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Breast and Cervical Screening by Race/Ethnicity: Comparative Analyses Before and During the Great Recession

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Abstract

Background—Traditionally, economic recessions have resulted in decreased utilization of preventive health services.

Purpose—To explore racial and ethnic differences in breast and cervical cancer screening rates before and during the Great Recession.

Methods—The Medical Expenditure Panel was the source for identifying 10,894 women, ages 50–74 for breast screening and 19,957 women, ages 21–65 for cervical screening. Survey years included 2004–2005 and 2009–2010. Dependent variables were as follows: 1) receipt of mammogram within the past 2 years; and 2) receipt of a Pap smear within the past 3 years. The interaction of the recession and the likelihood of screening between whites and minorities was analyzed. Multivariate regressions were applied to estimate the likelihood of screening for the two time periods while controlling for a recession variable.

Results—Nationally, breast and cervical cancer screening rates dropped during the recession period; white women contributed most to the decline. However, there were significant improvements in timely screening for both cancers among Hispanics during the recession period. After controlling for the recession, African American women were more likely to have timely screenings compared to white women. Screening rates during the recession were lowest in the South, Midwest and West.

Conclusion—There was a national reduction in the percentages of women who obtained timely breast and cervical screenings during the Great Recession. Outreach efforts are needed to ensure that women who were not screened during the recession are screened. Widespread education about the Affordable Care Act may be helpful.

Introduction

Economic recessions have historically had a negative impact on preventive services and overall health services utilization.¹ Most recently, millions of Americans were affected by the Great Recession (2007–2009). Unemployment, loss of employer-sponsored health insurance, reduced net worth, and other social factors that contribute to economic vitality were compromised.^{2, 3, 4} In December 2007, the national unemployment rate was 5% and by December 2009, the rate rose to 9.5%.³ Consequently, 5.8 million Americans lost employer-based health insurance and the uninsured rate rose 2.7%, resulting in an additional 5.6 million uninsured Americans.⁵ Furthermore, the unemployment rate during the Great Recession rose fastest, compared to the last six recessions in American history.³

There were also noteworthy differences in how the recession affected minority populations. As of December 2009, the unemployment rate for African Americans was 16.2%, 12.8% for Hispanics, and 9.0% for whites.³ Although the unemployment rate for whites was the lowest, whites make up the majority of the population. The job loss resulted in 3 million newly uninsured whites, 0.6 million newly uninsured African Americans, and 1.1 million newly uninsured Hispanics.⁵ Consistent with prior recessions in American history, these economic shifts resulted in a reduction in health services utilization among the general population.^{1, 5, 6, 7}

Because of the projected growth in the number of persons diagnosed with cancer, coupled with the quality of life and cost benefits of early detection, it is important to explore how national cancer screening goals may have been jeopardized during the recession.^{8, 9} Inarguably, early detection through screening can be lifesaving and because of the proven benefits of early detection for breast and cervical cancer, national screening goals have been determined and included as part of Healthy People 2020.¹⁰ Timely mammography screening can reduce breast cancer mortality rates by 15%–30%,^{11, 12, 13} and if detected early, cervical cancer is one of the most curable forms of cancers.¹⁴ However, receipt of timely health services is contingent upon a number of factors that are connected to the state of the economy.^{1, 4, 5, 15}

In this study, two forms of cancer with national screening targets were selected—breast and cervical cancer. This study contributes to the literature by examining trends in screening rates before and during the recession periods. Findings provide insight on specific populations to target for reengagement in care. To our knowledge, this is the first comparative analysis of breast and cervical screening rates during the Great Recession.

