that it was not measuring numeracy skills. Data collected from the interviewees for the process evaluation described a general sense of fatigue and discomfort among the respondents while conducting the NVS questionnaire. Although the NVS was found to be convenient within a clinical setting among patients with limited literacy rates,²⁶ the results of the current study suggest that it was not an optimal measure in a low-income community with low educational levels, such as East Los Angeles, considering the heavy reliance on numeracy skills in four out of the five main questions. Moreover, considering that the NVS was developed to measure health literacy, the findings suggest that there is a strong need for targeted public health education efforts to improve health literacy and, in particular, the comprehension of the Nutrition Facts label among Latinos. Improving these skills, and health literacy in general, can provide the information necessary to make informed positive dietary choices, including adherence to dietary guidelines,^{2,33,34} that can help improve overall health.

Limitations

Although there are numerous telling findings in this study, there are limitations worth mentioning. First, this study is cross-sectional, which undermines the potential for identifying causality and can only provide evidence for associations. Second, the sample size (n=269), although large for the research context, is still modest in absolute terms, suggesting the need for future studies with larger sample sizes among Latinos. Third, the results represent the outcomes within two neighborhoods in East Los Angeles and therefore are not necessarily generalizable to broader geographic areas or to Latinos in general. Fourth, the utilization levels may have been inflated as a result of social desirability given that the participants were informed that this was a nutrition survey. This calls for more objective measurements of utilization.¹⁷ Lastly, studies suggest that the NVS has adequate sensitivity but lacks in specificity.³⁵ That is, the measure does an adequate job in identifying patients with limited literacy skills but may misclassify patients with adequate literacy skills, at least when compared with the two most common literacy assessment tools used in health care settings: the Rapid Estimate of Adult Literacy in Medicine (REALM) and the Test of Functional Health Literacy in Adults (TOFHLA) scores.³⁵

Implications for Research and Practice

This study provides pertinent suggestions for future research and practice in nutrition programs. The findings demonstrated that individuals who report using the label while shopping are not correctly interpreting the available

information. Thus, programs should not only aim to increase utilization of the Nutrition Facts labels but provide the necessary targeted education to improve comprehension, particularly among older male Latinos with less than a high school diploma, who seemed to be at high risk for not adequately interpreting the information in this study. Such targeted educational efforts could also incorporate some of the proposed changes to the label, including improving interpretability of serving sizes as well as paying closer attention to sugar and caloric intake considering that these behaviors can help prevent chronic disease. In addition, nutrition education efforts should incorporate clear and simple strategies to improve numeracy skills to aid the interpretation of information provided on the label.

Given that utilization and interpretation of the current Nutrition Facts label are low, these findings suggest future research will be needed to determine whether the proposed changes, including modifying the information on serving size and calories, can help address the current challenges consumers face, particularly those with low levels of education. Future investigations might focus on the major barriers to adequate interpretation, including deconstructing the process of interpretation (eg, "What features of the Nutrition Facts label are getting attention from respondents: calories/% daily values/serving sizes? What are the barriers to appropriate interpretation of the information provided?"). These findings can also inform future efforts to spread awareness and help interpret the revised label once it is implemented.

Appropriately interpreting Nutrition Facts labels has the potential to support more healthy food purchasing and consumption patterns that can help prevent obesity and chronic disease morbidity and mortality across the lifespan of Latinos. In addition, improving the rates of using and properly interpreting the label among Latinos can not only potentially improve their health status but can help reduce health disparities. These are worthy goals deserving of further intervention and research efforts.

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