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Sociodemographic Correlates of Cancer Screening Services Among Hispanics and Non-Hispanic Whites in a Rural Setting

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Abstract

Objectives—To examine the relationship between age, race, ethnicity, education, insurance coverage, and income and use of cancer screening services.

Methods—We used a population-based sample (N = 1863) from a community randomized intervention study that took place in eastern Washington State.

Results—Pap testing was directly associated with having public health insurance, being 40 and older, and having a high income (>\$35,000). Having Medicare coverage was predictive of having had a mammogram or sigmoidoscopy / colonoscopy screening, but not an FOBT.

Conclusions—Our findings may reflect age-dependent factors that influence access to health care.

Keywords

cervical cancer; breast cancer; colorectal cancer; Hispanic; demographic factors

Introduction

Compared to non-Hispanic whites, Hispanics in the United States experience a higher incidence of certain types of cancer and a lower incidence of others. Incidence of cervical cancer, for example, is higher among Hispanics (13.8 per 100,000) than non-Hispanic whites (8.5 per 100,000).¹ Incidence of breast and colorectal cancer, however, is lower among Hispanics; SEER data from 2000 to 2004, for example, show the number of new cases of breast cancer was 89.3 per 100,000 for Hispanics versus 132.5 per 100,000 for non-Hispanic whites.¹ Incidence of colorectal cancer was 47.5 per 100,000 for Hispanics males versus 60.4 per 100,000 for non-Hispanic white males and 32.9 per 100,000 for Hispanic females versus 44.0 for non-Hispanic white females.¹

Early detection of precancerous cells or early forms of cancer through routine screening is thought to reduce mortality and in some cases prevent disease onset. Hispanics, in general, are less likely than non-Hispanic whites to receive routine screening exams.²⁻⁷ Data from the National Health Interview Survey for the year 2003 show that 74.7% of Hispanics had received a Pap test in the past 3 years, compared to 80.2% for non-Hispanic whites.²

Similarly, a smaller share of Hispanics than non-Hispanic whites had recently participated in mammography screening; 66.1% of Hispanics aged 40 and older received a mammogram in the past 2 years, compared to 70.8% of non-Hispanic whites. Data from the same source show relatively low participation in colorectal cancer screening; among Hispanics, 28.9% of men and 30.8% of women had received an FOBT in the past year or an endoscopy (sigmoidoscopy, colonoscopy, or protoscopy) in the past 5 years; this compares with 47.1% and 42.0% among non-Hispanic white men and women, respectively.²

The underlying premise of most previous investigations on cancer screening disparities is that individuals with limited resources or poor access to health care services are less likely than those with greater resources or health care access to receive timely cancer screening and are thereby more likely to receive a late-stage cancer diagnosis. Consistent with this theory, several previous investigations cite low income,⁷⁻⁹ low levels of education,⁹ and Hispanic ethnicity¹⁰ as predictors of nonparticipation in cancer screening services. Some studies suggest that socioeconomic factors are of primary importance in explaining screening-services use across ethnic groups,^{8, 11} whereas other studies underscore the importance of ethnicity when evaluating the disparate use of services.¹⁰

Using self-reported survey data from a population-based random sample of individuals in eastern Washington State, we examined the association between demographic factors and use of screening services for cervical, breast, and colorectal cancers. The study described here is, to our knowledge, the first large population-based sample of a mixed ethnic group from a rural area to examine cancer prevention practices. We test the prevailing view of the literature that low income, low levels of education, and Hispanic ethnicity predict low use of cancer screening services.

Methods

Setting

This trial was conducted in the Lower Yakima Valley of Washington state. A description of the area has been given in detail elsewhere.¹² The Yakima Valley is a rural region with a large agricultural industry that employs an estimated 50,000 Hispanics.

Sample

The study population included adults residing in any of the 20 communities of the Yakima Valley. The survey methods have been described in detail elsewhere.¹² Data for this paper come from the final assessment of the community trial. Briefly, each community's geographic boundaries were used to identify census blocks within the community. Because we wished to survey enough Hispanics to make inferences to both Hispanic and non-Hispanic white populations, the sampling design oversampled Hispanics. Census data (2000) were used to calculate the percentage of Hispanic residents within each census block. The census blocks were then ranked by percentage of Hispanics and divided into 3 groups (tertiles). Approximately 160 households were drawn from each community, with 50% of the sample coming from the first tertile (the census blocks with the highest percentage of Hispanics), 33% of the sample households from the second tertile (the census blocks with the next highest percentage of Hispanics), and 17% of the sample households from the third tertile (the census blocks with the lowest percentage of Hispanics). Address lists were purchased from bulk mailing companies and overlaid on the census block maps to identify households. Six of the communities had fewer than 160 housing units; in those cases, all households in the communities were surveyed.

