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Self-Reported Utilization of Eye Care among Latinos: The Los Angeles Latino Eye Study (LALES)

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Abstract

Purpose—To identify the prevalence and determinants of self-reported eye care utilization in Latinos.

Design—Population-based ocular epidemiological study in Latinos age 40+ living in La Puente, California.

Participants—5,455 participants.

Methods—Univariate, multivariable and stepwise logistic regression analyses were conducted to identify predisposing, enabling and need variables associated with self-reported eye care utilization.

Main Outcome Measures—Prevalence of self-reported utilization: eye care visit, having had a dilated examination in the past 12 months, ever having had a dilated examination, and odds ratios for factors associated with self-reported utilization.

Results—Overall, 36% of participants reported an eye care visit and 19% reported having a dilated examination in the past year. Fifty-seven percent reported ever having had a dilated eye examination. Greater eye care utilization was associated with older age, female gender, bilingual language

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proficiency (English and Spanish), more education, having health insurance, having a usual place for care, having a regular provider of care, greater number of co-morbidities, visual impairment, and lower vision-specific quality of life scores.

Conclusions—Increasing utilization and access to eye care for Latinos should be a priority because visual impairment has significant impacts on well-being and mortality.

Keywords

Latino/Hispanic; Utilization; Eye Care; Vision; LALES

INTRODUCTION

Latinos are the largest and fastest growing minority ethnic group in the United States. On average, Latinos are younger than the general population, with a median age of 26 years, as compared with non-Hispanic Whites, who have a median age of 38 years.[1] However, the number of older Latinos is increasing rapidly. Between 2005 and 2050, the proportion of the Latino population that is 65 years of age and older is expected to almost triple, increasing from 6% to 17%.[2]

This projected aging of the Latino population underscores the importance of securing access to and utilization of needed medical services for this population. Without adequate access to primary care physicians and specialists, aging Latinos will develop disabilities and chronic diseases and their complications at disproportionately high rates, diminishing their quality of life and economic productivity and adding to the nation's already rapidly increasing health care expenditures. Unfortunately, research consistently shows that Latinos have substantially worse access to care and lower utilization rates of medical services compared with other racial/ethnic groups in the United States, even among adults older than 65 years.[3]

Access to and utilization of primary care by Latinos is limited by a number of factors, including low rates of insurance coverage,[4] cultural and linguistic barriers,[1,5-8] and poor access to primary care[4] and specialty care, such as eye care, irrespective of insurance status.[9-11]

Previous studies have shown that the factors associated with poor access to eye care among Latinos living in the United States include lower education, less acculturation to the dominant culture, lack of medical and vision insurance coverage, lack of a usual provider of care, and no provider visit in the past 2 years.[12,13] Other factors include not finding a provider that speaks their language, not being able to afford the cost of medical care, and not knowing where to obtain care.[3]

In this study we identify and contrast the predisposing, enabling and need determinants of eye care utilization among Latinos with data from the Los Angeles Latino Eye Study (LALES), a population-based epidemiological study of eye disease among Latinos living in La Puente, California. The LALES collected survey and examination data from a cross-section of Latinos ages 40 years and older, including self-reported survey questions about access to general medical care and eye care.

METHODS

Study Design

Details of the LALES study design, sampling plan, and baseline data have been reported previously.[14] To summarize, a household census of all residents within six census tracts in La Puente, California, was conducted between February 2000 and May 2003 to identify eligible individuals. Demographic and socioeconomic characteristics of Latinos in the six census tracts

of La Puente were similar to those of the Latino population in Los Angeles County. All eligible participants (40 years or older at the time of the census and self-identified as Latino) were informed of the study and invited to participate in a home interview, a clinic interview and a clinic examination. Institutional Review Board (IRB) approval was obtained from the Los Angeles County/University of Southern California Medical Center Institutional Review Board. All study procedures adhered to the principles outlined in the Declaration of Helsinki for research involving human subjects.

Upon arrival at the clinic for the eye examination, participants completed an in-clinic questionnaire that consisted primarily of questions about health-related quality of life and access to care. Because these questions are critical to this study, participants who did not complete the in-clinic questionnaire were excluded, resulting in a total of 5,455 participants in this study. All participants were Latino by self-identification.