Conceptual Framework

There is clear evidence that health service utilization is based on system-level factors, such as insurance status and access to and utilization of a usual source of care.^{16, 17, 18, 19}

Moreover, personal characteristics, such as race/ethnicity, educational attainment, marital status, and perceived health status are also well documented in the literature as contributors to health service utilization.^{17, 18, 19} Therefore, Andersen's Behavioral Model of Health Services Use was selected as a guide for this study. The model acknowledges predisposing, enabling, and perceived need factors that influence or predict utilization of healthcare services.^{20, 21}

Methods

Data

Data from the consolidated Medical Expenditure Panel Survey (MEPS) were used for the analyses.²² Sponsored by the Agency for Healthcare Research and Quality (AHRQ), the survey provides information on the utilization of health services, using a nationally representative sample of civilian, non-institutionalized persons in the U.S. African Americans and Hispanics are oversampled.^{22, 23}

Based on U.S. Preventive Services Task Force age-appropriate screening recommendations,²⁴ as well as Healthy People 2020 age-based screening recommendations,¹⁰ the rates of receipt of mammography are examined within the past 2 years among women between the ages of 50 and 74 years. The rates of Pap smear are examined within the past 3 years among women between the ages of 21 and 65 years. Women who reported having a hysterectomy are excluded. Screening frequencies between the pre-recession period and the recession period are compared.

Independent Variables

A dummy variable was created as an indicator for the economic recession. It equals to 1 if the survey years are 2009–2010 and 0 if survey years are 2004–2005. Survey years were selected to accommodate time interval screening guidelines based on the recession period. For example, a mammogram should be conducted once within the past 2 years. Hence, the 2009 data reflect the screening rates during 2007–2009, that is, the Great Recession. Years 2004 and 2005 were selected as the pre-recession period, that is, the comparison period, to adequately account for screenings that occurred before the recession. The interaction terms of race and ethnicity with the recession indicator are controlled to examine if racial and ethnic groups had different utilization patterns during the recession period.

Other Independent Variables

Predisposing factors include marital status (not married [reference], married); education (no high school degree [reference], high school degree, college degree, advanced degree); primary language (English [reference], other); U.S. region (Northeast [reference], Midwest, South, West); and nativity (U.S.-born [reference], non-U.S.-born). Enabling factors include insurance (uninsured [reference], private, public); income (>200% of the Federal Poverty Level [reference], <100%, 100–200%); employment status (employed [reference], unemployed); usual source of care (no [reference], yes); and urban/nonurban (nonurban [reference], urban). Need factors include perceived health status (excellent [reference], very good, good, fair, poor) and comorbidities (no comorbidity [reference], yes). Comorbidities include common noncancerous conditions that typically require medical attention within a 12-month period: coronary artery disease, diabetes, hypertension, high cholesterol, osteoarthritis, depression, and anxiety. A binary variable that equaled 1 was constructed if respondents have any of the conditions and 0 otherwise.

Analysis

Rates of receiving mammograms and Pap smears before and during the recession are presented. Sample characteristics are summarized according to eligibility for mammogram and/or Pap smear. Multivariate logistic regressions are applied to estimate the likelihood of timely receipt of screening services. The interaction of the recession and likelihood of screening by race and ethnicity was also analyzed. Stata 12.0 was used for all analyses. Appropriate survey commands were used for all analyses to account for sample weighting and the complex survey design to ensure correct variance estimation.

Results

Breast Cancer Screening

Table 1 provides characteristics of the population of women between the ages of 50 and 74 years who were eligible for mammogram: white 6,936 (64%); African American 2,074 (19%); and Hispanic 5,333 (17%). On average, white women were more likely to report excellent health (18%) compared to Hispanic (8%) and African American women (8%), and less likely to have a comorbidity (71% among whites, 73% among Hispanics, and 79% among African Americans). White women were more likely to have private insurance (74%), compared to Hispanics (40%) and African Americans (51%). Approximately half of all races and ethnicity were employed and the majority had a usual source of care—white 92%, Hispanic 84%, and African American 90%. Fifty-four percent of Hispanics did not speak Spanish as a primary language and 67% of Hispanics were not born in the U.S.

Figure 1 provides summary statistics of mammography rates before and during the recession periods. There was a slight decrease in the percentage of white women screened (78% before and 76% during the recession). Percentages of African American women who were screened were unchanged at 76%, and screening among Hispanic women rose by 6 percentage points (from 71% to 77%).