Within each randomly selected household, one adult was interviewed. Eligibility criteria required that the respondent be 18 years of age or older, have lived in the household for at

least the past week, and able to respond to questions. Where 2 or more eligible adults lived in the household, the first adult to have a birthday after December 31 was selected for the interview.

Survey Procedures

Because the overall educational level of the population was relatively low, we used in-person interviewing. We hired local bilingual project interviewers to conduct the survey. Three training sessions of 6 hours each were conducted by bilingual project staff. The training addressed strategies for approaching households, methods for asking questions in a standard manner, methods of editing questionnaires, and rules for documenting household contacts and survey dispositions. All interviewers were tested and certified. Interviewing took place between March 2002 and October 2002. Respondents were given a \$5 grocery store coupon for participating. Prior to survey implementation, the survey and study protocols were reviewed and approved by the Institutional Review Board at the Fred Hutchinson Cancer Research Center (FHCRC).

Instrument

The interview instrument was a 104-item questionnaire divided into 8 sections: health care access, smoking behavior, eating patterns, cancer screening behavior, awareness of cancer events in the community, diabetes, acculturation, and demographics.

Because it was believed that some respondents might be unfamiliar with a given screening test, questions about cancer screening behaviors included brief descriptions of the tests. These included Pap test (a Pap smear is when a doctor takes a scraping of tissue from the cervix include the vagina during a pelvic exam), mammogram (a mammogram is an X-ray of the breasts by a machine that squeezes the breasts while a picture is taken), FOBT (you smear a little of your stool or feces on a card and send it in to your doctor or clinic), and sigmoidoscopy or colonoscopy (a test where a doctor inserts a tube in your rectum to check for bowel problems). Such descriptions have been shown to improve the accuracy of self-reported data.¹³

For each type of screening (cervical cancer, breast cancer, and colorectal cancer), respondents were asked if they had ever been screened and how long it had been since their last screening. We defined compliance according to the national guidelines for clinical services.¹⁴ For early detection of cervical cancer, the United States Preventive Task Force (USPSTF) recommends Pap screening at least every 3 years for women beginning at the onset of sexual activity.¹⁴ Screening for breast cancer is recommended for women aged 50 – 69 using mammogram alone or mammogram combined with clinical breast exam.¹⁴ For women aged 40 – 49, the USPSTF recommends neither for nor against routine mammogram screening.¹⁴ All organizations concerned with colorectal cancer emphasize the importance of screening beginning at age 50. The USPSTF, for example, recommends annual FOBT and/or sigmoidoscopy at unspecified intervals¹⁴; the American Cancer Society recommends combined annual FOBT with sigmoidoscopy every 5 years, and colonoscopy every 10 years¹⁵; and the American College of Gastroenterology recommends colonoscopy every 10 years or flexible sigmoidoscopy every 5 years plus annual FOBT.¹⁶

Based on these screening recommendations, our examination of compliance with cervical cancer screening is limited to women between the ages of 18 and older. Those who had a Pap smear within the past 3 years were described as “in compliance”; those more than 3 years ago were “not in compliance”; and those who never had a Pap smear were categorized as “never had.” Mammography screening information was obtained from women aged 40 and older. Women who had a mammogram within the past 2 years were considered “in

compliance.” Those who had a mammogram more than 2 years ago were categorized as “not in compliance,” and those who never had a mammogram were classified as “never had.”

All subjects 50 and older were assessed for 2 types of colorectal cancer screening. Individuals who reported having an FOBT at some time within the past 2 years were classified as being “in compliance.” Those who had ever had an FOBT, but more than 2 years ago were considered “not in compliance,” and those who never had such a test were categorized as “never had.” History of flexible sigmoidoscopy or colonoscopy was divided into those who had such a test within the last 5 years, those who had a sigmoidoscopy or colonoscopy more than 5 years ago, and those who had never had a sigmoidoscopy or colonoscopy. Questions about colorectal cancer screening included both sigmoidoscopy and colonoscopy in the same question because it was known from pretesting that many of our respondents did not discern the differences.

