

UC San Diego

UC San Diego Previously Published Works

Title

The Importance of Health Insurance in Addressing Asian American Disparities in Utilization of Clinical Preventive Services: 12-Year Pooled Data from California.

Permalink

<https://escholarship.org/uc/item/9500w30b>

Journal

Health equity, 4(1)

ISSN

2473-1242

Authors

McMenamin, Sara B
Pourat, Nadereh
Lee, Richard
[et al.](#)

Publication Date

2020

DOI

10.1089/heq.2020.0008

Peer reviewed

The Importance of Health Insurance in Addressing Asian American Disparities in Utilization of Clinical Preventive Services: 12-Year Pooled Data from California

Sara B. McMenamin,^{1*} Nadereh Pourat,² Richard Lee,³ and Nancy Breen⁴

Abstract

Purpose: Previous research has shown that Asian Americans are less likely to receive recommended clinical preventive services especially for cancer compared with non-Hispanic whites. Health insurance expansion has been recommended as a way to increase use of these preventive services. This study examines the extent to which utilization of preventive services by Asians overall and by ethnicity compared with non-Hispanic whites is moderated by health insurance.

Methods: Data from the California Health Interview Survey (CHIS) was used to examine preventive service utilization among non-Hispanic whites, Asians, and Asian subgroups 50–64 years of age by insurance status. Six waves of CHIS data from 2001 to 2011 were combined to allow analysis of Asian subgroups. Logistic regression models were run to predict the effect of insurance on receipt of mammography, colorectal cancer (CRC) screening, and flu shots among Asians overall and by ethnicity compared with whites.

Results: Privately insured Asians reported significantly lower adjusted rates of mammography (83.1% vs. 87.6%) and CRC screening (54.7% vs. 59.4%), and higher rates of influenza vaccination (48.7% vs. 38.5%) than privately insured non-Hispanic whites. Adjusted rates of cancer screening were lower among Koreans and Chinese for mammography, and lower among Filipinos for CRC screening.

Conclusion: This study highlights the limitations of providing insurance coverage as a strategy to eliminate disparities for cancer screening among Asians without addressing cultural factors.

Keywords: health disparities; Asian Americans; health insurance; preventive services

Introduction

With the release of the 2003 Institute of Medicine report, *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care*, reducing health disparities was underscored as a national priority in the United States.¹ Reducing racial/ethnic gaps in clinical preventive screening rates recommended by the United States Preventive Services Task Force (USPSTF) is a critical component of reducing overall health disparities.²

Previous research has documented disparities in the receipt of clinical preventive services by race/ethnicity.³ This research has found that Asian Americans are less likely to receive recommended clinical preventive services related to cancer compared with non-Hispanic whites.^{3–8} In addition, Asian Americans have lower screening rates for certain cancers compared with blacks and Hispanics despite having a higher socioeconomic status compared with these groups.⁹

¹Department of Family Medicine and Public Health, University of California, San Diego, La Jolla, California, USA.

²Department of Health Policy and Management, Fielding School of Public Health, University of California, Los Angeles, Los Angeles, California, USA.

³Information Management Services, Inc., Rockville, Maryland, USA.

⁴National Cancer Institute, NIH, Rockville, Maryland, USA.

*Address correspondence to: Sara B. McMenamin, PhD, Department of Family Medicine and Public Health, University of California, San Diego, 9500 Gilman Drive no. 0725, La Jolla, CA 92093-0725, USA, E-mail: smcmenamin@ucsd.edu



Studies of Asian Americans are largely limited to aggregate analyses of this diverse population because the sample size for Asian subgroups in most surveys is too small for in-depth analyses. Because the proportion of Asians is much higher in California than in the United States,¹⁰ and because the overall sample size is large, the California Health Interview Survey (CHIS) is a unique ongoing data source for studying disparities between Asian American subgroups. Subsequent research has reported on use of clinical preventive services among Asian subgroups, with most studies conducted in community clinics serving one Asian subgroup that does not allow for comparison.^{11–14}

Previous studies using CHIS compared utilization patterns of Asians by ethnicity and found wide variation in utilization patterns in colorectal and breast cancer screening.^{6,8,9,15,16} Consistent findings of variations in characteristics, insurance status, and outcomes among Asian American subgroups have led to continued recommendations for disaggregated analyses of Asian Americans by ethnicity and/or country of origin.¹⁷

The association between health insurance coverage and the use of clinical preventive services is well established in the general population.^{18,19} How insurance coverage contributes to the use of preventive services among Asian American ethnicities is less well understood. Previous research found that, even after adjusting for insurance status, Asians had lower rates of receipt of colorectal screening.^{6,15} Studies examining cancer screening among Asian women by health insurance status found that the impact of health insurance status on receipt of cancer screening varied significantly by subgroup.^{7,16,20} Even though cancer screening rates are lower among Asians, studies show that the human papilloma virus vaccine uptake tends to be higher among Asians than among non-Hispanic whites, suggesting the possibility of a greater cultural acceptance of vaccinations to prevent cancer compared with cancer screening among Asian populations.^{21,22}

This study explores why Asians have lower cancer screening rates than whites, even when insured. We examine data spanning 12 years to assess the potential role of insurance status on the utilization of three different clinical preventive services, two cancer screening modalities, and one type of vaccination (i.e., mammography, colorectal cancer (CRC) screening, and flu shots). These preventive services were selected from the list of preventive services covered under the Afford-

able Care Act (ACA) that were included in five or more sequential versions of CHIS and are recommended for the adult population of interest (i.e., adults 50–64 years of age). We hypothesize that having insurance will increase the likelihood of the use of preventive services but with less potency for Asian Americans than for non-Hispanic whites, especially for cancer screening services. Moreover, we anticipate that potency will vary by Asian ethnicity.

Methods

Data

Data are from CHIS, a population-based telephone survey conducted every other year since 2001 and continuously beginning in 2011 on a representative sample of 42,000–56,000 persons in California households. Data for this study combined six waves of the survey conducted in 2001, 2003, 2005, 2007, 2009, and 2011. Data were available for the following measures and survey waves: mammography (2001–2011), CRC screening (2001–2009), and flu shot (2003–2011). Items were not administered for these three preventive services in the 2013 cycle, so uninterrupted long-term trends in screening could not be examined in subsequent survey years. The CHIS oversampled Asian subgroups such as Vietnamese and Korean during select years. Interviews were conducted in Mandarin, Cantonese, Korean, and Vietnamese to include Asian respondents with limited or no English proficiency. Studies using CHIS have IRB approval through UCLA (no. 17-000362).