Socio-demographic and Clinical Data

After informed consent was obtained, an in-home interview was conducted to obtain demographic information, risk factors, history of ocular and medical conditions, utilization of care, acculturation, and insurance status. Operational definitions for these variables paralleled those used in the Hispanic Health and Nutrition Examination Survey.[15,16] A subsequent dilated eye examination, as well as blood pressure, fasting glucose and vision testing, was scheduled and performed in a standardized manner at the LALES Local Eye Examination Center.[17]

Dependent Variables

Three dichotomous self-reported measures of eye care use were analyzed for this study: having had any eye care visits in the past 12 months (visit in past year = yes/no), having had a dilated eye exam in the past 12 months (dilated exam in past year = yes/no), and ever having had a dilated eye exam (dilated exam ever = yes/no).

Independent Variables

Following the Health Behavioral Model,[18-20] we defined three categories of independent variables: predisposing variables, enabling variables, and need variables. Predisposing variables were further sub-categorized as predisposing demographic variables and predisposing social variables, and need variables were further sub-categorized as self-reported need variables and evaluated need variables.

Predisposing demographic variables included age, gender and marital status while *predisposing social variables* included acculturation, generational status, language preference, and educational attainment. Acculturation was measured using the short-form Cuellar Acculturation Scale.[21] Generational status was assigned as follows: participants who were foreign-born were categorized as first generation; participants who were born in the United States (US-born) with one or two foreign-born parents were categorized as second generation; and participants who were US-born with two US-born parents were categorized as third generation or higher.

Enabling variables included household income, insurance status, usual place of care (usual place), usual provider, and current driving status.

Self-reported need variables included the Short Form-12 Physical Health Composite (SF-12 PHC) score, the Short Form-12 Mental Health Composite (SF-12 MHC) score,[22,23] and the National Eye Institute Vision Functioning Questionnaire-25 (NEI VFQ-25)[24] composite score. The SF-12 PHC and SF-12 MHC scores were calculated such that a score of 50 (standard

deviation of 10) was the average score among adults in the United States.21 Higher scores represent better health-related quality of life.

Evaluated need variables included a LALES comorbidity score, along with presenting binocular near and distance visual acuity. The comorbidity score is a summation score of 12 medical conditions: diabetes mellitus, arthritis, stroke or brain hemorrhage, hypertension, angina, heart attack, heart failure, asthma, skin cancer, other cancers, back problems, and deafness or hearing problems.[21,25,26] Hypertension and diabetes were assessed by a combination of self-report, physical examination, and blood testing. Globe et al demonstrated that systemic comorbidites were associated with visual function.[25]

Imputation Procedures for Missing Data

With the exception of income, no independent variable was missing more than 1% of its values. We used mean and mode substitution to impute missing values except for income, for which we used the following stochastic regression imputation method. We estimated an ordinal logistic regression model for income with gender, age, martial status, and generation status as independent variables. For each individual with missing data we generated predicted probability cut-points for each income category using the regression coefficients from the model. We then drew a random number between zero and one from a uniform distribution and compared it to the probability cut-points to assign each individual to one income category.

Statistical Analysis

We computed the prevalence of each eye care utilization measure and evaluated the univariate association (measured by odds ratios) of each independent variable with each utilization measure. We also evaluated the multivariable associations of each independent variable with each measure of eye care utilization, controlling for all other independent variables. Because of a significant correlation among generational status, language preference, and acculturation level, only language preference was included in the final regression models. Forward stepwise logistic regression analyses were conducted to identify the order of importance of the independent variables in predicting each of the three measures of utilization of eye care; the variables that explain the greatest variance, conditional on all previously selected variables were selected. Those independent variables identified as significant for all three measures were categorized as most important; variables identified as significant independent variables in one or two models were categorized as moderately important; and variables not identified as significant for any of the three measures were categorized as least important.

All analyses were conducted using SAS software 9.1 (SAS Institute, Inc., Cary, NC). Only results at the $p<.05$ level were considered significant.

