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## Colorectal Cancer Test Use among Californians of Mexican Origin: Influence of Language Barriers

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### Abstract

**Objectives**—Striking decreases in colorectal cancer (CRC) incidence have been seen recently in non-Latino Whites but not in Latinos. The purpose of our study was to examine the influence of limited English proficiency (LEP) on differences in CRC test use rates between Mexican American and non-Latino White adults in California and reported reasons for not getting a CRC exam.

**Design**—Cross-sectional analysis of the 2005 California Health Interview Survey (CHIS).

**Setting**—Representative sample of non-institutionalized adults living in California.

**Participants**—Mexican American ( $n=1,529$ ) and non-Latino White men and women aged 50 and older ( $n=16,775$ ) who had not been diagnosed with CRC.

**Analysis**—Logistic regression analyzed the effect of ethnicity and limited English proficiency (LEP) on CRC test use after adjusting for sociodemographics, healthcare access, health status, and other health behaviors.

**Main Outcome Measures**—Respondents' likelihood of not receiving the CRC exam was examined as a function of ethnicity and LEP status; differences in reasons for not receiving CRC testing between ethnic groups were also examined.

**Results**—More than 40% of Californian Mexican American adults aged 50 and older have never had either fecal occult blood test or lower endoscopy CRC tests. Mexican Americans were more likely to have difficulty understanding their doctor due to language barriers ( $P<.01$ ). Mexican Americans more often reported provider barriers in getting an endoscopy (ie, test was not recommended by their medical provider) than non-Latino Whites ( $P=.01$ ). After adjustment for covariates, Mexican Americans were 1.32 times and those with LEP were 1.68 times more likely to have never had either CRC test.

**Conclusions**—Limited English proficiency significantly decreased the likelihood of getting tested for CRC ( $P<.01$ ). Eliminating language barriers should result in improvements in CRC test use among limited English proficiency Mexican Americans.

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## Keywords

Mexican Americans; Colonoscopy; Colorectal Cancer; Screening

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## Introduction

Nationwide, Latinos have lower rates of colorectal cancer (CRC) screening compared to non-Latino Whites (30% vs 44%), are more likely to be diagnosed with colon cancer in advanced stages, and have lower survival rates.<sup>1</sup> Further, based on the California Cancer Registry, from 1988 to 2002, a 26% decrease in invasive colorectal cancer incidence was found among non-Latino Whites compared to an 8% decline among Latinos.<sup>2</sup> These statistics suggest that it is important to increase CRC screening among Latinos.

Mexican Americans represent the largest proportion of Latinos in the United States and 77% of the Latinos living in California.<sup>3</sup> Approximately 30% of all Californians are of Mexican origin<sup>3</sup> and about one quarter are aged 50 years or older. Of Californians of Mexican origin aged 50 years and older, about half were born in Mexico and are limited English proficient (LEP).<sup>4</sup> Understanding why Mexican Americans have lower rates of CRC screening is important for reducing healthcare disparities, a major goal of *Healthy People 2010*. One hypothesized reason for health disparities in CRC screening among Mexican Americans is language barriers.<sup>5–9</sup> This study aimed to: 1) determine 2005 rates of CRC test use in California among adults of Mexican origin (Mexicans and Mexican Americans; hereafter referred to as Mexican Americans) compared to non-Latino Whites; 2) examine whether language barriers contributed to CRC test use disparities; and 3) explore differences in reported reasons for not getting a CRC test among non-Latino Whites and Mexican Americans. Previous studies have suggested that limited English proficiency contributes to health disparities<sup>5–9</sup>; however, this is the first study to examine CRC test use as a function of LEP after adjusting for socioeconomic status, healthcare access, health status, and other health behaviors. Furthermore, this study's emphasis on Mexican Americans is important because previous studies have emphasized regional variations among Latinos in their culture and health behaviors.<sup>10–11</sup>

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## Methods

The study sample included self-identified Mexican American ( $n=1,529$ ) and non-Latino White ( $n=16,775$ ) men and women aged 50 and older from the 2005 California Health Interview Survey who had never had a CRC diagnosis. The CHIS is a telephone survey of a representative sample of non-institutionalized individuals in California and includes several questions concerning health behaviors, including cancer test use. The CHIS is administered in Spanish by bilingual interviewers at the respondent's request.