The study population was limited to non-Hispanic whites ($n=55,599$) and non-Hispanic Asians ($n=6526$) ages 50–64. This age group was selected for three reasons. First, the USPSTF clinical practice guidelines recommend screening for both mammography and CRC for ages 50–64 throughout the study period.^{23,24} Second, persons over 64 were excluded because they are largely covered by Medicare, and thus not at risk for fluctuations in health insurance coverage. Finally, the 50–64 age group was singled out by the Centers for Disease Control and Prevention (CDC), AARP, and the American Medical Association (AMA) as an important target audience for improving screening rates.²⁵

Measures

Outcome variables. Three dichotomous outcomes are used to measure clinical preventive services. The USPSTF recommends screening for breast cancer using mammography every 2 years for women ages



50 and older;²⁶ and for CRC beginning for adults age 50 and older.²⁷ The Advisory Committee on Immunization Practices recommends annual vaccination for influenza (i.e., receipt of the flu shot) for everyone over 6 months of age.²⁸ Variables were coded a value of “1” for respondents who had the service within the recommended time interval and “0” for those who did not.

Independent variables of interest. Interactions by race/ethnicity, Asian subgroup, and insurance status are the main independent variables of interest. Race and ethnicity variables were combined to examine non-Hispanic Asian Americans (Asian) vs. non-Hispanic whites (white). Asians were further categorized by ethnicity into Chinese, Filipino, Japanese, Korean, South Asian, Vietnamese, and Other Asian. Insurance was categorized as public only, private, or uninsured. Private insurance includes insurance purchased by individuals or employers. Respondents without public or private insurance were classified as uninsured. To compare the role of insurance among Asians and whites, six variables were created to capture the interaction between race and insurance status: Asian-private insurance, Asian-public insurance, Asian-uninsured, white-private insurance, white-public insurance, and white-uninsured. Similarly, 24 variables were created to capture the interaction of insurance and ethnicity among Asian subgroups.

Control variables. The Andersen Behavioral Model of Health Services Use was used as a framework to select other determinants of health care use such as predisposing, enabling, or need factors.²⁹ *Predisposing factors* included gender, marital status (married vs. single), educational attainment (less than high school, some college, college graduate, higher than college graduate), and employment status (employed vs. unemployed). English language proficiency (native English speaker, speaks very well/well vs. not well/not at all), and percent of lifetime spent in the United States (0–49%, 50–99%, 100%) were used to measure level of acculturation. These two measures of acculturation along with federal poverty level (<100%, 100% to <200%, and 200% or higher) and having a “usual place to go when sick or needing care” (as defined by the respondent) were *enabling factors*. The *need* for health care was measured by variables addressing health status, including self-assessed general health status (excellent/very good/good vs. fair/poor) and smoking status (current smoker, not current smoker). Age of respondent and

year of survey were included in the regression models to account for variations in service use over time with the 2011 cycle of CHIS as the reference group for mammogram and flu shot and 2009 as the reference group for CRC screening.

Statistical analyses

Two weighted logistic regression models were run to predict the effect of insurance on receipt of mammography, CRC screening, and flu shots among Asians as a group (model 1) and by ethnicity (model 2) compared with whites. These two models were run three times on each outcome with different referent groups (white-private; white-public, white-uninsured) to compare different racial/ethnic and insurance categories. The same control variables were included in both models. Cell sizes were examined to ensure a sufficient number of respondents for stable estimates. Tables showing the white-private referent group are provided, and significant differences between racial/ethnic and insurance categories are discussed in the text. *p*-values for multiple comparisons were adjusted using the Bonferroni correction; however, results are presented without the adjustment to avoid Type II error.

Predicted probabilities (marginals) are computed from the weighted logistic regression models using the “PREDMARG” statement of the logistic procedure in SUDAAN. Predicted probabilities are estimated for every variable in the model while controlling for each covariate in the model.^{30,31} Predicted probabilities allow direct comparison of utilization among groups. Predicted probabilities and their 95% confidence intervals are presented in the tables. Full logistic regression models with odds ratios are presented in the Appendix Tables A1 and A2. Analyses were conducted in 2019–2020 using SAS 9.4, SAS Institute, Cary, NC and SUDAAN 11.0.1, RTI International, Research Triangle Park, NC. Models were weighted to account for the complex sample design of CHIS.

Results

White and Asian Californians 50–64 years of age differed significantly in their characteristics (Table 1). In terms of *predisposing* characteristics, Asians had a higher percentage of females, had lower levels of post-college education and lower incomes, and were more likely to be married or living as married compared with whites. In terms of *enabling* characteristics, Asians also had lower levels of acculturation with only 67% reporting proficiency in English (compared with 99.6%



Table 1. Characteristics of Non-Hispanic White and Asian Adults 50–64 in California, 2001–2011