RESULTS

Study Cohort

Of the 7,789 eligible participants, 6,870 (88%) completed the in-home questionnaire and 6,357 (82%) participants completed both the in-home questionnaire and full eye examination. Complete data was available on 5,455 participants who were included in this study (see Table 1). Twenty-one percent were age 65 years or older; 59% were female; 72% were married; 66% had a low acculturation score; 76% were foreign born; 67% had less than 12 years of education; and 51% preferred Spanish. Seventeen percent had an annual income of less than $10,000; 35% were uninsured; 25% had no usual place of care; 38% had no usual provider; and 30% did not drive. The mean comorbidity score was 1.54 (median=1.00); the mean SF-12 PHC score was 46.1; and the mean SF-12 MHC score was 49.9. On examination, 7% had impaired presenting binocular distance vision and 19% had impaired presenting binocular near vision.

We compared baseline socio-demographic characteristics between the 5,455 participants and the 893 non-participants. Compared to the participants, non-participants tended to be younger (<64 years) (83% vs.78%, p<0.0001), have higher household income (>$30K) (34% vs. 26%, p<0.0001), and have fewer comorbidities than the participants (1.2 vs. 1.5, p<0.0001). No gender differences were noted. No differences in marital status, acculturation, language preference, education and current driving status were found. In addition, the proportions of non-participants and participants having medical/vision insurance and a usual place of care were similar

Utilization of Eye Care

Overall, 36% of participants reported having an eye care visit in the past year, 57% reported ever having a dilated eye exam, and 19% reported having a dilated eye examination in the past year. When stratified by age groups, 14% of those participants aged 40-54 years, 21% of those aged 55-64 years, and 32% of those aged 65+ years received a comprehensive dilated examination in the past year, respectively.

The univariate odds ratio of each independent variable with each utilization measure is provided in Table 2. Among the *demographic predisposing variables*, age was associated with all three measures of eye care utilization; gender was associated with two measures (visit in the past year; dilated exam ever); and marital status was associated with two measures (dilated exam ever; dilated exam in the past year). Among the *social predisposing variables*, education and language preference were associated with all three measures of eye care. Among the *enabling variables*, income was associated with visit in the past year; current driving status was associated with two measures (visit in the past year; dilated exam ever); insurance status, having a usual provider of care, and usual place of care were associated with all three eye care measures. Among the *evaluated need variables*, impaired binocular distance vision was associated with all three eye care measures; impaired binocular near vision was associated with two measures (had visit in the past year; dilated exam in the past year). Among the *self-reported need variables*, the comorbidity score, SF-12 PHC and NEI VFQ-25 were associated with all three eye care measures. the SF-12 MHC was not associated with any measure of eye care use.

Table 3 presents the multivariable odds ratio of each independent variable (adjusted for the other independent variables), and Table 4 shows the results of the forward stepwise logistic regression analyses. Among the independent variables: age, education, insurance status, usual provider, the comorbidity score, and the NEI VFQ-25 score were the most important predictors of utilization of eye care based on the selection of these variables in all three stepwise logistic regression analyses. Gender, language preference, usual place of care, near- and distance vision impairment were the next most important predictors of eye care utilization based on their selection in one or two of the three stepwise logistic regression analyses. Finally, marital status, income, and the SF-12 PHC and the SF-12 MHC scores were the least important predictors of utilization of eye care based on the selection of these variables in none of the stepwise logistic regression analyses.

DISCUSSION

Recently published guidelines from the American Academy of Ophthalmology (AAO) recommend that members of high risk population groups, including Latinos, receive a comprehensive eye exam every 1 to 3 years between the ages 40 and 54 years, every 1 to 2 years between the ages of 55 and 64 years, and every 6 to 12 months after the age of 64.[27] In this population-based study of Latinos 40 years and older living in Southern California, only 36% reported having an eye care visit of any kind in the past year; 19% reported having a comprehensive (dilated) eye exam in past year; and 57% reported having a dilated eye exam ever. When stratified by age groups, 14% of participants aged 40-54 years, 21% of those aged

55-64 years, and 32% of those aged 65+ years received a comprehensive dilated examination in the past year. These rates of eye care utilization by older Latinos are not in keeping with the recommendations of the AAO and are particularly notable given the high rates of undiagnosed eye disease,28 blindness and visual impairment in this population.12

This study's results are consistent with other published research on access to eye care among Latinos. Using nationally representative data from the National Health Interview Survey (NHIS), Zhang et al.[29] found that 22.1% of Hispanics 18 years of age and older reported an eye care visit in the past year and that 28.9% reported a dilated eye exam in the past year. In a smaller survey of urban public housing residents in Los Angeles County (n=152), Baker et al., found that 59% of Latinos reported an eye care visit in the past 2 years.30 By contrast, in this study approximately one in three Latinos reported an eye care visit in the past year and one in five reported a dilated eye exam in the same time period.