## Measurement

The two most common CRC screening modalities are the fecal occult blood test (FOBT) and lower endoscopy (or endoscopy), comprised primarily of flexible sigmoidoscopy and colonoscopy. Colonoscopy is the gold standard for CRC screening but FOBT and sigmoidoscopy are also commonly used. In the FOBT procedure, multiple stool samples are collected by the patient at home, packaged, and then submitted for lab analysis. The FOBT is the least expensive CRC screening procedure, is less sensitive than endoscopy in detecting CRC, but does not require special patient preparation. The endoscopic procedures involve the insertion of a flexible tube into the rectum that is then used to visually examine the colon;

colonoscopy extends further into the colorectum and is thus able to detect more CRC than sigmoidoscopy. Compared to FOBT, the endoscopic procedures are significantly more expensive, require significant patient preparation and staff training, but are more sensitive in detecting CRC.

Items relating to lower endoscopy (ie, sigmoidoscopy and colonoscopy) and fecal occult blood test (FOBT) testing were asked on the 2005 CHIS.<sup>4</sup> For both procedures, respondents were asked whether they ever had the test (yes-no) and whether a doctor recommended the test in the past year (yes-no). If respondents had never had an endoscopy or FOBT or had not been screened during the recommended period (10 years and 1 year, respectively), CHIS asked for the most important reason for not having the test. The free response reasons were coded by CHIS researchers into 10 categories; these were further categorized as provider- vs patient-oriented reasons.<sup>12</sup> If needed, respondents were given a graphic and procedural description of each CRC exam.

Of those who had seen a doctor in the past 12 months, CHIS respondents were asked whether they had difficulty understanding the doctor (yes-no). Of those who had difficulty understanding their doctor on their last doctor visit, they were asked if this was because 1) the doctor spoke a different language (yes-no), and 2) whether they needed someone else to help them understand the doctor (yes-no).

### Covariates

Several hypothesized predictors of CRC test use were selected based on recommendations from existing literature reviews.<sup>13–18</sup> These were entered as covariates in the logistic regression model to predict CRC test use. These included sociodemographic variables (sex, age, education, percent above poverty level, and urban vs rural residence), healthcare access (having usual health care source, having health insurance, and seeing a doctor in the past year), health status, and health behaviors associated with colorectal cancer (fruit and vegetable intake, physical activity, and smoking status).

### Analyses

Descriptive statistics of variables measuring covariates and language barriers were examined as a function of ethnicity and test use. STATA Version 9 was used for all analyses. Point estimates and logistic regression results took into account complex sampling design using replicate weights to obtain jackknife variance estimates. The alpha level was set at 0.05.

The logistic regression model was designed to predict receiving no CRC test vs having some CRC test (operationalized as never having FOBT or endoscopy and coded as 1, vs ever having one test or both tests, coded 0). The purpose of this categorization was to highlight disparities between non-Latino Whites and Latinos in never receiving either CRC test. The primary predictors of interest were ethnicity (non-Latino White vs Mexican American) and limited English proficiency (speaks no English or does not speak it well vs speaks only English or speaks it well or very well). Logistic regression model misspecification and multicollinearity were examined. If the model was misspecified, all interactions between ethnicity and LEP status with other variables in the model were added to the regression model and the specification procedures reexamined.

## Results Descriptive Statistics

### Participant Characteristics

Compared to Mexican Americans, non-Latino Whites were significantly ( $P<.01$ ) older, more likely to have a high school diploma, less likely to live below the federal poverty level, more

likely to live in a rural area, have a usual source of health care, have health insurance, have seen a doctor within the past year, have good health status, and eat five or more servings of fruits and vegetables per day (Table 1).

### CRC Test Use Correlates

Having no CRC test at all (ie, having neither FOBT nor endoscopy) was significantly ( $P<.05$ ; Table 1) associated with younger age, being Mexican American, not having a high school diploma, living below the federal poverty level, not having a usual source of health care, not having health insurance, not seeing a doctor the previous year, not getting a recommendation from a doctor, having better health status, not eating five or more servings of fruits and vegetables, not being regularly physically active, and being a smoker. Sex and urban status had no association with CRC test use.