	Non-Hispanic white		Non-Hispanic Asian	
	<i>n</i>	% (95% CI)	<i>n</i>	% (95% CI)
Gender				
Male	23,142	48.5 (48.0–49.0)	2822	44.4 (42.7–46.1)
Female	32,457	51.5 (51.0–52.0)	3704	55.6 (53.9–57.3)
Marital status				
Married or living as married	34,354	72.7 (72.2–73.3)	4980	82.6 (81.2–84.0)
Other	21,215	27.3 (26.7–27.8)	1543	17.4 (16.0–18.8)
Education				
High school or less	11,640	24.3 (23.7–24.8)	2031	32.2 (30.4–34.0)
Some college	17,039	29.1 (28.5–29.6)	1165	17.1 (15.7–18.6)
College graduate	13,801	24.1 (23.6–24.6)	2099	33.5 (31.8–35.4)
More than college	13,119	22.6 (22.1–23.0)	1231	17.2 (15.9–18.5)
Employment status				
Employed	37,636	69.8 (69.2–70.4)	4369	70.5 (68.8–72.1)
Unemployed	17,869	30.2 (29.6–30.8)	2147	29.5 (27.9–31.2)
English proficiency				
English proficient	55,452	99.6 (99.5–99.7)	4098	67.0 (65.2–68.7)
Limited or no English proficiency	145	0.4 (0.3–0.5)	2428	33.0 (31.3–34.8)
Percent of time in U.S.				
0–49	1188	2.6 (2.2–3.0)	3376	52.1 (50.4–53.8)
50–99	2624	5.4 (5.1–5.8)	2138	34.4 (32.8–36.1)
100	51,786	92.0 (91.6–92.3)	1008	13.5 (12.4–14.6)
Income (percent of FPL)				
< 100 FPL	2974	4.5 (4.2–4.8)	996	12.0 (10.9–13.2)
100–< 200 FPL	5290	8.3 (7.9–8.6)	1084	16.8 (15.4–18.2)
200+ FPL	47,335	87.2 (86.7–87.7)	4446	71.2 (69.5–72.9)
Health insurance coverage				
Any private	45,255	83.3 (82.8–83.8)	4531	73.3 (71.7–74.9)
Public only	5531	8.3 (7.9–8.7)	868	11.1 (10.0–12.3)
Uninsured	4813	8.4 (8.0–8.9)	1127	15.6 (14.4–16.8)
Have usual place to go when need care sick or needing health advice				
Yes	51,396	92.5 (92.1–92.9)	5658	87.9 (86.6–89.0)
No or ER is usual source	4188	7.5 (7.1–7.9)	868	12.1 (11.0–13.4)
General health status				
Excellent/very good/good	47,147	85.4 (84.9–85.9)	4434	71.9 (70.2–73.5)
Fair/poor	8445	14.6 (14.1–15.1)	2091	28.1 (26.5–29.8)
Smoking status				
Current smoker	8371	15.1 (14.6–15.6)	655	10.4 (9.3–11.6)
Not a current smoker	47,220	84.9 (84.4–85.4)	5869	89.6 (88.4–90.7)

Source: California Health Interview Survey 2001, 2003, 2005, 2007, 2009, 2011/2012.

In cases where there are missing responses, the total of the categories will not equal the total sample size (i.e., $n=55,599$ for non-Hispanic white and $n=6526$ for non-Hispanic Asian).

Boldface indicates a statistically significant difference ($p \leq 0.05$) in rates between non-Hispanic whites and non-Hispanic Asians.

CI, confidence interval; CHIS, California Health Interview Survey; ER, emergency room.

of whites) and 87% reporting being born outside of the United States compared with 8% of whites. There were significant differences in type of health insurance coverage, with whites being more likely to have private coverage (83.3% vs. 73.3%), less likely to be uninsured (8.4% vs. 15.6%), and more likely to have a usual place to go for health care (92.5% vs. 87.9%). In terms of need for health care, whites had higher rates of daily smoking but reported better overall health status than Asians.

Across all insurance types, whites had higher rates of mammography and CRC screening while Asians reported higher flu shot rates (Table 2). The same pat-

tern was seen among the privately insured, with whites having higher rates of mammography and CRC screening, but lower rates of flu shots than Asians. Among the publicly insured, there was no difference in mammography or flu shot rates, but there was a lower rate of CRC screening among Asians. Among the uninsured, the only significant difference, was a higher rate of flu shots for Asians compared with whites.

Table 3 presents the predicted probabilities of preventive service utilization by insurance type and race, based on the logistic regression models. Asians with private health insurance had significantly lower



Table 2. Preventive Screening Rates by Health Insurance Coverage for Non-Hispanic Whites and Non-Hispanic Asians, Ages 50–64, CHIS 2001–2011

	Mammography ^a (2001–2011) % (95% CI)	CRC screening ^b (2001–2009) % (95% CI)	Flu shot ^c (2003–2011) % (95% CI)
All insurance types			
Non-Hispanic white	85.5 (84.8–86.1)	58.6 (57.9–59.3)	39.0 (38.3–39.6)
Non-Hispanic Asian	79.9 (77.8–81.8)	48.1 (46.0–50.2)	42.9 (41.0–44.9)
Any private insurance ^d			
Non-Hispanic white	88.9 (88.4–89.5)	61.6 (60.9–62.3)	40.3 (39.6–41.0)
Non-Hispanic Asian	85.1 (82.7–87.2)	53.1 (50.6–55.6)	44.9 (42.7–47.2)
Public insurance ^e			
Non-Hispanic white	78.0 (75.2–80.5)	56.9 (54.1–59.6)	44.7 (42.2–47.2)
Non-Hispanic Asian	80.5 (73.8–85.9)	43.4 (37.4–49.6)	48.5 (42.5–54.5)
Uninsured ^f			
Non-Hispanic white	55.8 (52.1–59.3)	27.9 (24.9–31.1)	20.3 (17.6–23.2)
Non-Hispanic Asian	54.3 (48.6–59.9)	27.1 (23.4–31.3)	28.8 (24.7–33.2)

Source: CHIS 2001, 2003, 2005, 2007, 2009, 2011/2012.

Boldface indicates a statistically significant difference ($p \leq 0.05$) in rates between Non-Hispanic white and Non-Hispanic Asian.

^aMammogram within the past 2 years.

^bFOBT in past year, sigmoidoscopy in the past 5 years, or colonoscopy within the past 10 years.

^cFlu shot within the past year.

^dPrivate insurance includes insurance purchased by individuals or employers.

^ePublic insurance includes Medicare, Medicaid, and other forms of public coverage such as military.

^fAnyone without public or private insurance was classified as uninsured.

CRC, colorectal cancer; FOBT, fecal occult blood test.

probability of mammography screening (83.1% vs. 87.6%), CRC screening (54.7% vs. 59.4%), and higher probability of flu shots (48.7% vs. 38.5%) compared with whites with private health insurance. Among the publicly insured, Asians had a higher predicted probability of flu shots compared with whites; differences for

mammography and CRC screening were not significant. Among the uninsured, the only significant difference was that Asians had higher rates of flu shots compared with whites.