Use of eye care by the Latinos in this study was associated with a number of variables associated with the Health Behavioral Model. Among predisposing variables, older age, female gender, speaking both Spanish and English, and more education were independently associated with greater use of eye care. These results are consistent with previous research showing that women and older individuals are more likely to use health services than their male and younger counterparts. Previous research has also shown that education is associated with greater use of eye care.[31]

Interestingly, both Spanish monolinguals and English monolinguals were less likely to use eye care than bilinguals. The possible explanations for this finding are intriguing. Language preference is a frequently used proxy measure for acculturation.32 Traditional acculturation theory suggests that English monolinguals should be the most advantaged in an immigrant population because they are the most assimilated.33 Our results, however, are more consistent with the more recent segmented acculturation theory, which suggests that immigrants who retain their ethnic identity – as reflected by the retention of Spanish – while also attaining English proficiency are the most educationally and economically advantaged.[34] In fact, we found that compared to the monolingual English LALES participants, bilingual participants had a higher level (12+ years) of education (58% vs. 29%) and a higher (>$30K) household income (35% vs. 25%), were more likely to have vision insurance (66% vs. 49%), a usual place of care (83% vs. 74%), and a usual care provider (71% vs. 60%) and were currently driving (86% vs. 67%), all $p<0.0001$. Future research should test segmented acculturation theory with respect to other health outcomes.

Among the independent variables most strongly associated with using eye care were predisposing demographic variables associated with need (older age) and self-reported and evaluated measures of need (impaired near and far binocular vision and a lower VFQ-25 score). These results suggest that some Latinos in need are indeed receiving necessary eye care services. However, other relatively strong independent variables for eye care were a social predisposing variable (education) and an enabling variable (insurance status), indicating that the least educated and uninsured were also the least likely to use eye care services. These groups deserve special attention in initiatives to increase use of eye care among Latinos.

Previous studies suggest that having a medical home is an important independent variable of access to primary care in disadvantaged populations, including Latinos[35] In this study, older Latinos who reported having a usual source of care and a usual provider – both indicators of having a medical home – were significantly more likely to use eye care. These findings support the importance of a medical home in establishing access to medical care in general and show that a medical home is important for establishing access to specialty care in addition to primary care. In a similar study of eye care utilization by older African Americans, Owsley et al.

reported that 44% did not have an eye exam in the past year, and that implementing an eye health education program (InCHARGE) improved the eye care utilization rate.[36]

Since having vision insurance was an important enabling variable, we conducted a stepwise regression analyses to identify indicators of eye care for the subgroup of participants with vision insurance. General health insurance was not included in the model. Significant indicators of eye care in the past 12 months ($p<0.05$) in order of importance were 1) having a larger number of chronic conditions, 2) having a usual provider of care, 3) having binocular near visual impairment, 4) having a higher level of education, 5) having a worse NEI -25 composite score, 6) having English language preference, 7) being of female gender, 8) being of older age, 9) being a current driver, 10) having binocular presenting visual impairment, and 11) having a usual place of care. Similar variables emerged for the other eye care variables.

Since the NEI VFQ-25 composite score was associated with all three eye care measures in the stepwise analyses (Table 4), stepwise regression analyses were conducted to identify the primary subscales of the VFQ-25 independently associated with each of the eye care dependent variables. For Eye Care in the Past 12 months, the primary subscales in order of importance (all $p<0.05$) were 1) Driving Difficulties, 2) General Vision, 3) Vision Related Mental Health, 4) Near Vision, and 5) Distance Vision. For Complete Eye Exam in Past 12 months, the significant subscales were 1) Driving Difficulties, 2) General Health, 3) General Vision and 4) Vision Related Role Function. For Complete Eye Exam Ever, the significant subscales were 1) Distance Vision, 2) General Vision, 3) Vision Related Role Function, 4) Driving Difficulties and 5) Vision Related Social Function. The two subscales associated with all three dependent variables were Driving Difficulties and General Vision.