### Language Barriers

Compared to non-Latino Whites, Mexican Americans were more likely to report experiencing more conditions indicative of language barriers (Table 1). Nineteen percent of Mexican Americans spoke only English in the home, compared to 90% of non-Latino Whites ( $P<.01$ ). Forty-five percent of Mexican Americans (compared to <1% of non-Latino Whites) were LEP (spoke no English at home or did not speak it well;  $P<.01$ ). Significantly more Mexican Americans than non-Latino Whites indicated that they had difficulty understanding the doctor at their last visit (5.5% vs 2.1%,  $P<.01$ ). Of those who had difficulty understanding their doctor ( $n=405$ ), more Mexican Americans than non-Latino Whites said it was because the doctor spoke another language (82% vs 48%,  $P<.01$ ) and more Mexican Americans than non-Latino Whites said they needed someone to help them understand the doctor (67% vs 20%,  $P<.01$ ). Compared to those having had one or both CRC tests, those without any test, tended not to “speak only English in the home” (68% vs 81%,  $P<.01$ ), were more likely to be LEP (23% vs 8%,  $P<.01$ ), had difficulty understanding their doctor due to language (70% vs 55%,  $P<.05$ ), and needed someone to help them understand their doctor (49% vs 30%;  $P<.05$ ).

### CRC Test Use Rates

Twenty-two percent of non-Latino Whites compared to 43% of Mexican Americans never had a CRC test ( $P<0.01$ ) (Table 2). Forty-three percent of non-Latino Whites compared to 21% of Mexican Americans had previously had both tests ( $P<.01$ ). Approximately equal proportions of non-Latino Whites and Mexican Americans had ever had either FOBT or endoscopy alone ( $P>.10$ ). Seventy-eight percent of non-Latino Whites ever had any CRC test; this was significantly more than Mexican Americans (57%;  $P<.01$ ). Among those who had a CRC test, nearly all reported having the CRC test recently, either FOBT within a year or endoscopy within 10 years.

### CRC Test Use Rates by LEP Status

Among Mexican Americans, compared to LEP respondents, non-LEP respondents were significantly more likely to have had FOBT only (10% vs 16%;  $P=.01$ ), both tests (11% vs 29%;  $P<.01$ ), and to have ever had any test (45% vs 67%;  $P<.01$ ) (Table 2). Compared to LEP respondents, non-LEP respondents were significantly less likely to have had neither test (55% vs 33%,  $P<.01$ ).

### Logistic Regression

The logistic regression model was well-specified. Correlations between all variables included in the logistic regression model indicated that the variables were not collinearly related nor were large confidence intervals observed around odds ratio estimates.

Table 3 reports the logistic regression to predict never having either CRC test. Non-Latino Whites, those who were older, had higher education, had lower poverty status, had a usual source of health care, had health insurance, saw a doctor in the past year, were physically active on a regular basis, and were a smoker were less likely to have had neither FOBT nor endoscopy ( $P<.05$ ).

After adjustment for covariates, Mexican Americans were 1.32 times as likely as non-Latino Whites to have either CRC test ( $P=.01$ ). Those with limited English proficiency were 1.68 times more likely as those without to have never had any CRC test ( $P<0.01$ ).

### Reported Reasons for Not Getting a CRC Test

Many Mexican Americans and non-Latino Whites said they did not have an endoscopy because they “put it off” (18% and 20%, respectively) or because it was “painful, embarrassing, or unpleasant” (14% and 23%, respectively) (Table 4); significantly more non-Latino Whites indicated the latter compared to Mexican Americans ( $P=.01$ ). Compared to non-Latino Whites, Mexican Americans more often cited provider barriers (“test was not recommended” and “did not know the test was needed”) as the reason for not obtaining an endoscopy ( $P<0.10$ ). Non-Latino Whites more often said they did not get an endoscopy for “no reason” or because they “never thought of it” ( $P<0.10$ ). Mexican Americans were more likely to report any provider barrier whereas non-Latino Whites were more likely to report any patient barrier ( $P<0.05$ ).