Table 4 compares predicted probabilities for use of preventive services by insurance type for six Asian

Table 3. Predicted Probabilities^a of Mammography, Colorectal Cancer Screening, and Flu Shot by Insurance Type and Race, Ages 50–64

	Mammography ^b (2001–2011) Predicted probabilities (95% CI)	CRC screening ^c (2001–2009) Predicted probabilities (95% CI)	Flu shot ^d (2003–2011) Predicted probabilities (95% CI)
Private insurance ^e			
White (referent)	87.6 (86.9–88.4)	59.4 (58.6–60.3)	38.5 (37.8–39.3)
Asian	83.1 (80.2–85.6)	54.7 (52.0–57.4)	48.7 (46.0–51.4)
Public insurance ^f			
White (referent)	84.1 (81.6–86.3)	59.4 (56.7–62.0)	43.0 (40.3–45.9)
Asian	85.3 (78.8–90.1)	53.2 (46.4–59.9)	55.5 (48.7–62.0)
Uninsured ^g			
White (referent)	68.0 (64.8–71.0)	36.7 (33.4–40.1)	25.5 (22.4–29.0)
Asian	64.4 (57.1–71.2)	40.3 (35.0–46.0)	40.5 (34.6–46.6)

Source: CHIS 2001, 2003, 2005, 2007, 2009, 2011/2012.

Boldface indicates a statistically significant difference ($p \leq 0.05$) in rates between Non-Hispanic white with private insurance (i.e., the referent group).

These models were adjusted for gender, marital status, education, employment, English language proficiency, percent of lifetime spent in the United States, income, having a usual place to go when sick or needing care, general health status, smoking status, age, and year of survey. The full models can be found in Appendix Table A1.

^aThe predicted probabilities (marginals) are adjusted rates derived from logistic regression models.

^bMammogram within the past 2 years.

^cFOBT in the past year, sigmoidoscopy in the past 5 years, or colonoscopy within the past 10 years.

^dFlu shot within the past year.

^ePrivate insurance includes insurance purchased by individuals or employers.

^fPublic insurance includes Medicare, Medicaid, and other forms of public coverage such as military.

^gAnyone without public or private insurance was classified as uninsured.



Table 4. Predicted Probabilities^a of Mammography, Colorectal Cancer, and Flu Shot by Insurance Type and Asian Ethnicity, Ages 50–64

Race and insurance type	Mammography ^b (2001–2011) Predicted probabilities (95% CI)	CRC ^c (2001–2009) Predicted probabilities (95% CI)	Flu ^d (2003–2011) Predicted probabilities (95% CI)
Private insurance ^e			
White (referent)	87.6 (86.8–88.3)	59.3 (58.5–60.2)	38.3 (37.5–39.1)
Chinese	80.2 (75.7–84.1)	58.1 (54.3–61.9)	46.1 (42.4–49.8)
Filipino	84.6 (78.5–89.2)	51.0 (45.3–56.8)	50.3 (44.4–56.2)
Japanese	85.5 (79.8–89.7)	55.0 (49.3–60.6)	47.9 (42.3–53.6)
Korean	75.5 (65.2–83.5)	51.9 (44.8–58.9)	54.3 (46.6–61.8)
South Asian	81.7 (73.4–87.9)	50.2 (41.7–58.7)	45.7 (39.1–52.4)
Vietnamese	88.5 (79.4–93.9)	64.9 (57.9–71.3)	57.5 (49.4–65.3)
Public insurance ^f			
White (referent)	84.4 (82.0–86.6)	59.5 (56.8–62.1)	43.1 (40.3–45.9)
Chinese	80.9 (60.7–92.1)	50.8 (37.0–64.6)	51.0 (37.4–64.4)
Filipino	84.9 (69.5–93.3)	69.7 (56.1–80.6)	49.9 (35.8–63.9)
Japanese	68.0 (27.2–92.3)	31.5 (11.4–62.2)	45.7 (22.6–70.8)
Korean	82.6 (64.5–92.5)	38.5 (22.8–57.0)	73.2 (56.2–85.3)
South Asian	59.8 (16.2–92.0)	32.5 (6.6–76.7)	27.2 (8.7–59.4)
Vietnamese	88.8 (80.1–94.0)	56.1 (47.5–64.4)	63.0 (53.6–71.6)
Uninsured ^g			
White (referent)	68.1 (64.9–71.2)	36.7 (33.3–40.1)	25.5 (22.4–28.9)
Chinese	64.7 (52.5–75.3)	32.9 (24.9–41.9)	34.6 (26.4–43.9)
Filipino	64.0 (44.7–79.7)	42.1 (30.1–55.2)	41.6 (24.7–60.8)
Japanese	37.9 (20.2–59.5)	33.7 (16.7–56.3)	26.2 (11.0–50.5)
Korean	54.8 (43.1–66.0)	33.9 (25.6–43.2)	47.1 (37.3–57.1)
South Asian	66.9 (30.9–90.1)	32.5 (12.4–62.1)	36.7 (14.5–66.5)
Vietnamese	80.4 (70.2–87.7)	60.5 (49.1–70.9)	54.3 (43.9–64.3)

Source: CHS 2001, 2003, 2005, 2007, 2009, 2011/2012.

Boldface indicates a statistically significant difference ($p \leq 0.05$) in rates between Non-Hispanic white (i.e., the referent group).

These models were adjusted for gender, marital status, education, employment, English language proficiency, percent of lifetime spent in the United States, income, having a usual place to go when sick or needing care, general health status, smoking status, age, and year of survey. The full models can be found in Appendix Table A2.

Adjusted for demographic, acculturation, and health care status and access characteristics.

^aThe predicted probabilities (marginals) are adjusted rates derived from logistic regression models.

^bMammogram within the past 2 years.

^cFOBT in the past year, sigmoidoscopy in the past 5 years, or colonoscopy within the past 10 years.

^dFlu shot within the past year.

^ePrivate insurance includes insurance purchased by individuals or employers.

^fPublic insurance includes Medicare, Medicaid, and other forms of public coverage such as military.

^gAnyone without public or private insurance was classified as uninsured.

ethnicities. The total of 6526 Asian respondents is composed of the following: 1961 Chinese (30%), 1345 Vietnamese (21%), 937 Filipino (14%), 879 Korean (13%), 651 Japanese (10%), 422 South Asian (6%), 323 other Asian (5%), and 8 respondents with unknown ethnicity. Data were not shown separately for

other Asian or unknown Asian ethnicity due to their small sample sizes. Among Asian Americans with private insurance, there were lower predicted probabilities of mammography screening among Koreans (75.5%) and Chinese (80.2%) compared with whites with private insurance (87.6%). There was a lower predicted probability of colorectal screening among Filipinos with private insurance (51.1%) compared with whites (59.3%). All privately insured Asian American subgroups, except for South Asian, had a higher predicted probability of flu shots compared with privately insured whites.