Socio-demographic Factors

We used self-reported ethnicity. Only Hispanics and non-Hispanic whites were used in the analyses. Age was grouped into 4 categories to correspond with ages when various cancer screening activities are recommended: 18-39, 40-49, 50-64, and 65 and over.

Acculturation

Questions about acculturation asked about language most often spoken, language most often used for thought, ethnic identification of self, and birthplace of self. A mixed model distribution method was used to assign study participants to one of 2 groups, representing levels of acculturation (low and high). Validation of this scale has been reported previously.¹⁷

Quality Control

To ensure the quality of the data, all coding and editing were checked by project staff at the FHCRC. A 10% random sample of households were recontacted and asked to verify that the interviewer had spoken with the respondent listed and to confirm the validity of household rostering information. Where the information was incorrect, and the contacted person reported having lived in the home when the survey was conducted, the questionnaire data were assumed to be erroneous, and the interview was repeated with the appropriate person in the household. All interviews completed by that interviewer were then checked and repeated as needed. Complete questionnaires were entered into a database, and analyses were performed using SAS.

Analysis

For the purposes of statistical analyses, we examined whether the respondent was compliant with screening guidelines. The primary response variables were compliance of one of the 4 screening services: PAP test, mammography, FOBT, and sigmoidoscopy/colonoscopy. For each screening test, we examined whether a gender-eligible and age-eligible respondent who had received an initial screening exam had his or her most recent test performed within the time frame specified by the screening guidelines.

Because the participants were recruited from 20 communities in the Lower Yakima Valley, unmeasured community-level factors, such as resources available within a community or informal communications among neighbors, could influence responses from participants residing in the same community. Prior to randomization, the communities were grouped into pairs (based on size and percent Hispanic), and within each pair one community was assigned to intervention status and the other to control status. When examining the association between a socio-demographic factor and a screening behavior, the community

pairing and the community-level effects were controlled for as random effects to account for the variability both between pairs and between 2 communities within a pair. The difference in response due to the intervention was adjusted for as a fixed effect. Generalized linear mixed models were applied on the response variables using SAS macro GLIMMIX. Thus, we examined the direct associations between a given demographic characteristic and compliance with a given screening exam, adjusted for randomization status.

Results

Response Rates

From a sample of 2936 addresses, 2437 households were approached for the study. The remaining addresses were vacant buildings (217), organizations (40), nonexistent dwellings (205), and businesses (37). Interviews were completed by 1863 individuals. There was no answer after 5 or more visits in 254 households, yielding a conservative response rate of 76.4%. The response rate of the known eligible households where an adult was present (N = 2083) was 89.4%.

Recognizing that gender and age determine eligibility for cancer screening services, we examined the demographic factors among women aged 18 and older (for cervical cancer screening), women aged 40 and older (for breast cancer screening), and women and men aged 50 and older (for colorectal cancer screening).

Among women age-eligible for cervical cancer screening (aged 18 and older), a large share (42.0%) were aged 18 – 39, about half were Hispanic, and among the Hispanics, nearly two-thirds had a low level of acculturation (Table 1). Education level was generally equally distributed across 4 categories: 8th grade or less, 9th – 12th grade, high school graduate or GED, and at least some college. The majority of women were married, and approximately half had private health insurance, the remaining women had public insurance (28.1%), no insurance (17.7%) or Medicare (8.7%). Over a third of households had annual household incomes of \$15,000 or less.

When we examined the associations between demographic characteristics and use of screening services, we found age to be indirectly associated with having obtained a recent screening exam for cervical cancer (Table 2). Hispanic women were over 3 times more likely than non-Hispanic white women to have had a recent Pap test. Level of acculturation was not associated with compliance with screening services for cervical cancer. Contrary to expectation, increasing years of education were indirectly associated with receipt of a recent Pap test, and those with public insurance were the group most likely to be compliant with screening (compared to private, Medicare, and no insurance). Having a higher level of income directly predicted recent use of cervical cancer screening.

Among women age-eligible for mammography screening, roughly equal percentages fell into the 3 age categories: 40 – 49, 50 – 64, and 65+. Slightly more than a third of the women were Hispanic; and among Hispanics, about 60 % had a low level of acculturation. Education level was generally equally distributed across the 4 categories. The majority of respondents were married. Approximately half of women aged 40 and older had private health insurance, the remaining had public (19%), Medicare (14.5%), and no insurance (11.5%). Nearly 40% of women had annual household incomes of \$15,000 or less.