The two most common reasons that both Mexican Americans and non-Latino Whites gave for not having the FOBT was due to patient barriers—they either “put off” having the FOBT or thought it was “too painful, embarrassing, or unpleasant.” Mexican Americans more often reported that the reason for not having an FOBT was because they “did not have a doctor” ( $P=.03$ ). Non-Latino Whites more often said they did not get an FOBT because they “have not had any problems” ( $P=.05$ ).

### Discussion

Compared to non-Latino Whites, Mexican Americans were significantly more likely to have no CRC test (22% vs 43%;  $P<.01$ ). After adjusting for socioeconomic, healthcare system factors, health status, and health behaviors, Mexican Americans with limited English proficiency were less likely than those without LEP to have had CRC testing, and this was independent of age. This suggests that LEP is a critical contributor to CRC testing.

Compared to non-Latino Whites, Mexican Americans were significantly more likely to have no CRC test.

Mexican Americans more often cited provider barriers<sup>12</sup> for not getting an endoscopy or FOBT, though overall patient barriers were cited more often by both ethnic groups. About twice the percent of Mexican Americans as compared to non-Latino Whites said that they did not get an endoscopy because it was not recommended by their physician ( $P=.09$ ). About three times as many Mexican Americans as non-Latino Whites said they did not get an endoscopy because they did not know they needed the test ( $P=.05$ ). Not receiving a recommendation and not knowing they needed the test may have been due in part to language barriers. Mexican Americans were 15 times more likely than non-Latino Whites to report they did not get an FOBT because they had no doctor ( $P=.03$ ). These results support recent research in which patient choice, as compared to doctor's referral, accounted for only a small percentage of treatment disparities.<sup>19</sup>

Although Latinos may have basic access to health care, the quality of health care they receive may be poorer due to provider-oriented barriers that can be influenced by language barriers. For example, they may receive fewer physician recommendations, have visits of shorter

duration, and fewer contacts with medical care providers.<sup>20</sup> In the present investigation, 14% of Mexican Americans reported that an endoscopy was recommended by their doctor compared to 26% of non-Latino Whites (Table 1;  $P<.01$ ). Further, based on post-hoc analysis, Mexican Americans with limited English proficiency were twice as likely to report having a provider barrier in getting endoscopy compared to those without LEP ( $P=.02$ ; data not shown).

LEP Mexican Americans in California were less likely to get any CRC test compared to Mexican Americans who spoke English, and compared to non-Latino Whites who spoke English. While a Mexican American patient may lack knowledge about the importance of CRC testing and a provider may not understand the attitudes about CRC testing held by their Mexican American patient, communication is a bridge that can help to eliminate disparities in CRC testing. At its most basic level, speaking the same language determines the depth and accuracy at which such health-related communication may occur. LEP patients have been found to have difficulty explaining their symptoms, asking their provider follow up questions, and filling prescriptions.<sup>21</sup> Patients also do not believe that doctors understand their medical needs or that they are seen as often as needed.<sup>21</sup> LEP patients have been found to be less likely to report empathy from their providers or be able to establish a sense of rapport.<sup>7</sup> Even among insured Latinos, health care among LEP patients has been observed to be poorer, resulting in longer waits, difficulty getting information by phone, and a lack of continuity of care.<sup>6</sup> In the present analysis, even after adjustment for healthcare access, language barriers still predicted whether Californians got screened for CRC. These results for Mexican Americans mirror other studies<sup>5–9</sup> indicating that language barriers contribute to poorer quality of health care among Latinos.