Analyses of Asian American ethnicities with public insurance revealed slightly different patterns in preventive services use. Only Koreans with public insurance had a significantly lower predicted probability of CRC screening compared with whites with public insurance (38.2% vs. 59.5%). Koreans (73.0%) and Vietnamese (62.9%) had significantly higher predicted probabilities of flu shots compared with whites with public insurance (43.1%).

Analysis comparing uninsured Asians and whites showed that Japanese (38.1%) and Koreans (54.5%) had lower predicted probability of mammogram compared with uninsured whites (68.1%). Finally, uninsured Vietnamese had higher predicted probability of utilization for all three preventive services compared with uninsured whites: mammogram (80.1% vs. 68.1%), CRC screening (60.1% vs. 36.6%), mammograms, and flu shots (54.0% vs. 25.5%).

Odds ratios for the year of survey in the models showed that use of mammography and flu shots did not increase over time (Appendix Tables A1 and A2). In contrast, use of CRC screening did increase over time.

Discussion

Three new findings emerged from this study: (1) disparities in use of preventive services among Asians and whites occur primarily within the privately insured population; (2) Asians across all insurance types are more likely to get flu shots, and (3) uninsured Vietnamese Americans had higher rates of all three preventive services compared with uninsured whites. The implications of each finding is discussed below.

First, our results showed that disparities in mammography and CRC screening occurred primarily among the privately insured population. The ACA was successful in increasing insurance coverage and reducing the disparity in insurance rates between Asians and whites, especially for Koreans and Vietnamese,



primarily through increases in private insurance coverage.^{33,34} A recent analysis found that despite increases in private insurance coverage, disparities in utilization of and access to health care services between Asians and whites remained.^{35,36} More research is needed to understand why Asians with private insurance are less likely to utilize cancer screenings compared with whites—but not among those with public insurance or uninsured. It is possible that campaigns to increase preventive services among Asians have focused on publicly insured and uninsured Asian Americans. This may be one area ripe for outreach by health educators in private health insurance plans. Continuing medical education for Asian physicians is another strategy that has worked to increase cancer screening.³⁷

Second, across all three types of insurance status categories, Asians were more likely to report receiving a flu shot compared with whites. Previous research has suggested that Asians have lower use of screening modalities and higher use of vaccinations such as flu shots.^{16,20} It is unclear if lower mammography and colorectal screenings among Asians is due to the complexity or invasiveness of the modality or to access barriers related to having to go outside of the primary care setting to obtain screening services.³⁸ To increase use of such cancer screenings among insured Asians, qualitative research to better understand perceived barriers, knowledge gaps, language barriers, and other concerns is warranted.³⁹

Finally, our results show that uninsured Vietnamese Americans had higher rates of utilization of all three clinical preventive services compared with uninsured whites. Sustained targeted outreach to the Vietnamese community in Northern California since 1986 through the Vietnamese Community Health Promotion Project (VCHPP) likely accounts for these higher rates.^{37,39–41} By targeting the range of diseases prevalent among Vietnamese, and remaining largely focused on the local Vietnamese community over decades, the VCHPP built trust in the community, including among doctors and researchers. VCHPP conducts continuing medical education for Vietnamese physicians, hires lay health workers, and recruits volunteers for research studies. Similar consistent health promotion interventions could be used to increase screening rates among other Asian American ethnicities.

Limitations

This research is subject to four limitations. First, data are limited to California, where health care delivery

may differ from the rest of the United States; therefore, our results may not be generalizable outside of California. However, California has the largest population of Asian Americans of any state,¹⁰ making its Asian sample the most robust in the nation. Second, the insurance variable in CHIS is hierarchical, prioritizing individuals with Medicaid or Medicare first. Therefore, those with Medicaid for part of the year and private insurance for another part were coded as having public insurance. Similarly, those without insurance for part of the year were captured in private or publicly insured categories. However, the number of individuals who changed insurance status during the year or were uninsured for only part of the year was very small and would not significantly change our results. Third, to be consistent with clinical practice guidelines, our study sample was restricted to ages 50–64, which limited our ability to identify significant differences in some Asian subgroups. For example, publicly insured South Asians had an adjusted mammography screening rate of nearly 25% points lower than publicly insured whites but, due to small numbers of publicly insured South Asians, this difference was not statistically significant. Finally, the data available in CHIS were not consistent throughout the study period and more recent data on breast and CRC screening were not available in CHIS. Despite these limitations, CHIS is the best dataset for assessing the role of insurance on preventive services by multiple Asian subgroups due to the great diversity of the Asian population in California. Furthermore, CHIS is the most accurate source of health data on Asians due to the large Asian sample size and the survey being conducted in multiple Asian languages.

Health Equity Implications

The finding of persistent disparities in cancer screening for Asians, even for those with private insurance, highlights limitations in the ability of health insurance coverage to eliminate disparities in cancer screening among Asians. Health insurance plans and health care systems may want to review their outreach strategies to determine if they need to tailor their approach to Asian members or specific Asian subgroups with lower rates of screening. Additional research is needed to further understand why disparities in cancer screenings among privately insured Asians persist and how to eliminate these disparities. Lessons learned from the successes in the Vietnamese American community can provide valuable insights on how



to increase screening rates among other subgroups of Asians.

Acknowledgments

The authors would like to acknowledge the contribution of Sara Yoeun for her assistance with compiling the references and editing and formatting the article.

Author Disclosure Statement

No competing financial interests exist.

Funding Information

No funding was received for this article.