This study has several limitations. The reliance on self-reported measures of utilization of care poses a risk of recall bias, i.e., participants may not recall use of medical care and eye care services accurately.[37] To minimize recall bias, LALES only asked questions with a 12-month recall period or questions about ever having had a particular kind of visit.[14] The use of retrospective questions about visits in the past year is supported by Roberts et al.[38] who found that recollections of medical care visits less than 12 months in the past were less prone to recall bias than more temporally distant visits. Some studies have found the accuracy of self-reported data to be highly variable,[39] whereas other research has found that self-reports of health care utilization in the past year and of comorbidities have low levels of inaccuracy.[40]

This study's results may not generalize to all Latinos living in the United States. Utilization of eye care by Latinos may differ based on a number of factors not addressed in this study, including regional factors, immigration/documentation status, and Latino subgroup membership. The city of La Puente, CA, was selected for LALES in an effort to address some of these concerns because the Latino population residing therein is demographically similar to the extant Latino population of the United States.[14]

Disparities in eye care utilization affecting Latinos have been previously documented.[12,29] This study also shows that Latinos are not using eye care services at the levels recommended by the AAO. Increasing utilization of eye care for Latinos should be a priority for medical care providers, health insurers, and public health policy makers. Untreated visual impairment and blindness are important causes of morbidity and mortality in this population.[12] Visual impairment and blindness in older adults have significant adverse impacts on multiple health aspects, including psychological well-being, activities of daily living, economic productivity and mortality. Without the increased use of eye care services, the burden of visual impairment and blindness, though largely preventable, will continue to be significant health problem among a growing number of aging Latinos.

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Table 1

Distribution of Predisposing, Enabling and Need Variables in the Los Angeles Latino Eye Study (LALES, n=5,455)

Predisposing Demographic Variables	**N (%)**
Age (yrs)	
40-49	2,034 (37)
50-64	2,288 (42)
65+	1,133 (21)
Gender	
Male	2,238 (41)
Female	3,217 (59)
Marital Status	
Married	3,941 (72)
Divorced/separated/widowed	1,185 (22)
Never Married	3,29 (6)
Predisposing Social Variables	
Acculturation	
High (More Assimilated to US Culture)	1,833 (34)
Low (Less Assimilated to US Culture)	3,622 (66)
Generational Status	
First	4,139 (76)
Second	731 (13)
Third and Higher	585 (11)
Language	
English	1,857 (34)
Spanish	2,775 (51)
Both	823 (15)
Education (yrs)	
0-5	1,512 (28)
6-11	2,131 (39)
12	1,045 (19)
13+	767 (14)
Enabling Variables	
Household Income (in thousands)	
<10	938 (17)
10-14	989 (18)
15-29	2,105 (39)
30-40	1,061 (19)
≥50	362 (7)
Insurance Status	

Predisposing Demographic Variables	**N (%)**
Not Insured	1,882 (35)
Medical Only	751 (14)
Medical + Vision	2,821 (52)
Usual Place of Care	
Yes	4,096 (75)
No	1,359 (25)
Usual Provider	
Yes	3,354 (62)
No	2,101 (38)
Currently Driving	
Yes	3,802 (70)
No	1,653 (30)
Evaluated Need Variables	
Binocular Distance Vision	
Impaired	360 (7)
Not Impaired	5,095 (93)
Binocular Near Vision	
Impaired	1,038 (19)
Not Impaired	4,417 (81)
Self-Reported Need Variables	**Mean, Median (SD)**
Comorbidity score	1.54, 1.00 (1.60)
SF-12 PHC[†]	46.12, 49.33 (9.78)
SF-12 MHC[†]	49.92, 52.79 (10.83)
NEI VFQ-25 Composite Score[‡]	81.66, 87.19 (15.79)

US (United States); SD (standard deviation)

[†]Short Form-12 Physical Health Composite (SF-12 PHC) and Short Form-12 Mental Health Composite (SF-12 MHC) are scored such that a score of 50 (standard deviation of 10) is the average score among adults in the United States.