### Methodological Limitations and Considerations

Self-report measures may be biased and cognitive testing indicates that it is difficult to answer questions about colorectal cancer testing procedures.<sup>16</sup> However, CHIS interviewers described each test in both graphic and practical ways to improve comprehension. The 2005 California Health Interview Survey used random digit dialing (RDD) of households with telephone land lines. Increasingly, RDD surveys have dealt with declining response rates and greater cell phone use. The response rate of the 2005 CHIS was 27%, which is comparable to the California Behavioral Risk Factor Surveillance System Survey. Thus CHIS 2005 respondents may differ systematically from the residents living in the state of California as a whole. Those at a lower socioeconomic status, Hispanics, and the underinsured are more likely to have no phone or only a cell phone,<sup>22–23</sup> which are not reached by the CHIS. Thus, Mexican Americans who do participate in the CHIS may not be representative of all Californian Mexican Americans. However, the CHIS adjusts for nonresponse bias and CHIS researchers are currently investigating the effect cell phone usage has on response bias. The CHIS items do not differentiate CRC tests given for the purpose of screening vs diagnosis, thus the results of the present investigation refer only to CRC “test use.” A significant proportion (15%–30%) selected the “other” category as the reason why endoscopy or FOBT tests were not undertaken, which limits the ability to fully understand the reasons for not getting the tests.

### Summary

Lower rates of CRC testing among Mexican Americans in California relative to non-Latino Whites are explained by several common socioeconomic factors as well as by language barriers. Provider barriers may continue to be a source of disparities in CRC test use rates, and these too may be linked to poor communication due to language barriers. Language may be a critical barrier for limited English proficient Mexican Americans, resulting in fewer recommendations from doctors for the preferred endoscopic screening procedures.



It is important to attend to language barriers that contribute to health disparities among Latinos. An estimated 50%–60% of CRC deaths might be prevented if all US adults aged 50 years or older were routinely screened.<sup>24–25</sup> Colonoscopy alone could lead to a 70% reduction in colorectal cancer mortality when used with 100% compliance<sup>26</sup> and survival from colorectal cancer is about 90% when the cancer is diagnosed early.<sup>27</sup> Further, from 1990 to 2000 the proportion of those who spoke a language other than English in the home increased in California from 31% to 39% and nationwide the Latino population grew by 58% with the vast majority of non-English speakers being Spanish-speaking.<sup>28</sup> Methods for decreasing language barriers include using universal, graphic signage in clinical settings, hiring bilingual and interpreter staff, translating forms, documents, and health promotion brochures into Spanish, developing written plans for providing LEP services in clinics and hospitals, training staff on LEP policies, maintaining data to track LEP policy implementation, and publicizing and widely offering free English as a second language education in community settings.<sup>28–30</sup> Continued research to understand and reduce language barriers may substantially reduce disparities in CRC screening, morbidity, and mortality.

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## References

1. American Cancer Society. Cancer Facts & Figures for Hispanics/Latinos 2006–2008. [February 10, 2009]. Available at: <http://www.cancer.org/downloads/STT/CAFF2006HispPWSecured.pdf>
2. California Cancer Registry. Cancer in California: 1988–2002: Colon and Rectum Cancer: Section VI. [February 10, 2009]. Available at: <http://www.ccrca.org/Cancer05/index.html>
3. U.S. Census Bureau. [February 10, 2009]. Available at: [http://factfinder.census.gov/home/saff/main.html?\\_lang=en](http://factfinder.census.gov/home/saff/main.html?_lang=en)
4. DuBard CA, Gizlice Z. Language spoken and differences in health status, access to care, and receipt of preventive services among US Hispanics. *Am J Public Health* 2008;98(11):2021–2028. [PubMed: 18799780]
5. Pippins JR, Alegría M, Haas JS. Association between language proficiency and the quality of primary care among a national sample of insured Latinos. *Med Care* 2007;45:1020–1025. [PubMed: 18049341]
6. Pérez-Stable EJ. Language access and Latino health care disparities. *Med Care* 2007;45:1009–1011. [PubMed: 18049339]
7. Diaz JA, Roberts MB, Goldman RE, Weitzen S, Eaton CB. Effect of language on colorectal cancer screening among Latinos and non-Latinos. *Cancer Epidemiol Biomarkers Prev* 2008;17:2169–2173. [PubMed: 18708410]
8. Natale-Pereira A, Marks J, Vega M, Mouzon D, Hudson SV, Salas-Lopez D. Barriers and facilitators for colorectal cancer screening practices in the Latino community: perspectives from community leaders. *Cancer Control* 2008;15:157–165. [PubMed: 18376383]
9. Gorin SS, Heck JE. Cancer screening among Latino subgroups in the United States. *Prev Med* 2005;40:515–526. [PubMed: 15749133]
10. Zambrana RE, Breen N, Fox S, Gutierrez-Mohamed ML. Use of cancer screening practices by Hispanic women: Analysis by subgroup. *Prev Med* 1999;29:466–477. [PubMed: 10600427]
11. California Health Interview Survey. [February 10, 2009]. Available: <http://www.chis.ucla.edu/>
12. Mandelblatt JS, Yabroff KR, Kerner JF. Equitable access to cancer services: a review of barriers to quality care. *Cancer* 1999;86:2378–2390. [PubMed: 10590381]
13. Hiatt RA, Klabunde C, Breen N, Swan J, Ballard-Barbash R. Cancer screening practices from National Health Interview Surveys: past, present, and future. *J Natl Cancer Inst* 2002;94:1837–1846. [PubMed: 12488477]