References

1. Institute of Medicine. *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care*. Washington, DC: National Academy Press, 2003.
2. U.S. Department of Health and Human Services. *Healthy People 2010, 2d ed., with Understanding and Improving Health and Objectives for Improving Health, 2 vols.* Washington: U.S. Government Printing Office, 2000.
3. The Robert Wood Johnson Foundation. Racial and ethnic disparities in access to and quality of health care. Research Synthesis Report No. 12. 2007. Available at www.rwjf.org/content/dam/farm/reports/issue_briefs/2007/rwjf17860/subassets/rwjf17860_1 Accessed July 6, 2019.
4. Homayoon B, Shahidi NC, Cheung WY. Impact of Asian ethnicity on colorectal cancer screening: a population-based analysis. *Am J Clin Oncol*. 2013;36:167–173.
5. Hwang H. Colorectal cancer screening among Asian Americans. *Asian Pac J Cancer Prev*. 2013;14:4025–4032.
6. Liss DT, Baker DW. Understanding current racial/ethnic disparities in colorectal cancer screening in the United States: the contribution of socioeconomic status and access to care. *Am J Prev Med*. 2014;46:228–236.
7. Kandula NR, Wen M, Jacobs EA, et al. Low rates of colorectal, cervical, and breast cancer screening in Asian Americans compared with non-Hispanic Whites. *Cancer*. 2006;107:184–192.
8. Wong ST, Gildengorin G, Nguyen T, et al. Disparities in colorectal cancer screening rates among Asian Americans and non-Latino whites. *Cancer*. 2005;104(S12):2940–2947.
9. Jun J, Nan X. Determinants of cancer screening disparities among Asian Americans: a systematic review of public health surveys. *J Cancer Educ*. 2018;33:757–768.
10. U.S. Census Bureau QuickFacts. United States Census Bureau website. Available at <https://www.census.gov/quickfacts/table/RHI705210/35,15,48,06> Accessed May 14, 2020.
11. Kagawa-Singer M, Pourat N. Asian American and Pacific Islander breast and cervical carcinoma screening rates and healthy people 2000 objectives. *Cancer*. 2000;89:696–705.
12. Jo AM, Maxwell AE, Wong WK, et al. Colorectal cancer screening among underserved Korean Americans in Los Angeles county. *J Immigr Minor Health*. 2008;10:119–126.
13. Kim K, Chapman C, Vallina H. Colorectal cancer screening among Chinese American immigrants. *J Immigr Minor Health*. 2012;14:898–901.
14. Oh KM, Jacobsen KH. Colorectal cancer screening among Korean Americans: a systematic review. *J Community Health*. 2014;39:193–200.
15. Lee HY, Lundquist M, Ju E, et al. Colorectal cancer screening disparities in Asian Americans and Pacific Islanders: which groups are most vulnerable? *Ethn Health*. 2011;16:501–518.
16. Chawla N, Breen N, Liu B, et al. Asian American women in California: a pooled analysis of predictors for breast and cervical cancer screening. *Am J Public Health*. 2015;105:e98–e109.
17. Kim W, Keefe RH. Barriers to healthcare among Asian Americans. *Soc Work Public Health*. 2010;25:286–295.
18. Faulkner LA, Schauffer HH. The effect of health insurance coverage on the appropriate use of recommended clinical preventive services. *Am J Prev Med*. 1997;13:453–458.
19. Solanki G, Schauffer HH. Cost-sharing and the utilization of clinical preventive services. *Am J Prev Med*. 1999;17:127–133.
20. Pourat N, Kagawa-Singer M, Breen N, et al. Access versus acculturation: identifying modifiable factors to promote cancer screening among Asian American women. *Med Care*. 2010;48:1088–1096.
21. Sriram S, Ranganathan R. Why human papilloma virus vaccination coverage is low among adolescents in the US? A study of barriers for vaccination uptake. *J Family Med Prim Care*. 2019;8:866.
22. Spencer JC, Calo W, Brewer NT. Disparities and reverse disparities in HPV vaccination: a systematic review and meta-analysis. *Prev Med*. 2019;123:197–203.
23. Final recommendation statement: breast cancer: screening. United States Preventive Services Task Force Website. Available at <https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/breast-cancer-screening1> Accessed May 14, 2020.
24. Final recommendation statement: colorectal cancer: screening. United States Preventive Services Task Force Website. Available at <https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/colorectal-cancer-screening2> Accessed May 14, 2020.
25. CDC (Centers for Disease Control and Prevention), AARP, American Medical Association (AMA). Promoting preventive services for adults 50–64: community and clinical partnerships. 2009. Available at <https://www.cdc.gov/aging/pdf/promoting-preventive-services.pdf> Accessed May 14, 2020.
26. Breast cancer: screening. U.S. Preventive Services Task Force (USPSTF) Website. Available at <https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/breast-cancer-screening1?ds=1&s=breast%20cancer> Accessed May 14, 2020.
27. Colorectal cancer: screening. U.S. Preventive Services Task Force (USPSTF) Website. Available at <https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/colorectal-cancer-screening> Accessed May 14, 2020.
28. Grohskopf LA, Sokolow LZ, Broder KR, et al. Prevention and control of seasonal influenza with vaccines. *MMWR Recomm Rep*. 2016;65:1–54.
29. Andersen RM, Davidson PL. *Improving Access to Care in America: Individual and Contextual Factors. Changing the US Health Care System*. San Francisco: Jossey-Bass, 2001:3-0.
30. Korn EL, Graubard BI. *Analysis of Health Surveys*. New York: John Wiley, 1999.
31. Bieler GS, Brown GG, Williams RL, Brogan DJ. Estimating model-adjusted risks, risk differences, and risk ratios from complex survey data. *Am J Epidemiol*. 2010;171:618–623.
32. Immunization coverage. World Health Organization Website. 2018. Available at www.who.int/news-room/fact-sheets/detail/immunization-coverage Accessed May 14, 2020.
33. Park JJ, Humble S, Sommers BD, et al: Health insurance for Asian Americans, Native Hawaiians, and Pacific Islanders under the Affordable Care Act. *JAMA Intern Med* 2018;178:1128–1129.
34. Park JJ, Sommers BD, Humble S, et al. Medicaid and private insurance coverage for low-income Asian Americans, native Hawaiians, and Pacific Islanders, 2010–16. *Health Affairs* 2019;38:1911–1917.
35. Park S, Stimpson JP, Kemmick Pintor J, et al. The effects of the Affordable Care Act on health care access and utilization among Asian American Subgroups. *Med Care* 2019;57:861–868.
36. Park S, Chen J, Ma GX, et al. Utilization of essential preventive health services among Asians after the implementation of the preventive services provisions of the Affordable Care Act. *Prev Med Rep* 2019;16:101008.
37. Mock J, McPhee SJ, Nguyen T, et al. Effective lay health worker outreach and media-based education for promoting cervical cancer screening among Vietnamese American women. *Am J Public Health*. 2007;97:1693–1700.
38. AARP. The health and healthcare of Asian Americans and Pacific Islanders ages 50+. 2015. Available at https://www.aarp.org/content/dam/aarp/research/surveys_statistics/health/2015/health-healthcare-asian-americans-pacific-islanders-age-50-plus.doi.10.26419%252Fres.00098.001.pdf Accessed July 6, 2019.
39. Nguyen BH, Stewart SL, Nguyen TT, et al. Effectiveness of lay health worker outreach in reducing disparities in colorectal cancer screening in Vietnamese Americans. *Am J Public Health*. 2015;105:2083–2089.