The proportion of women aged 40 – 49 who had had a mammogram in the past 2 years, was 86.4; this percentage decreased slightly with increasing age category (50 – 64 and 65+), though the differences were not statistically significant. Hispanic and non-Hispanic whites were about equally likely to have had a recent mammogram. Contrary to expectation, a

smaller proportion of highly acculturated Hispanics (compared to those having a lower level of acculturation) had received a recent mammogram, though the difference was not statistically significant. Level of education was not associated with receipt of a recent mammogram. Women who reported having Medicare coverage were about half as likely as those having private health care coverage to have had a recent exam. Notably, those having no health care coverage had the same rate of screening as those with Medicare. Income was not associated with recent receipt of a mammogram.

Among women and men age-eligible for colorectal cancer screening, the majority were ages 50 – 64 (compared to ages 65 and older). Nearly 60% were female. Only a quarter of these respondents were Hispanic, and among Hispanics, slightly more than half had a low level of acculturation. Education level was generally equally distributed across the 4 categories. The majority of study respondents were married. Approximately half of respondents aged 50 and older had private health insurance; the remaining had Medicare (21%), public insurance (12.4%), or no insurance (10.2%). Over a third of households had annual household incomes of \$15,000 or less.

Of particular importance is the differential use of screening services for colorectal cancer by ethnic group. Compared to non-Hispanic whites, Hispanics were more likely to have received a recent FOBT test, but were less likely to have received a recent sigmoidoscopy/ colonoscopy. Among Hispanics, those with a higher level of acculturation were slightly less likely to have received a recent screening exam; though the associations were nonsignificant. Contrary to expectation, as the number of years of completed education rose, the proportion of individuals who had received a recent FOBT screening dropped, though the associations were nonsignificant. A larger share of respondents having a high school education or at least some college had received a colonoscopy / sigmoidoscopy in the past 5 years, compared to those having less than a high school education; though the associations were not significant. For FOBT screening, a higher proportion of those with Medicare and public insurance than those with private insurance received a recent test, though no significant associations were noted. In contrast, for colonoscopy or sigmoidoscopy screening, those with Medicare were 2.5 times more likely and those with no insurance were half as likely as those with private insurance to have had an exam in the past 5 years. Having a higher level of income was directly associated with having received a recent colonoscopy / sigmoidoscopy. A trend was noted for an indirect association with income and recent receipt of an FOBT screening exam, though the association did not reach significance.

Discussion

In this study, we examined the association between demographic factors and use of screening services for cervical, breast, and colorectal cancers. Our findings suggest that the associations between socio-demographic factors and recent receipt of cancer screening services vary widely across screening exams. Given that screening exams are recommended for individuals in specified age and gender categories, these findings may reflect age-dependent access factors (such as access to employer-based health care coverage or Medicare). Because individuals aged 65 and older are eligible for Medicare coverage, for example, the association between age and screening may be influenced by the available benefits of this coverage. Alternatively, these findings may suggest that unmeasured factors, such as a physician referral for screening, or one's knowledge about the need for screening or attitudes or beliefs may influence one's decision to obtain regular cancer screening.

Our finding that Hispanics were more likely than non-Hispanic whites to have received a recent screening for cervical cancer is inconsistent with previous research.^{18, 19} This finding may be an artifact of age, because screening rates were highest in the 18-39 age-group and a

greater share of Hispanics than non-Hispanic whites fell into this category; fully 59% of Hispanic women were 18-39, compared to 24.6% of non-Hispanic white women (data not shown). One reason that Pap tests are more common among women in this age-group is that Pap tests are part of the medical services that are performed during of prenatal examinations. Nevertheless, our data showed that irrespective of age, Hispanics were more likely to have received screening. This finding may be attributable to effective outreach programs that provide low-cost or free screening. The Washington State Department of Health receives funding from the Centers for Disease Control and Prevention's National Breast and Cervical Cancer Early Detection Program (NBCCEDP). The program aims to improve access to screening exams for the early detection of breast and cervical cancer among the low-income, uninsured, and underserved women.²⁰ The program offers free screening to women between the ages of 18 and 64 who meet income and insurance criteria. Because a greater share of Hispanics meets the program's criteria, we would expect higher participation rates in this group. The NBCCEDP program began in 1991 and is thought to have contributed to the national 18% increase in mammogram use among women aged 50 and older. Nationally, about 50 % of the women using the program have been from racial/minority groups; estimates show that the program is reaching about 20 % of eligible women.²⁰ If such programs are effective in reaching all sectors of the community, especially those with a low level of acculturation, the impact of these programs may explain the lack of association between level of acculturation and cervical cancer screening service acquisition. This finding is inconsistent with that of some previous research reporting lower screening-service acquisition among low-acculturated Hispanics (compared to those with a higher level of acculturation).¹⁸