14. Etzioni DA, Ponce NA, Babey SH, et al. A population-based study of colorectal cancer test use: results from the 2001 California Health Interview Survey. *Cancer* 2004;101:2523–2532. [PubMed: 15505783]
15. Liang, SY.; Phillips, KA.; Nagamine, M.; Ladabaum, U.; Haas, JS. Rates and predictors of colorectal cancer screening; *Preventing Chronic Disease* [serial online]. 2006 [February 10, 2009]. p. 1-13. Available at: [http://www.cdc.gov/pcd/issues/2006/oct/06\\_0010.htm](http://www.cdc.gov/pcd/issues/2006/oct/06_0010.htm)
16. Pollack, LA.; Blackman, DK.; Wilson, KM.; Seeff, LC.; Nadel, MR. Colorectal cancer test use among Hispanic and non-Hispanic U.S. populations; *Preventing Chronic Disease* [Serial online]. 2006 [February 10, 2009]. p. 1-12. Available at: [http://www.cdc.gov/pcd/issues/2006/apr/05\\_0120.htm](http://www.cdc.gov/pcd/issues/2006/apr/05_0120.htm)
17. Seeff LC, Nadel MR, Klabunde C, et al. Patterns and predictors of colorectal cancer test use in the adult U.S. population. *Cancer* 2004;100:2093–2103. [PubMed: 15139050]
18. Shah M, Zhu K, Potter J. Hispanic acculturation and utilization of colorectal cancer screening in the United States. *Cancer Detect Prev* 2006;30:306–312. [PubMed: 16872756]
19. Robert Wood Johnson Foundation. Creating a Synthesis of Research Racial and Ethnic Disparities in Health Care. Dec2006 [February 10, 2009]. Available at: <http://www.rwjf.org/reports/grr/033373.htm>
20. Abraído-Lanza AF, Chao MT, Gammon MD. Breast and cervical cancer screening among Latinas and non-Latina Whites. *Am J Public Health* 2004;94:1393–1398. [PubMed: 15284049]
21. Wu S, Ridgely MS, Escarce JJ, Morales LS. Language access services for Latinos with limited English proficiency: Lessons learned from *Hablamos Juntos*. *J Gen Intern Med* 2007;22(suppl 2):350–355. [PubMed: 17957424]
22. Blumberg, SJ.; Luke, JV. Wireless substitution: early release of estimates from the National Health Interview Survey. National Center for Health Statistics. July-December2007 [May 1, 2009]. Available at: <http://www.cdc.gov/nchs/nhis.htm>
23. Kempf AM, Remington PL. New challenges for telephone survey research in the twenty-first century. *Ann Rev Public Health* 2007;28:113–26. [PubMed: 17094769]
24. Maciosek MV, Coffield AB, Edwards NM, Goodman MJ, Flottemesch TJ, Solberg LI. Priorities among effective clinical preventive services: results of a systematic review and analysis. *Am J Prev Med* 2006;31:52–61. [PubMed: 16777543]
25. Pignone M, Rich M, Teutsch SM, Berg AO, Lohr KN. Screening for colorectal cancer in adults at average risk: a summary of the evidence for the U.S. Preventive Services Task Force. *Ann Intern Med* 2002;137:132–141. [PubMed: 12118972]
26. Maciosek MV, Solberg LI, Coffield AB, Edwards NM, Goodman MJ. Colorectal cancer screening: Health impact and cost effectiveness. *Am J Prev Med* 2006;31:80–89. [PubMed: 16777546]
27. American Cancer Society. [February 10, 2009]. Available: <http://www.cancer.org/docroot/home/index.asp>
28. Perkins, J.; Youdelman, M.; Wong, D. Ensuring Linguistic Access in Health Care Settings: Legal Rights and Responsibilities. Vol. 2nd. Washington, DC: National Health Law Program; 2003.
29. Green AR, Peters-Lewis A, Percac-Lima S, et al. Barriers to screening colonoscopy for low-income Latino and White patients in an urban community health center. *J Gen Intern Med* 2008;23:834–40. [PubMed: 18350339]
30. Robert Wood Johnson Foundation. Universal Symbols in Health Care Workbook: Executive Summary; Best Practices for Sign Systems. [February 10, 2009]. Available at: <http://www.segd.org/resources/symbols.html>