40. Nguyen TT, Le G, Nguyen T, et al. Breast cancer screening among Vietnamese Americans: a randomized controlled trial of lay health worker outreach. *Am J Prev Med.* 2009;37:306–313.
41. Nguyen K-P, Hung S, Ha NT, et al. *Mon An Viet Nam: A collection of Vietnamese Recipes from the San Francisco Bay Area Vietnamese Community. The Vietnamese Community Health Promotion Project.* San Francisco, CA: UCSF, 1982.

Cite this article as: McMenamin SB, Pourat N, Lee R, Breen N (2020) The importance of health insurance in addressing Asian American disparities in utilization of clinical preventive services: 12-year pooled data from California, *Health Equity* 4:1, 292–303, DOI: 10.1089/hec.2020.0008.

Abbreviations Used

ACA = Affordable Care Act
AMA = American Medical Association
CI = confidence interval
CDC = Centers for Disease Control and Prevention
CHIS = California Health Interview Survey
CRC = colorectal cancer
ER = emergency room
FOBT = fecal occult blood test
FPL = federal poverty level
N/A = not applicable
USPSTF = United States Preventive Services Task Force
VCHPP = Vietnamese Community Health Promotion Project

Publish in Health Equity



- Immediate, unrestricted online access
- Rigorous peer review
- Compliance with open access mandates
- Authors retain copyright
- Highly indexed
- Targeted email marketing

liebertpub.com/hec

(Appendix follows →)



Appendix

Appendix Table A1. Odds Ratio and 95% Confidence Intervals of Mammography, Colorectal Cancer Screening, and Flu Shot by Demographic Characteristics, Ages 50–64

	Mammography ^a (2001–2011)	CRC screening ^b (2001–2009)	Flu shot ^c (2003–2011)
Race/Ethnicity-insurance type			
White-private ^d (referent)	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Asian-private	0.68 (0.55–0.85)	0.81 (0.71–0.92)	1.56 (1.37–1.76)
White-public ^e	0.74 (0.60–0.90)	1.00 (0.88–1.14)	1.22 (1.07–1.39)
Asian-public	0.81 (0.50–1.33)	0.76 (0.55–1.04)	2.08 (1.54–2.81)
White-uninsured ^f	0.28 (0.24–0.33)	0.36 (0.31–0.42)	0.53 (0.44–0.64)
Asian-uninsured	0.24 (0.17–0.34)	0.43 (0.33–0.56)	1.09 (0.83–1.43)
Year			
2001	0.88 (0.74–1.05)	0.58 (0.53–0.64)	N/A
2003	0.87 (0.74–1.02)	0.42 (0.38–0.46)	0.95 (0.87–1.03)
2005	1.05 (0.88–1.25)	0.58 (0.53–0.64)	0.56 (0.51–0.61)
2007	1.01 (0.84–1.21)	0.74 (0.67–0.82)	0.91 (0.84–0.99)
2009	1.07 (0.88–1.31)	1.00 (1.00–1.00)	0.95 (0.87–1.03)
2011	1.00 (1.00–1.00)	N/A	1.00 (1.00–1.00)
Gender			
Male	N/A	1.12 (1.06–1.19)	0.80 (0.76–0.85)
Female	N/A	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Marital status			
Married or living as married	1.34 (1.20–1.50)	1.18 (1.11–1.25)	0.99 (0.92–1.07)
Other	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Education			
High school or less	0.79 (0.68–0.93)	0.64 (0.59–0.71)	0.64 (0.59–0.70)
Some college	0.89 (0.77–1.02)	0.74 (0.69–0.80)	0.71 (0.65–0.77)
College graduate	0.92 (0.79–1.06)	0.86 (0.79–0.93)	0.76 (0.70–0.82)
More than college	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Employment status			
Employed	0.87 (0.78–0.96)	0.91 (0.85–0.98)	0.85 (0.79–0.91)
Unemployed	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
English proficiency			
English proficient	0.98 (0.70–1.38)	0.99 (0.80–1.21)	0.79 (0.65–0.97)
Limited or no English proficiency	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Percent of time in U.S.			
0–49	1.03 (0.78–1.35)	0.74 (0.64–0.87)	0.59 (0.50–0.69)
50–99	1.21 (0.97–1.50)	0.97 (0.85–1.10)	0.79 (0.71–0.89)
100	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Income (percent of FPL)			
< 100 FPL	0.67 (0.54–0.84)	0.67 (0.57–0.79)	0.76 (0.66–0.89)
100–< 200 FPL	0.73 (0.63–0.85)	0.78 (0.69–0.88)	0.87 (0.77–0.99)
200+ FPL	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Have usual place to go when sick or needing health advice			
Yes	3.01 (2.55–3.55)	2.61 (2.31–2.96)	2.43 (2.09–2.81)
No or ER is usual source	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
General health status			
Excellent/very good/good	1.15 (1.00–1.32)	0.81 (0.74–0.89)	0.69 (0.63–0.76)
Fair/poor	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Smoking status			
Current smoker	0.60 (0.53–0.69)	0.65 (0.60–0.71)	0.74 (0.67–0.81)
Current nonsmoker	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Age	1.02 (1.01–1.04)	1.10 (1.09–1.11)	1.06 (1.05–1.07)

Source: CHIS 2001, 2003, 2005, 2007, 2009, 2011/2012.

^aMammogram within the past 2 years.

^bFOBT in the past year, sigmoidoscopy in the past 5 years, or colonoscopy within the past 10 years.

^cFlu shot within the past year.

^dPrivate insurance includes insurance purchased by individuals or employers.

^ePublic insurance includes Medicare, Medicaid, and other forms of public coverage such as military.

^fAnyone without public or private insurance was classified as uninsured.

CHIS, California Health Interview Survey; CRC, colorectal cancer; ER, emergency room; FOBT, fecal occult blood test; FPL, federal poverty level; N/A, not applicable.