Contrary to expectation, our data showed that women with public insurance were more likely than women with private insurance to have obtained a recent Pap test. Our data further showed that recent Pap test use increased with increasing income. Those with higher levels of income are thought to be less likely to have public health insurance, and this was true in our data, which showed that 44.2% of Hispanic women compared with 12.6% of non-Hispanic white women reported having public health care coverage (data not shown). Similarly, 45.9% of Hispanic women, compared with 29.6% of non-Hispanic white women, earned an annual household income of \$15,000 or less (data not shown). One explanation for this finding is that the Hispanic women in our study have large families and may still be eligible for public health insurance. Because our income data were grouped into \$15,000 or less, \$15,001 - \$35,000 and \$35,000 or more, it is possible to imagine a family household income of over \$35,000 a year and still below 250% of the poverty levels (if the family has sufficient numbers of dependents).

Recent mammogram use was most common among women with private health insurance and second most common among those with public health care coverage. Among women aged 40 and older, 26.0% of Hispanics and 73.4% of non-Hispanic whites reported having private health care coverage (data not shown). That recent mammogram use is associated with having health care coverage is corroborated in several previous studies, in particular, Strzelczyk et al, who, using data from the Colorado Mammography Project, showed that women who were least likely to adhere to mammogram screening recommendations were uninsured/underinsured, among other factors.²¹ Selvin and colleagues showed that having a usual source of care and health care coverage was directly associated with screening for breast cancer.²² In a recent analysis, Palmer and colleagues reported that women adherent with mammogram screening were 3.6 times more likely to have health care coverage than were nonadherent women.¹¹ Notably, our findings showed that recent use of mammogram screening was indirectly associated with having Medicare coverage. This finding was contrary to expectation because Medicare provides reimbursement for annual mammograms for women aged 65 and older.²⁰ The effectiveness of the NBCCEDP program in prompting

low-income women to receive a mammogram may explain why a greater portion of those with public insurance had a recent screening compared to Medicare.

Screening for colorectal cancer by FOBT or colonoscopy / sigmoidoscopy was more common among men than women. This finding corroborates those of several national and regional studies²³⁻²⁵ and may be explained by higher socioeconomic status or greater health care coverage among men aged 50 and older (compared to women). The common misperception that colorectal cancer strikes only males may lead to a greater share of males requesting screening from their health care providers. In a recent study using data from the national Behavioral Risk Factor Surveillance System (BRFSS), Brawarsky et al. showed that men are no more likely than women to be recommended by a health care provider to receive screening, but are more likely to get screened.²⁶ Thus, it is possible that higher perceived susceptibility among males accounts for these differences.

Our findings showed that a higher proportion of Hispanics than non-Hispanic whites had received a recent FOBT, though the differences were nonsignificant. Similar percentages of Hispanics and non-Hispanic whites had received a recent sigmoidoscopy / colonoscopy. This finding is inconsistent with previous studies that have showed relative low use rates among Hispanics.²⁷⁻²⁹ Our finding that Medicare was predictive of colorectal screening by colonoscopy / sigmoidoscopy but not FOBT was somewhat surprising. Adams et al used 1997 – 1999 data from the BRFSS and showed that Medicare beneficiaries are more likely than privately insured individuals to be screened for colorectal cancer using sigmoidoscopy.³⁰ This may be attributable to Medicare provisions for colonoscopy / sigmoidoscopy and the potential lack of provisions for such services with other public insurance plans. This is consistent with findings from a recent review of health care insurance programs conducted by Klabunde et al, showing health care insurance plans were most likely to cover FOBT (97%) and least likely to cover colonoscopy (57%).³¹ Medicare legislation passed in 1998 allowed Medicare beneficiaries to receive coverage for sigmoidoscopy screening every 5 years. In 2001, new legislation was passed to allow Medicare beneficiaries to provide coverage for colonoscopy; this resulted in a sharp increase in the number of colonoscopies performed.³² The 1998 Medicare Policy change was associated with a significant increase in the odds of screening among low-income (< \$25,000) Medicare beneficiaries.³⁰ Because colonoscopies are more expensive procedures than FOBTs, it is possible that physicians differentially refer patients who have insurance coverage to receive a colonoscopy / sigmoidoscopy and, likewise, refer patients who lack insurance coverage to undertake FOBT testing. Physician referral is widely shown to be an important predictor of screening services use.^{27,33-35} This finding is consistent with the suggestion in our data that as income increases, use of FOBT decreases and use of sigmoidoscopy / colonoscopy increases.