Table 2 displays multivariate results, controlling for the recession indicator, race/ethnicity, and other covariates. Overall, compared to the pre-recession period, women were significantly less likely to receive a mammogram during the recession period ($OR=0.82$, $p<0.001$). African American women were more likely to have a mammogram compared to white women ($OR=1.31$, $p<0.01$). The interaction term between Hispanics and the economic recession was significant ($OR=1.39$, $p=0.05$), which indicates that mammography screening among whites was lower than Hispanics during the recession period. Furthermore, findings show an increase in screening among Hispanics during the recession period, compared to the pre-recession period. The interaction term between African American women and the recession indicator was not significant, which indicates that screening rates were unchanged among African American women during the recession, compared to white women.

In addition, multivariate regression results show that married women were more likely to have a mammogram than unmarried women ($OR=1.36$, $p<0.001$). The likelihood of receiving a timely mammogram was significantly lower for women who did not speak English as a primary language compared to those who did ($OR=0.55$, $p<0.001$). Women without a high school degree were less likely to be screened than those with degrees. Need factors are examined by perceived health and comorbidities. In general, women with higher perceptions of health status were more likely to be screened than those with lower perceptions of their health status, and those with comorbidities were more likely to be screening than those without comorbidities ($OR=1.74$, $p<0.001$).

The likelihood of screening was greatest among those with incomes more than 200% of the federal poverty level. Access to private insurance, public insurance, and a usual source of care were the most significant enabling factors. Compared to uninsured women, those with private insurance were almost three times more likely to be screened ($OR=2.97$, $p<0.001$).

and those with public insurance were 2.5 times more likely to be screened ($OR=2.50$, $p<0.001$). Residents of the Northeast Region of the country were most likely to be screened than those in other regions. The Midwest and South fared worse ($OR=0.73$, $p<0.001$; $OR=0.73$, $p<0.001$, respectively).

Cervical Cancer Screening

There were 19,957 women between the ages of 21 and 65 years: whites 10,845 (54%), Hispanics 5,333 (27%), and African Americans 3,779 (19%; Table 1). The majority of white women perceived their health as very good or excellent (61%), compared with 44% of Hispanics and 46% of African American women. Forty-five percent of African American women reported a comorbid condition, compared to 44% of whites and 36% of Hispanics. Hispanics were least likely to have private insurance (41%), compared to 54% of African Americans and 77% of whites. The majority of all populations were employed (white, 78%; Hispanic, 65%; and African American, 74%) and Hispanics were less likely to have a usual source of care (31%). Fifty-three percent of Hispanics did not speak English as a primary language and 63% of Hispanics were not born in the U.S.

Figure 2 provides summary statistics of Pap smear rates before and during the recession periods. There was a slight decrease in the percentage of white women screened (88% before and 85% during the recession). Percentages of African American women who were screened were unchanged at 89%, and screening among Hispanic women rose by 3 percentage points (from 84% to 87%).

According to the multivariate regressions (Table 2), overall, compared to the pre-recession period, women were less likely to obtain a Pap smear during the recession period ($OR=0.79$, $p<0.001$). However, African American women were more likely to have a Pap smear than white women ($OR=1.78$, $p<0.001$). Compared to the pre-recession period, Hispanic women were more likely to be screened during the recession period ($OR=1.56$, $p<0.001$). The percentage of white women with a timely Pap smear dropped 3 percentage points during the recession (from 88% before to 85% during that period; Figure 2). However, percentage rates for Hispanics increased from 84% before the recession to 87% during the recession. Rates for African Americans remained unchanged at 89%.

According to multivariate regressions for the two time periods (Table 2), married women were more likely to be screened than women who were not married ($OR=1.75$, $p<0.001$). Those with a college degree were most likely to be screened ($OR=2.08$, $p<0.001$), followed by those with an advanced degree ($OR=1.64$, $p<0.001$) compared to those without a degree (reference). Consistent with trends in breast screening, women with higher perceptions of health status were more likely to be screened than women with lower perceptions of health status ($p<0.05$). However, screening rates were higher for those with comorbidities ($OR=1.33$, $p<0.001$) compared to those without comorbidities.