(Appendix continues →)



Appendix Table A2. Odds Ratio and 95% Confidence Intervals of Mammography, Colorectal Cancer Screening, and Flu Shot by Demographic Characteristics, Ages 50–64

	Mammography ^a (2001–2011)	CRC Screening ^b (2001–2009)	Flu Shot ^c (2003–2011)
Race/Ethnicity-insurance type			
White-private ^d (referent)	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Chinese-private	0.56 (0.41–0.76)	0.95 (0.79–1.14)	1.41 (1.18–1.67)
Filipino-private	0.77 (0.50–1.19)	0.69 (0.53–0.90)	1.68 (1.30–2.18)
Japanese-private	0.83 (0.55–1.25)	0.82 (0.64–1.06)	1.52 (1.19–1.94)
Korean-private	0.42 (0.24–0.72)	0.72 (0.52–0.99)	2.00 (1.43–2.81)
South Asian-private	0.62 (0.37–1.04)	0.67 (0.45–0.98)	1.38 (1.03–1.85)
Vietnamese-private	1.10 (0.53–2.29)	1.30 (0.93–1.82)	2.30 (1.61–3.30)
White-public ^e	0.76 (0.62–0.93)	1.01 (0.88–1.15)	1.24 (1.09–1.41)
Chinese-public	0.59 (0.20–1.71)	0.68 (0.36–1.29)	1.73 (0.95–3.16)
Filipino-public	0.79 (0.30–2.04)	1.66 (0.86–3.19)	1.65 (0.89–3.08)
Japanese-public	0.28 (0.04–1.78)	0.28 (0.07–1.13)	1.38 (0.45–4.27)
Korean-public	0.66 (0.24–1.83)	0.39 (0.17–0.90)	4.87 (2.17–10.94)
South Asian-public	0.19 (0.02–1.68)	0.29 (0.04–2.45)	0.58 (0.14–2.46)
Vietnamese-public	1.13 (0.54–2.35)	0.87 (0.58–1.29)	2.94 (1.92–4.52)
White-uninsured ^f	0.28 (0.24–0.34)	0.36 (0.31–0.42)	0.53 (0.44–0.64)
Chinese-uninsured	0.24 (0.14–0.42)	0.30 (0.19–0.46)	0.84 (0.55–1.28)
Filipino-uninsured	0.23 (0.10–0.54)	0.46 (0.26–0.83)	1.16 (0.50–2.66)
Japanese-uninsured	0.08 (0.03–0.19)	0.31 (0.11–0.86)	0.55 (0.18–1.68)
Korean-uninsured	0.16 (0.09–0.26)	0.31 (0.20–0.49)	1.47 (0.95–2.27)
South Asian-uninsured	0.27 (0.05–1.33)	0.29 (0.08–1.12)	0.93 (0.25–3.43)
Vietnamese-uninsured	0.57 (0.31–1.04)	1.06 (0.63–1.79)	2.00 (1.27–3.15)
Year			
2001	0.87 (0.73–1.04)	0.58 (0.53–0.64)	N/A
2003	0.86 (0.73–1.01)	0.42 (0.38–0.46)	0.94 (0.87–1.03)
2005	1.04 (0.87–1.24)	0.58 (0.53–0.64)	0.56 (0.51–0.61)
2007	1.00 (0.84–1.19)	0.74 (0.67–0.82)	0.91 (0.84–0.98)
2009	1.06 (0.87–1.28)	1.00 (1.00–1.00)	0.95 (0.87–1.03)
2011	1.00 (1.00–1.00)	N/A	1.00 (1.00–1.00)
Gender			
Male	N/A	1.12 (1.06–1.19)	0.80 (0.76–0.86)
Female	N/A	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Marital status			
Married or living as married	1.34 (1.20–1.50)	1.18 (1.11–1.25)	0.99 (0.92–1.07)
Other	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Education			
High school or less	0.78 (0.67–0.91)	0.64 (0.58–0.70)	0.64 (0.59–0.69)
Some college	0.88 (0.77–1.01)	0.74 (0.69–0.80)	0.70 (0.65–0.76)
College graduate	0.92 (0.80–1.07)	0.87 (0.80–0.94)	0.76 (0.70–0.82)
More than college	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Employment status			
Employed	0.86 (0.78–0.96)	0.92 (0.85–0.98)	0.85 (0.79–0.91)
Unemployed	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
English proficiency			
English proficient	0.96 (0.67–1.37)	1.09 (0.88–1.35)	0.89 (0.72–1.11)
Limited or no English proficiency	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Percent of time in U.S.			
0–49	1.01 (0.76–1.33)	0.76 (0.65–0.89)	0.59 (0.50–0.70)
50–99	1.22 (0.98–1.54)	0.97 (0.85–1.11)	0.78 (0.69–0.88)
100	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Income (percent of FPL)			
< 100 FPL	0.64 (0.52–0.80)	0.67 (0.56–0.79)	0.76 (0.65–0.88)
100–< 200 FPL	0.71 (0.62–0.83)	0.77 (0.69–0.87)	0.87 (0.77–0.98)
200+ FPL	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Have usual place to go when sick or needing health advice			
Yes	2.98 (2.52–3.52)	2.60 (2.31–2.94)	2.45 (2.12–2.84)
No or ER is usual source	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
General health status			
Excellent/very good/good	1.17 (1.02–1.35)	0.82 (0.74–0.89)	0.71 (0.64–0.77)
Fair/poor	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)

(continued)

(Appendix continues →)



Appendix Table A2. (Continued)

	Mammography ^a (2001–2011)	CRC Screening ^b (2001–2009)	Flu Shot ^c (2003–2011)
Smoking status			
Current smoker	0.61 (0.53–0.70)	0.65 (0.60–0.71)	0.74 (0.68–0.81)
Current nonsmoker	1.00 (1.00–1.00)	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Age	1.02 (1.01–1.04)	1.10 (1.09–1.11)	1.06 (1.05–1.07)

Source: CHIS 2001, 2003, 2005, 2007, 2009, 2011/2012.

^aMammogram within the past 2 years.

^bFOBT in past year, sigmoidoscopy in past 5 years, or colonoscopy within the past 10 years.

^cFlu shot within the past year.

^dPrivate insurance includes insurance purchased by individuals or employers.

^ePublic insurance includes Medicare, Medicaid, and other forms of public coverage such as military.

^fAnyone without public or private insurance was classified as uninsured.