[‡]National Eye Institute Visual Functioning Questionnaire-25 (NEI VFQ-25) is scored using the standard algorithm to calculate the subscale scores that have a possible range from 0 to 100. Then eleven of the 12 subscale scores (excluding the general health rating question) are averaged to yield a composite score.

Table 2

Univariate Associations of Predisposing, Enabling and Need Variables stratified by Utilization of Eye Care in the Los Angeles Latino Eye Study (LALES, n=5,455)

	One or More Eye Care Visits in Past 12 Months (n=1,964, 36%)	Ever Had a Dilated Eye Exam (n=3,109, 57%)	One or More Dilated Eye Exams in Past 12 Months (n=1,036, 19%)
Predisposing Demographic Variables			
Age			
40-49	1.00	1.00	1.00
50-64	1.50 (1.32, 1.71)*	1.88 (1.66, 2.13)*	1.64 (1.38, 1.94)*
65+	2.36 (2.03, 2.76)*	4.33 (3.66, 5.13)*	3.32 (2.75, 3.99)*
Gender			
Male	1.00	1.00	1.00
Female	1.24 (1.11, 1.39)*	1.14 (1.02, 1.28)*	1.13 (0.98, 1.30)
Marital Status			
Never Married	1.00	1.00	1.00
Married	1.17 (0.92, 1.49)	1.24 (0.99, 1.55)	1.26 (0.92, 1.72)
Divorced/Separated/Widowed	1.31 (1.01, 1.70)	1.70 (1.33, 2.18)*	1.50 (1.08, 2.09)*
Predisposing Social Variables			
Language Spoken at Home			
English	1.00	1.00	1.00
Spanish	0.79 (0.70, 0.89)*	0.94 (0.83, 1.06)	0.94 (0.81, 1.10)
Both	1.13 (0.95, 1.34)	1.90 (1.59, 2.27)*	1.27 (1.03, 1.55)*
Education			
0-5	1.00	1.00	1.00
6-11	1.09 (0.94, 1.25)	1.11 (0.97, 1.27)	0.93 (0.78, 1.11)
12	1.21 (1.02, 1.43)*	1.57 (1.33, 1.84)*	1.12 (0.91, 1.38)
13+	1.68 (1.41, 2.01)*	2.26 (1.87, 2.73)*	1.44 (1.16, 1.79)*
Enabling Variables			
Household Income (in thousands)			
<10	1.00	1.00	1.0
10-14	1.01 (0.83, 1.22)	0.92 (0.77, 1.11)	0.97 (0.77, 1.23)
15-29	1.03 (0.88, 1.22)	0.95 (0.81, 1.11)	0.95 (0.78, 1.16)
30-49	1.32 (1.10, 1.58)*	1.10 (0.92, 1.32	1.07 (0.86, 1.34)
≥50	1.23 (0.95, 1.58)	1.28 (0.99, 1.64)	0.92 (0.67, 1.26)
Insurance Status			
Not Insured	1.00	1.00	1.00
Medical only	1.73 (1.43, 2.09) *	1.62 (1.37, 1.93) *	1.60 (1.26, 2.05) *
Medical + Vision	3.14 (2.75, 3.59) *	2.57 (2.27, 2.90) *	2.79 (2.35, 3.31) *