**Table 1**  
**Descriptive statistics and colorectal cancer screening rates as a function of ethnicity and colorectal cancer test use\* from the 2005 California Health Interview Survey among those aged 50 years and older (N=18,304)**

Participant Characteristics	Mexican American N=1,529	Non-Latino White N=16,775	P	Never Had Endoscopy or FOBT N=4,155	Ever Had Both or One CRC Test N=14,149	P
	Mean	Mean	Percent	Mean	Mean	Percent
Age (years)	61.7	64.5	<.01	60.13	65.33	<.01
Sex (male)	47.8	46.4	0.38	46.3	46.8	0.73
Ethnicity (non-Latino white)	—	—	—	71.8	87.4	<.01
High school diploma	46.7	93.5	<.01	77.3	88.6	<.01
Percent living above federal poverty level	74.0	96.0	<.01	87.4	94.1	<.01
Urban resident	89.8	82.0	<.01	83.1	83.4	0.74
Usual source of health care	90.1	96.0	<.01	86.8	97.8	<.01
Had health insurance <sup>†</sup>	79.4	94.5	<.01	81.6	95.5	<.01
Saw doctor in the past year	84.7	89.7	<.01	76.8	93.0	<.01
Doctor recommended endoscopy <sup>‡</sup>	14.0	25.6	<.01	17.8	28.8	<.01
Doctor recommended FOBT <sup>‡</sup>	5.3	5.3	0.98	4.3	5.9	<.01
Good health status <sup>§</sup>	55.4	80.2	<.01	73.6	76.9	<.01
Five or more fruits and vegetables/day	44.6	49.8	<.01	45.7	50.0	<.01
Regular physical activity	28.7	30.3	0.22	26.8	31.1	<.01
Non-smoker	88.6	87.4	0.28	81.1	89.8	<.01
<b>Language Barriers</b>						
Only English spoken at home	18.6	89.6	<.01	68.1	81.1	<.01
Limited English proficient <sup>  </sup>	45.4	0.4	<.01	22.6	8.3	<.01
Difficulty understanding doctor	5.5	2.1	<.01	3.3	2.5	0.09
Doctor spoke another language <sup>‡  </sup>	82.2	48.3	<.01	69.7	55.3	0.04
Needed someone to understand doctor <sup>‡##</sup>	66.5	19.9	<.01	48.6	29.9	0.03

\* Includes Mexican American and non-Latino white Californian adults aged 50 and older who had not been diagnosed with colorectal cancer.

<sup>†</sup> Had health insurance all last year vs. those who had no health insurance or had health insurance part of last year.

- \* Not entered into logistic regression due to small sample size.
- § Good, very good, and excellent health status vs. fair and poor health status.
- // Speaks no English in the home or does not speak it well vs speaks only English or speaks it well or very well.
- ¶ Of those who said they had difficulty understanding the doctor, the percent who said it was because the doctor spoke a different language.
- # Of those who said they had difficulty understanding the doctor, the percent who said they needed someone else to help understand the doctor.