This study has some limitations. First, bias could result if a person who lived in an intervention community of the main study was prompted to receive screening and the intervention was differentially effective for those having a given demographic characteristic. Analyses of the data from this study, however, show no difference between intervention and control communities in use of services, but because of the potential for contamination, we adjusted our analysis for intervention or control status. A second concern pertains to the accurate reporting of screening services use. We relied on self-reported information for data on our main outcomes of interest: use of screening services. Some previous investigations have reported that testing rates determined by self-report were higher than those determined by medical record. Hall et al interviewed members of 3 health maintenance organizations. Using medical record information as the gold standard, they reported moderate sensitivity (85% for sigmoidoscopy or colonoscopy) and specificity (>80% for FOBT and colonoscopy).³⁶ A second study enrolled participants who were members of the Kaiser

Permanente Health Care Plan who according to their medical record had either had or not had an FOBT, sigmoidoscopy, or colonoscopy. The study reported high sensitivity (96.2% for FOBT and 96.2% for either sigmoidoscopy or colonoscopy) and specificity (85.9% for FOBT and 92.0% for either sigmoidoscopy or colonoscopy).³⁷ The same study reported no differences in the accuracy of self-reported data by ethnicity; however, a limited number of previous investigations have found higher overreporting among Hispanics, compared to other groups.³⁸ Studies that have examined test, re-test reliability of colorectal screening exams have reported less than optimal results. The study used a sample of 868 respondents and reported a moderate reliability for questions addressing ever having had an FOBT [$\kappa = 0.55$ (0.49 – 0.61)] and good reliability for questions addressing ever having had an endoscopy exam [$\kappa = 0.69$ (0.65 – 0.74)]. Our in-person interviewing technique may have enhanced social desirability for healthful behaviors, thereby increasing this type of bias.

Another limitation is that apart from acculturation, we did not assess the influence of cultural factors or health beliefs on screening services use. Although this did not limit the conclusions that we could draw, future studies may benefit from the inclusion of these factors.

The strengths of this study are that we collected information on multiple screening tests and could evaluate the influence of socio-demographic factors across screening tests. Moreover, our data are population based and were collected from a rural community where there is a large variation in ethnicity and level of acculturation.

We found that no single demographic characteristic consistently predicted service use across screening tests, though age, insurance status, and household income appeared to be important predictors for some tests. Further research is needed to elucidate the influence of socio-demographic factors in combination with provider characteristics and personal beliefs about cancer on cancer screening. Additional research is needed to assess the influence of policies that govern health care access on use of cancer screening tests in underserved populations.

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Demographic Characteristics of Survey Respondents who are Gender and Age Eligible for Selected Cancer Screening Services

Table 1

	Women aged 18 and older (N = 1021)		Women aged 40 and older (N = 592)		Men and women aged 50 and older (N = 687)	
	N	%	N	%	N	%
Age						
18-39	429	42.0	-	-	-	-
40-49	192	18.8	192	32.4	-	-
50-64	215	21.1	215	36.3	371	54.0
65+	185	18.1	185	31.3	316	46.0
Gender						
Male	--	--	--	--	287	41.8
Female	1021	100	592	100	400	58.2
Race						
White	522	51.1	390	65.9	505	73.5
Hispanic	499	48.9	202	34.1	182	26.5
Acculturation (Hispanics only)						
Low	300	62.1	119	60.4	97	54.5
High	183	37.9	78	39.6	81	45.5
Education						
8 th grade or less	272	26.7	152	25.8	176	25.7
9 th -12 th , no diploma	238	23.4	132	22.4	152	22.2
High school graduate or GED	224	22.0	135	22.9	139	20.3
At least some college	284	27.9	171	29.0	217	31.7
Marital status						
Married/live-in partner	645	63.4	332	56.3	394	57.5
Widowed	126	12.4	124	21.0	148	21.6
Divorced/separated	150	14.7	109	18.5	110	16.1
Never married	96	9.4	25	4.24	33	4.82
Insurance						
Private	463	45.4	321	54.2	386	56.3
Medicare	89	8.7	86	14.5	145	21.1