Access to insurance, employment, and a usual source of care were the most significant enabling factors. Compared to uninsured women, women with private insurance and/or public insurance were more than twice as likely as to be screened ($OR=2.17$, $p<0.001$; $OR=2.15$, $p<0.001$). Unemployed women were less likely to be screened than employed

women (OR=0.72, $p<0.001$), and women with a usual source of care were more than twice as likely to be screened than those without a usual source of care (OR=2.08, $p<0.001$). Although there were no statistically significant findings by region, women in urban areas were more likely to be screened than women in non-urban areas (OR=1.20, $p<0.05$).

During the recession period, women were less likely to obtain a Pap smear compared to the pre-recession period (OR=0.79, $p<0.001$). Compared to white women, African American women were more likely to receive a Pap smear (OR=1.78, $p<0.001$). Hispanic women were more likely to receive a timely Pap smear during the recession period, compared to the pre-recession period (OR=1.56, $p<0.001$).

Discussion

This study contributes to the literature by examining racial and ethnic trends in breast and cervical cancer screening rates before and during the Great Recession. Consistent with findings from prior studies on trends in preventive services during recessions,^{1, 7, 15} screening rates for breast and cervical cancer screenings dropped during the Great Recession. Because it is estimated that three million whites lost insurance coverage during the recession,⁵ it is not surprising that white women contributed most to the reduction. The decline has resulted in a negative impact on the Healthy People 2020 objective, which identifies 81% as the national target for breast screening and 93% as the national target for cervical screening.¹⁰ Because of the likelihood of advanced-stage diagnosis, the implications can be serious and costly.^{25, 26, 27, 28} Efforts are needed to re-engage this population in education and screening services to reduce risks and promote early detection.

Screening rates among Hispanics were higher during the recession period than before it. A 6% increase for breast screening and a 3% increase in cervical screening during the recession period, compared to the prerecession period, is moving Hispanics closer to national targets. This is especially noteworthy because Hispanics have been historically diagnosed with the both cancers at more advanced stages than whites.^{29, 30} Screening efforts funded by the National Breast and Cervical Cancer Early Detection Programs have made a significant contribution to the overall number of women screened. Hispanics, in particular, have benefited—approximately 312,000 Hispanics were screened for cervical cancer and 267,000 were screened for breast cancer from 2006 through 2011.³¹ In addition, philanthropies, such as the Avon Foundation and the Susan B. Komen Foundation have made significant contributions in heightening awareness and expanding access to breast screening—particularly among communities of color.^{32, 33}

Improved screening among Hispanics may also be the result of local and national partnerships that offer evidence-based, culturally tailored outreach and preventive services, specifically among safety-net provider groups.³⁴

Insurance and usual source of care were the strongest predictors of screening.^{17, 35, 36} It should also be noted that the gap in likelihood of screening between those with private insurance and public insurance is fairly small, suggesting that public and private providers are achieving a fairly consistent level of performance. Based on socioeconomic data,

African American screening rates may have remained consistent during the two periods for two possible reasons: (1) although African Americans were adversely impacted by the recession, their income reductions were not as dramatic as whites,⁵ and (2) compared to whites, higher proportions of African Americans have lower incomes (those populations may have already been covered by public insurance).^{5, 37}

Fiscella and colleagues³⁸ found that poor English fluency is a contributor to healthcare access disparities by ethnicity, even when controlling for insurance. Results of this study corroborate those findings, since there was a significant association between primary language and likelihood of timely screening. Women 50 and older who did not speak English as a primary language had significantly lower screening rates than those who spoke English as a primary language. Therefore, linguistically tailored outreach services for these populations may be helpful.