	One or More Eye Care Visits in Past 12 Months (n=1,964, 36%)	**Ever Had a Dilated Eye Exam (n=3,109, 57%)**	**One or More Dilated Eye Exams in Past 12 Months (n=1,036, 19%)**
Usual Place of Care			
No	1.00	1.00	1.00
Yes	2.70 (2.33, 3.13)*	2.25 (1.98, 2.56)*	2.55 (2.10, 3.10)*
Usual Provider			
No	1.00	1.00	1.00
Yes	2.43 (2.15,2.75)*	2.35 (2.10, 2.64)*	2.28 (1.95, 2.67)*
Currently Driving			
No	1.00	1.00	1.00
Yes	1.14 (1.01, 1.29) *	1.25 (1.10, 1.40)*	0.99 (0.85, 1.15)
Evaluated Need Variables			
Binocular Distance Vision			
Not Impaired	1.00	1.00	1.00
Impaired	1.38 (1.10,1.72)*	1.49 (1.18, 189)*	1.76 (1.37, 2.27)*
Binocular Near Vision			
Not Impaired	1.00	1.00	1.00
Impaired	0.67 (0.58, 0.78)*	0.77 (0.67, 0.88)*	1.03 (0.87, 1.23)
Self-Reported Need Variables			
Comorbidity score	1.25 (1.20, 1.30)*	1.42 (1.35, 1.49)*	1.36 (1.30, 1.43)*
SF-12 PHC†	0.99 (0.98, 0.99)*	0.98 (0.97, 0.98)*	0.98 (0.97, 0.99)*
SF-12 MHC†	0.99 (0.99, 1.00)	1.00 (0.99, 1.00)	0.99 (0.98, 1.00)
NEI VFQ-25 Composite Score‡	0.99 (0.99, 1.00)*	0.99 (0.98, 0.99)*	0.98 (0.98, 0.99)*

*P<.05 for test of null hypothesis that odds ratio is 1.00.

†Short Form-12 Physical Health Composite (SF-12 PHC) and Short Form-12 Mental Health Composite (SF-12 MHC) are scored such that a score of 50 (standard deviation of 10) is the average score among adults in the United States.

‡National Eye Institute Visual Functioning Questionnaire-25 (NEI VFQ-25) is scored using the standard algorithm to calculate the subscale scores that have a possible range from 0 to 100. Then eleven of the 12 subscale scores (excluding the general health rating question) are averaged to yield a composite score.

Table 3

Multivariable Associations of Predisposing, Enabling and Need Variables stratified by Utilization of Eye Care in the Los Angeles Latino Eye Study (LALES, n=5,455)

	One or More Eye Care Visits in Past 12 Months (n=1,964, 36%)	Ever Had a Dilated Eye Exam (n=3,109, 57%)	One or More Dilated Eye Exams in Past 12 Months (n=1,036, 19%)
Predisposing Demographic Variables			
Age			
40-49	1.00	1.00	1.00
50-64	1.45 (1.26, 1.167)*	1.88 (1.64, 2.15)*	1.46 (1.22, 1.76)*
65+	1.76 (1.46, 2.13)*	3.77 (3.07, 4.63)*	2.25 (1.80, 2.82)*
Gender			
Male	1.00	1.00	1.00
Female	1.37 (1.20, 1.57)*	1.300 (1.14, 1.49)*	1.18 (1.00, 1.38)*
Marital Status			
Never Married	1.00	1.00	1.00
Married	0.93 (0.72, 1.20)	0.97 (0.76, 1.24)	1.02 (0.73, 1.41)
Divorced/Separated/Widowed	0.95 (0.72, 1.26)	1.07 (0.82, 1.40)	0.98 (0.69, 1.39)
Predisposing Social Variables			
Language Spoken at Home			
English	1.00	1.00	1.00
Spanish	0.80 (0.70, 0.92)*	0.91 (0.80, 1.05)	0.89 (0.75, 1.06)
Both	0.86 (0.71, 1.03)	1.35 (1.11, 1.64)*	0.94 (0.75, 1.16)
Education			
0-5	1.00	1.00	1.00
6-11	1.32 (0.88, 1.21)	1.21 (1.04, 1.41)*	0.98 (0.81, 1.19)
12	1.07 (0.89, 1.31)	1.66 (1.36, 2.01)*	1.19 (0.95, 1.51)
13+	1.48 (1.20, 1.83)*	2.43 (1.95, 3.03)*	1.56 (1.21, 1.99)*
Enabling Variables			
Household Income (in thousands)			
<10	1.00	1.00	1.0
10-14	1.05 (0.85, 1.28)	0.93 (0.77, 1.15)	0.97 (0.82, 1.26)
15-29	1.02 (0.86, 1.23)	0.97 (0.81, 1.16)	1.01 (0.78, 1.16)
30-49	1.16 (0.94, 1.43)	1.02 (0.83, 1.26)	1.07 (0.83, 1.38)
≥50	1.01 (0.76, 1.33)	1.12 (0.84, 1.50)	0.92 (0.65, 1.31)
Insurance Status			
Not Insured	1.00	1.00	1.00
Medical only	1.36 (1.10, 1.67)*	1.50 (1.28, 1.76)	1.82 (1.47, 2.25)
Medical + Vision	2.14 (1.81, 2.52)*	1.18 (0.97, 1.44) *	1.82 (1.47, 2.25)*