	Women aged 18 and older (N = 1021)		Women aged 40 and older (N = 592)		Men and women aged 50 and older (N = 687)	
	N	%*	N	%*	N	%*
Public	287	28.1	117	19.8	85	12.4
None	181	17.7	68	11.5	70	10.2
Income						
\$15,000 or less	335	39.7	184	39.6	220	41.8
\$15,001-\$35,000	316	37.4	169	36.3	174	33.1
More than \$35.0	193	22.9	112	24.1	132	25.1

* Percentages are based on nonmissing values.

Table 2
Associations Between Demographic Characteristics and Adherence to Cancer Screening Service Recommendations

Factor	Women aged 18 and older (n = 821)				Women aged 40 and older (n = 420)				Men and women aged 50 and older (n = 259)			
	Had a Pap test in past 3 years		Had a mammogram in past 2 years		Had a fecal occult blood test in past year		Had a colonoscopy or sigmoidoscopy in past 5 years		Had a colonoscopy or sigmoidoscopy in past 5 years		Had a colonoscopy or sigmoidoscopy in past 5 years	
	N	%	OR	p value	N	%	OR	p value	N	%	OR	p value
Age												
18-39	365	96.8	1.0	--	-	-	--	--	-	-	--	--
40-49	163	90.1	0.31	<0.01	121	86.4	1.0	--	-	-	--	--
50-64	184	88.9	0.26	<0.001	170	85.0	0.89	0.72	100	76.9	1.0	--
65+	109	67.7	0.07	<0.001	129	81.1	0.69	0.24	131	78.9	1.12	0.69
Gender												
Male	-	-	--	--	-	-	--	--	105	84.7	1.0	--
Female	821	88.7	--	--	420	84.2	--	--	126	73.3	0.50	0.02
Race												
White	412	83.7	1.0	--	295	84.5	1.0	--	191	78.6	1.0	--
Hispanic	409	94.2	3.17	<0.001	125	83.3	0.89	0.68	40	75.5	0.84	0.63
Acculturation (Hispanics only)												
Low	248	95.0	1.0	--	71	87.7	1.0	--	19	82.6	1.0	--
High	148	93.7	0.78	0.57	52	80.0	0.57	0.22	20	71.4	0.35	0.15
Education												
8 th grade or less	209	91.3	1.0	--	90	84.9	1.0	--	37	74.0	1.0	--
9 th -12 th , no diploma	182	84.7	0.54	0.04	95	81.9	0.82	0.58	48	70.6	0.84	0.68
High school graduate or GED	179	86.5	0.63	0.14	102	89.5	1.52	0.31	58	81.7	1.56	0.32
At least some college	248	91.2	1.03	0.92	131	81.4	0.76	0.42	86	81.9	1.58	0.28
Insurance												
Private	378	85.9	1.0	--	256	86.8	1.0	--	151	77.0	1.0	--
Medicare	64	83.1	0.78	0.45	55	77.5	0.52	0.05	39	89.3	2.5	0.05
Public	241	94.9	2.9	<0.001	79	84.0	0.79	0.48	21	77.8	1.06	0.91
None	138	89.0	1.29	0.38	30	76.9	0.51	0.10	8	50.0	0.30	0.02
Income												

Factor	Women aged 18 and older (n = 821)				Women aged 40 and older (n = 420)				Men and women aged 50 and older (n = 259)			
	Had a Pap test in past 3 years				Had a mammogram in past 2 years				Had a fecal occult blood test in past year			
	N	%	OR	p value	N	%	OR	p value	N	%	OR	p value
\$15,000 or less	251	86.3	1.0	--	116	82.9	1.0	--	69	78.4	1.0	--
\$15,001-\$35,000	273	91.3	1.68	0.05	132	87.4	1.46	0.26	60	76.9	0.91	0.81
More than \$35,000	172	93.0	2.29	0.01	86	84.3	1.15	0.70	49	80.3	1.12	0.79

* Percentages are based on nonmissing values.

*** odds ratio adjusted for community; community pair treated as a random effect; treatment arm and predictor of interest treated as fixed effect