Consistent with U.S. regions most impacted by unemployment and uninsurance during the recession, breast screening in the Midwest and South was lowest, followed by the West.^{4, 5} The region with the largest percentage drop in employer-sponsored coverage was the Midwest, and newly uninsured rates were highest in the South, Midwest, and West.⁵ The Northeast fared better, mainly because of more widespread public insurance programs with high eligibility thresholds.⁵ Because women in urban communities were more likely to be screened for cervical cancer, special efforts are needed to screen residents of rural communities in the South, Midwest, and West who elected to forgo screening during recession.

Provisions of the Affordable Care Act (ACA) are expected to have a favorable impact on screening rates. Expanded Medicaid coverage, health insurance exchanges, and no cost-sharing requirements will promote access and continuity of care.³⁹ As the law takes effect, local and national efforts are needed to ensure that those who have been affected by the recession understand the law and how it can benefit them.

This study had several limitations, which serve as opportunities for future research. First, the analyses were cross-sectional and do not explore causality. Screening rates before and during the Great Recession were analyzed; therefore, temporal trends of cancer screening from the recession could not be determined. Second, responses to the MEPS questionnaire are self-reported, which may result in inaccurate responses or recall bias. Third, there may be differences in screening rates within Hispanic subgroups and among other racial populations⁴⁰; however, because of limited sample sizes, heterogeneous screening patterns among those populations were not analyzed.

Conclusion

The findings of this study underscore the important role of insurance and usual source of care in accessing preventive screening services. Because screenings for women with public insurance remained relatively high and unchanged during the recession, the case for expanding insurance coverage and a usual source of care is further strengthened. Although the provisions of the ACA will support these opportunities, collaborative efforts between

health services providers, local and federal government, not-for-profit stakeholders, and private industry are needed. These partnerships can help ensure that those affected by the recession are able to reenter the system of care and receive timely preventive health services.

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References

1. Ruhm CJ. Are recessions good for your health?. *Q J Econ.* 2000; 115:617–650.
2. Taylor, P.; Kochhar, R.; Fry, R.; Velasco, G.; Motel, S. Wealth gaps rise to record highs between whites, blacks and Hispanics.. Pew Research Center. 2011. www.pewsocialtrends.org/files/2011/07/SDT-Wealth-Report_7-26-11_FINAL.pdf
3. US Bureau of Statistics. The Recession of 2007–2009: BLS Spotlight on Statistics. www.bls.gov/spotlight/2012/recession/
4. Hacker JS, Huber GA, Nichols A, Rehm P, Craig S. Economic insecurity and the Great Recession. 2011
5. Holahan J. The 2007–09 Recession and health insurance coverage. *Health Aff (Millwood)*. 2011; 30:145–152. [PubMed: 21134911]
6. Dorn SD, Wei D, Farley JF, et al. Impact of the 2008–2009 economic recession on screening colonoscopy utilization among the insured. *Clin Gastroenterol Hepatol.* 2012; 10:278–284. [PubMed: 22155558]
7. Mortensen K, Chen J. The great recession and racial and ethnic disparities in health services use. *JAMA Intern Med.* 2013;1–2. [PubMed: 23877079]
8. Smith BD, Smith GL, Hurria A, Hortobagyi GN, Buchholz TA. Future of cancer incidence in the U.S.: Burdens upon an aging, changing nation. *J Clin Oncol.* 2009; 27:2758–2765. [PubMed: 19403886]
9. Siegel R, DeSantis C, Virgo K, et al. Cancer treatment and survivorship statistics, 2012. *CA Cancer J Clin.* 2012; 62:220–241. [PubMed: 22700443]
10. USDHHS. Healthy People 2020. Office of Disease Prevention and Health Promotion. 2010
11. Hoerger TJ, Ekwueme DU, Miller JW, et al. Estimated effects of the national breast and cervical cancer early detection program on breast cancer mortality. *Am J Prev Med.* 2011; 40:397–404. [PubMed: 21406272]
12. Mandelblatt JS, Cronin KA, Bailey S, et al. Effects of mammography screening under different screening schedules: model estimates of potential benefits and harms. *Ann Intern Med.* 2009; 151:738–747. [PubMed: 19920274]
13. Fletcher SW, Elmore JG. Mammographic screening for breast cancer. *N Engl J Med.* 2003; 348:1672–1680. [PubMed: 12711743]
14. Cervical Cancer: Prevention and early detection. www.cancer.org/acs/groups/cid/documents/webcontent/003167-pdf.pdf
15. Hurd, MD.; Rohwedder, S. Effects of the financial crisis and Great Recession on American households.; National Bureau of Economic Research. Report No. 2010. p. 16407 www.nber.org/papers/w16407
16. Weinick, RM.; Drilea, SK. Usual sources of health care and barriers to care, 1996. Vol. 79. *Stat Bull Metrop Life Insur Co*; 1984. p. 11-17.1998
17. Selvin E, Brett KM. Breast and cervical cancer screening: sociodemographic predictors among white, black, and Hispanic Women. *Am J Public Health.* 2003; 93:618–623. [PubMed: 12660207]
18. DeVoe JE, Tillotson CJ, Wallace LS. Usual source of care as a health insurance substitute for U.S. adults with diabetes?. *Diabetes Care.* 2009; 32:983–989. [PubMed: 19252167]
19. Shavers VL, Brown ML. Racial and ethnic disparities in the receipt of cancer treatment. *J Natl Cancer Inst.* 2002; 94:334–357. [PubMed: 11880473]