**Table 2**  
**Colorectal cancer test use rates\* as a function of ethnicity and limited English proficiency among those aged 50 years and older from the 2005 California Health Interview Survey (N=18,304)**

CRC Screening Test Use Rates	Combined Mexican-Americans and Non-Latino Whites N=18,304			Mexican-Americans n=1,529		P
	Mexican n=1,529	Non-Latino White n=16,775	LEP <sup>†</sup> n=590	Non-LEP n=939		
FOBT only	13.5 (11.6–15.6)	13.3 (12.7–13.9)	10.1 (7.4–13.6)	16.3 (13.4–20.0)	.01	
Endoscopy only	22.6 (19.8–25.8)	22.8 (22.0–23.7)	23.3 (18.9–28.5)	22.0 (18.4–26.1)	.67	
Both endoscopy and FOBT	20.8 (18.2–23.7)	42.1 (41.0–43.1)	11.2 (8.1–15.5)	28.7 (25.4–32.3)	<.01	
Neither test	43.1 (39.7–46.6)	21.8 (21.0–22.7)	55.3 (50.0–60.6)	33.0 (29.1–37.2)	<.01	
Ever had any test	56.9 (53.4–60.3)	78.2 (77.3–79.0)	44.7 (39.4–50.1)	67.0 (62.8–70.9)	<.01	

\* Includes Mexican-American and non-Latino white Californian adults aged 50 and older who had not been diagnosed with colorectal cancer.

<sup>†</sup> LEP is limited English proficient.

**Table 3**  
**Logistic regression model to predict never receiving any colorectal cancer test use from the 2005 California Health Interview Survey among Mexican Americans and non-Latino White adults aged 50 years and older (N=18,304)**

	Never Had FOBT or Endoscopy <sup>a</sup>		
	Adj. OR	95% CI	P
<b>Sociodemographic factors</b>			
Ethnicity (Mexican American) <sup>b</sup>	1.32	(1.07–1.53)	.01
Gender (male) <sup>c</sup>	0.91	(0.82–1.03)	.12
Age (years)	0.95	(0.95–0.96)	<.01
Higher education <sup>d</sup>	0.91	(0.89–0.94)	<.01
Percent above federal poverty level	0.97	(0.95–0.99)	<.01
Urban resident <sup>e</sup>	0.96	(0.87–1.10)	.71
<b>Health care access</b>			
Usual source of health care <sup>f</sup>	0.35	(0.28–0.43)	<.01
Have health insurance <sup>g</sup>	0.63	(0.52–0.77)	<.01
Saw doctor in the past year <sup>h</sup>	0.36	(0.30–0.42)	<.01
<b>Health status</b>			
Good health status <sup>i</sup>	1.14	(0.98–1.33)	.09
<b>Other health behaviors</b>			
High fruit and vegetable intake <sup>j</sup>	0.94	(0.84–1.06)	.34
Regular physical activity <sup>k</sup>	0.86	(0.77–0.97)	.01
Non-smoker <sup>l</sup>	1.44	(1.24–1.67)	<.01
<b>Language barrier</b>			
Limited English proficient (LEP) <sup>m</sup>	1.68	(1.27–2.22)	<.01

Note. The analysis includes Mexican American and non-Latino white Californian adults aged 50 and older who had not been diagnosed with colorectal cancer.

<sup>a</sup> 1=Had neither endoscopy nor FOBT colorectal cancer screening, 0=had FOBT or endoscopy or both tests;

<sup>b</sup> 1=Mexican American, 0=Non-Latino White

<sup>c</sup> 1=Male, 0=female

<sup>d</sup> 11-point scale with 0=no formal education through 10=doctoral degree

<sup>e</sup> 1=Urban, 0=rural

<sup>f</sup> 1=Has usual source of health care, 0=does not have usual source of health care

<sup>g</sup> 1=Had health insurance all of last year, 0=did not have health insurance the entire year

<sup>h</sup> 1=Saw a doctor in the past 12 months, 0=did not see doctor

<sup>i</sup> 1=Good, very good, excellent health status, 0=poor or fair health status

<sup>j</sup> 1=Consumes five or more servings of fruits and vegetables per day, 0=does not consume

$k$   
1=Regularly physically active, 0=some physical activity or sedentary

$l$   
1=Quit or never smoked, 0=smoker

$m$   
1=Speaks no English in the home or does not speak it well, 0=speaks only English or speaks it well or very well