	One or More Eye Care Visits in Past 12 Months (n=1,964, 36%)	**Ever Had a Dilated Eye Exam (n=3,109, 57%)**	**One or More Dilated Eye Exams in Past 12 Months (n=1,036, 19%)**
Usual Place of Care			
No	1.00	1.00	1.00
Yes	1.29 (1.06, 1.56)*	1.07 (0.90, 1.28)	1.28 (0.99, 1.65)
Usual Provider			
No	1.00	1.00	1.00
Yes	1.32 (1.12, 1.55)*	1.40 (1.19, 1.64)*	1.24 (1.01, 1.52)*
Currently Driving			
No	1.00	1.00	1.00
Yes	1.19 (1.02, 1.40)*	1.49 (1.27, 1.75)*	1.19 (0.98, 1.45)
Evaluated Need Variables			
Binocular Distance Vision			
Not Impaired	1.00	1.00	1.00
Impaired	1.13 (1.08,1.19)*	1.21 (1.14, 1.28)	1.20 (1.13, 1.27)
Binocular Near Vision			
Not Impaired	1.00	1.00	1.00
Impaired	1.01 (1.00, 1.01)*	1.00 (0.99, 1.01)*	1.01 (1.00, 1.01)
Self-Reported Need Variables			
Comorbidity score	1.01 (1.00, 1.90)*	1.00 (1.00, 1.01)*	1.00 (0.99, 1.01)*
SF-12 PHC†	0.99 (0.98, 0.99)	0.98 (0.98, 0.99)	0.99 (0.98, 0.99)
SF-12 MHC†	1.45 (1.11, 1.00)	1.19 (0.89, 1.58)	1.28 (0.94, 1.73)
NEI VFQ-25 Composite Score‡	0.58 (0.49, 0.69)*	0.63 (0.53, 0.74)*	0.85 (0.69, 1.05)*

*P<.05 for test of null hypothesis that odds ratio is 1.00.

†Short Form-12 Physical Health Composite (SF-12 PHC) and Short Form-12 Mental Health Composite (SF-12 MHC) are scored such that a score of 50 (standard deviation of 10) is the average score among adults in the United States.

‡National Eye Institute Visual Functioning Questionnaire-25 (NEI VFQ-25) is scored using the standard algorithm to calculate the subscale scores that have a possible range from 0 to 100. Then eleven of the 12 subscale scores (excluding the general health rating question) are averaged to yield a composite score.

Table 4

Forward Stepwise Logistic Regression Results Stratified by Utilization of Eye Care in the Los Angeles Latino Eye Study (LALES, n=5,455)

	One or More Eye Care Visits in Past 12 Months (n=1,964, 36%)	Ever Had a Dilated Eye Exam (n=3,109, 57%)	One or More Dilated Eye Exams in Past 12 Months (n=1,036, 19%)
Predisposing Demographic Variables			
Age	4	1	3
Gender	6	9	---
Predisposing Social Variables			
Language Preference	9	10	---
Education	7	2	5
Enabling Variables			
Insurance Status	1	5	2
Usual Place of Care	11	---	7
Usual Provider	3	3	6
Currently Driving	12	8	---
Evaluated Need Variables			
Distance Visual Impairment	10	---	---
Near Visual Impairment	5	7	---
Self-Reported Need Variable			
Comorbidity score	2	4	1
NEI VFQ-25	8	6	4

NEI VFQ-25 (National Eye Institute Visual Functioning Questionnaire-25)

Note. This table shows the order in which variables were selected in the forward stepwise logistic regression analyses of access to eye care. The number 1 indicates that this was the first variable selected. Estimates of the adjusted odds ratios are given in Table 3.