20. Andersen R, Aday LA. Access to medical care in the U.S.: realized and potential. *Med Care*. 1978; 16:533–546. [PubMed: 672266]
21. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter?. *J Health Soc Behav*. 1995; 36:1–10. [PubMed: 7738325]
22. Medical Expenditure Panel Survey Background. meps.ahrq.gov/mepsweb/about_meps/survey_back.jsp
23. National Medical Expenditure Survey (U.S.); Center for General Health Services Intramural Research (U.S.). Cornelius, L. Usual sources of medical care and their characteristics. USDHHS, Public Health Service Agency for Health Care Policy and Research, National Technical Information Service [distributor]; Rockville MD: Springfield VA: 1991. 5600 Fishers Ln. Rockville 20857
24. USPSTF. A-Z Topic Guide. www.uspreventiveservicestaskforce.org/uspsttopics.htm#Ctopics
25. Wells BL, Horm JW. Stage at diagnosis in breast cancer: race and socioeconomic factors. *Am J Public Health*. 1992; 82:1383–1385. [PubMed: 1415866]
26. Gregorio D, Cummings K, Michalek A. Delay, stage of disease, and survival among white and black women with breast cancer. *Am J Public Health*. 1983; 73:590–593. [PubMed: 6837827]
27. Adami H, Malker B, Holmberg L, Persson I, Stone B. The relation between survival and age at diagnosis in breast cancer. *N Engl J Med*. 1986; 315:559–563. [PubMed: 3736639]
28. Arozullah AM, Calhoun EA, Wolf M, et al. The financial burden of cancer: estimates from a study of insured women with breast cancer. *J Support Oncol*. 2004; 2:271–278. [PubMed: 15328826]
29. Elledge RM, Clark GM, Chamness GC, Osborne CK. Tumor biologic factors and breast cancer prognosis among white, Hispanic, and black women in the U.S. *J Natl Cancer Inst*. 1994; 86:705–712. [PubMed: 7908990]
30. Ries, L.; Eisner, M.; Kosary, C., et al. SEER cancer statistics review, 1975–2001. National Cancer Institute; Bethesda MD: 2004.
31. CDC. Cancer: NBCCEDP screening program summaries; National Aggregate. www.cdc.gov/cancer/nbccedp/data/summaries/national_aggregate.htm
32. Avon Foundation: Working to end breast cancer and domestic violence. www.avonfoundation.org
33. Susan G. Komen for the cure. www5.komen.org/
34. CDC. National Breast and Cervical Cancer Early Detection Program (NBCCEDP). www.cdc.gov/cancer/nbccedp/
35. DeVoe JE, Fryer GE, Phillips R, Green L. Receipt of preventive care among adults: insurance status and usual source of care. *Am J Public Health*. 2003; 93:786–791. [PubMed: 12721145]
36. Llewellyn J, Cornelius. The degree of usual provider continuity for African and Latino Americans. *J Health Care Poor Underserved*. 1997; 8:170–185. [PubMed: 9114626]
37. Distribution by race/ethnicity: Kaiser State Health Facts. www.statehealthfacts.org/comparebar.jsp?ind=158&cat=3
38. Fiscella K, Franks P, Doescher MP, Saver BG. Disparities in health care by race, ethnicity, and language among the insured: findings from a national sample. *Med Care*. 2002; 40 (journals.lww.com/lwwmedicalcare/Fulltext/2002/01000/Disparities_in_Health_Care_by_Race,_Ethnicity,_and.7.aspx).
39. Koh HK, Sebelius KG. Promoting prevention through the Affordable Care Act. *N Engl J Med*. 2010; 363:1296–1299. [PubMed: 20879876]
40. Vargas Bustamante A, Chen J, Rodriguez HP, Rizzo JA, Ortega AN. Use of preventive care services among Latino subgroups. *Am J Prev Med*. 38(6):610–9. 201. [PubMed: 20494237]

Figure 1.

Percentage of women with a mammogram before and during the Great Recession

Figure 2.
Percentage of women with a Pap smear before and during the Great Recession

Table 1

Demographic Characteristics of Sample Based on USPSTF Age-Appropriate Recommendations

	Women Ages 50-74 (Mammogram)			Women Ages 21-65 (Pap Smear)		
	White N=6936(%)	Hispanic N=1884(%)	African American N=2074(%)	White N=10845(%)	Hispanic N=5333(%)	African American N=3779(%)
Age (years)	60	59	59	41	38	39
Marital Status						
Married	4230(61)	998(53)	728(32)	6398(59)	2880(54)	1020(27)
Not Married	2706(39)	886(47)	1346(68)	4447(41)	2453(46)	2759(73)
Perceived Health						
Excellent	1248(18)	151(8)	167(8)	2711(25)	907(17)	680(18)
Very Good	2289(33)	375(21)	477(23)	3904(36)	1440(27)	1058(28)
Good	2081(30)	659(35)	746(36)	3037(28)	1973(37)	1285(34)
Fair	902(13)	527(28)	498(24)	868(8)	853(16)	605(16)
Poor	416(6)	151(8)	186(9)	325(3)	160(3)	151(4)
Comorbidity						
Yes	4924(71)	1375(73)	1638(79)	4772(44)	1920(36)	1700(45)
No	2012(29)	509(27)	436(21)	6073(56)	3413(64)	2073(55)
Education						
No degree	1040(15)	1168(62)	663(32)	1193(11)	2560(48)	831(22)
High school degree	3606(52)	471(25)	954(46)	4989(46)	1919(36)	2003(53)
College degree	1040(15)	113(6)	166(8)	2386(22)	427(8)	454(12)
Advanced degree	1317(18)	131(7)	290(14)	2277(21)	427(8)	491(13)
Income						
> 200% FPL	693(10)	414(22)	539(26)	1410(13)	1547(29)	1171(31)
< 100% FPL	1040(15)	527(28)	539(26)	1735(16)	1653(31)	983(26)
100-200% FPL	5202(75)	942(50)	996(48)	7700(71)	2133(40)	1625(43)
Insurance						
Uninsured	486(7)	452(24)	249(12)	1193(11)	1866(35)	605(16)
Private	5132(74)	754(40)	1058(51)	8351(77)	2186(41)	2040(54)
Public	1317(19)	678(36)	767(37)	1301(12)	1281(24)	1134(30)
Usual Source of Care						
Yes	6381(92)	1583(84)	1867(90)	9001(83)	3680(69)	2948(78)
No	555(8)	301(16)	207(10)	1844(17)	1653(31)	831(22)
Employment						
No	3121(45)	1037(55)	1058(51)	2386(22)	1866(35)	983(26)
Yes	3815(55)	847(45)	1016(49)	8459(78)	3467(65)	2796(74)
Primary Language						
English	6936(100)	867(46)	2074(100)	10845(100)	2506(47)	3779(100)
Other	-	1017(54)	-	-	2827(53)	-
Urban/Non-urban						
Urban	5271(76)	1714(91)	1784(86)	8676(80)	4853(91)	3288(87)

Women Ages 50-74 (Mammogram)				Women Ages 21-65 (Pap Smear)		
	White	Hispanic	African American	White	Hispanic	African American
	N=6936(%)	N=1884(%)	N=2074(%)	N=10845(%)	N=5333(%)	N=3779(%)
Non-urban	1665(24)	170(9)	290(14)	2169(20)	480(9)	491(13)
US Region						
Northeast	1249(18)	301(16)	332(16)	1952(18)	693(13)	642(17)
Midwest	1803(26)	94(5)	332(16)	3037(28)	427(8)	681(18)
South	2497(36)	717(38)	1224(59)	3579(33)	1813(34)	2154(57)
West	1387(20)	772(41)	186(9)	2277(21)	2400(45)	302(8)
Nativity						
US born	6752(96)	622(33)	1950(94)	10411(96)	1973(37)	3477(92)
Non US born	184(4)	1262(67)	124(6)	434(4)	3360(63)	302(8)

Notes: Source : Medical Expenditure Panel Survey 2004/2005 and 2009/2010

Table 2

Interaction of Recession and Screening by Race and Ethnicity and Results of Multivariate Analyses after Controlling for the Recession

	Pap Smear		Mammogram	
	OR	p-value	OR	p-value
Key Independent Variables				
Before recession (year =2004, 2005)	ref		ref	
Recession indicator (year =2009, 2010)	0.79	0.00	0.82	0.00
White	ref		ref	
African American	1.78	0.00	1.31	0.01
Hispanic	1.11	0.35	0.94	0.68
Interaction: African American & Recession	1.12	0.41	1.10	0.50
Interaction: Hispanic & Recession	1.56	0.00	1.39	0.05
Other Covariates				
Age	0.98	0.00	1.00	0.69
Marital Status				
Not Married	Ref		ref	
Married	1.75	0.00	1.36	0.00
Perceived Health				
Excellent	ref		ref	
Very good	0.85	0.04	0.90	0.29
Good	0.73	0.00	0.71	0.00
Fair	0.63	0.00	0.59	0.00
Poor	0.43	0.00	0.46	0.00
Comorbidity				
No	ref		ref	
Yes	1.33	0.00	1.74	0.00
Education				
No degree	ref		ref	
High school degree	1.12	0.11	1.36	0.00
College degree	2.08	0.00	1.78	0.00
Advanced degree	1.64	0.00	1.73	0.00
Income				
>200% FPL	ref		ref	
<100% FPL	1.06	0.54	0.73	0.00
100- 200% FPL	1.01	0.92	0.72	0.00
Insurance				
Uninsured	ref		ref	
Private	2.17	0.00	2.97	0.00
Public	2.15	0.00	2.50	0.00
Usual Source of Care				
No	ref		ref	

	Pap Smear		Mammogram	
	OR	p-value	OR	p-value
Yes	2.08	0.00	2.58	0.00
Employment				
Employed	ref		ref	
Unemployed	0.72	0.00	0.92	0.25
Primary Language				
English	ref		ref	
Other	0.82	0.09	0.55	0.00
Urban/Non-urban				
Non-urban	ref		ref	
Urban	1.20	0.01	1.03	0.72
US Region				
Northeast	ref		ref	
Midwest	0.94	0.47	0.73	0.00
South	0.99	0.86	0.73	0.00
West	1.04	0.68	0.78	0.01
Nativity				
US born	ref		ref	0.68
Non US born	0.94	0.59	1.05	0.68

Notes: Source: Medical Expenditure Panel Survey 2004/2005 and 2009/2010

Women 50-74(n=10,894); Women 21-65(n=19,957)