# Short-Term Impact of the 2009 United States Preventive Services Task Force Recommendations for Breast Cancer Screening on Utilization of Mammography: A Longitudinal Data Analysis


## Abstract

**Background:** In 2009, The United States Preventive Services Task Force (USPSTF) recommended against routine screening mammography for women aged 40 to 49 years, and recommended biennial rather than annual mammography for women aged 50 to 74 years for women of average risk. This recommendation caused significant backlash from patient advocates and physicians. The impact of these controversial recommendations on mammography utilization among American women is unknown.

**Method:** We used longitudinal data from National Health Interview Survey and Medical Expenditure Panel Survey to compare self-reported mammography screening in 2008, 2009, and 2010. We stratified women into three age groups: 41-49, 51-74, and 76 years and older. We estimated logistic multivariate regression models with person-specific fixed effects to compare mammography screening in each of the three years.

**Results:** The percentage of women aged 40 to 49 years who reported a mammogram in the past year rose from 44.6% in 2008 to 55.5% in 2010 ($p<0.05$). In contrast, annual mammography rates in other age groups didn't show a statistically significant change from its 2008 estimate. The multivariate analyses confirmed that women aged 41 to 49 years were more likely to report mammography in the past year in 2010 than in 2008 ($p<0.01$), which was not the case for women in two other age groups.

**Conclusions:** The evidence does not show any short-term response to the USPSTF recommendations on screening for breast cancer and if anything, a slight positive response to screening frequency in younger women was observed following the 2009 guideline update.

## Introduction

In 2009, the United States Preventive Services Task Force (USPSTF) updated their guidelines to recommend against routine screening mammography for women aged 40 to 49 years and to recommend biennial instead of annual mammography for women aged 50 to 74 years for women of average risk.[1,2] The Task Force also concluded that "current evidence is insufficient to assess the additional benefits and harms of screening mammography in women age 75 years or older (p.716)."[1] In contrast, the 2002 guideline "recommends screening mammography, with or without clinical breast examination, every one to two years for women aged 40 years and older (p.343)."[2]

The debate that ensued after the issuance of the guidelines received mass media coverage may have had the unintended consequences of raising awareness of breast cancer screening among women and their family members. The vast majority (89%) of a sample of women aged 39 to 49 years surveyed in four private practice obstetrician and gynecologist offices in 2010 reported that they wanted annual mammography starting in their 40s; 86% felt the guideline changes were unsafe, even if the changes were doctor recommended.[3] The guideline update invoked many medical societies to release their own guidelines.[4] Many major health organizations, including MD Anderson Comprehensive Cancer Center, Susan G. Komen Breast Cancer Foundation, and the American Cancer Society, felt the modest survival benefit of mammography in women aged 40 to 49 years outweighed the risks associated with false positive results.[4] Furthermore, the USPSTF 2009 guidelines had little effect on health insurance coverage. Most private and public insurers continued to cover annual mammography for women age 40 years and older.[5-7] For example, both UnitedHealthcare and Aetna considers

annual mammography screening a medically necessary preventive service for women aged 40 year and older.[5,8] Medicare and Medicaid did not alter their coverage for annual mammography for women 40 years and older.[7] Moreover, as a result of advocacy efforts, breast cancer screening is the only preventive procedure that the Patient Protection and Affordable Care Act (ACA) coverage did not match the most recent USPSTF recommendations and instead, covers annual mammography without co-pay or co-insurance for women starting at age 40 years of average risk.[9] Likewise, the National Breast and Cervical Cancer Early Detection Program continues to pay for annual mammography for underserved women aged 40 to 64 years of average risk.[10]

The impact of the controversial USPSTF recommendations on screening mammography utilization among American women is not well understood. While a handful of studies have examined the short-term impact of the 2009 guidelines mammography utilization, the results are mixed. Using National Health Interview Survey data, Pace, He and Keating found that adjusted mammography rates increased slightly (1.3%; p=0.09) for women aged 50 to 74 years and remained stable for women aged 40 to 49 years and women aged 75 years and older from 2008 to 2011.[6] Using the Medical Expenditure Panel Survey data, Howard and Adams reported that the adjusted mammography rates were stable for all three age groups from 2006 to 2010.[11] These researchers combine survey data at multiple years, but did not observe the same study cohort over time. Therefore, a causal interpretation of their analyses could not be determined. We improve upon these prior published studies by using population-based longitudinal survey data (2008-2010) to compare self-reported mammography screening in the three years following the USPSTF change in screening mammography

recommendations. We hypothesized that due to the vigorous debate on mammography screening and significant criticism from patient advocates and physicians, women in all three age groups affected by the USPSTF guidelines did not alter screening behavior in a short term. Such findings shed light on the challenges faced when expert recommendations go against accepted practice patterns and patient advocates.

**Methods**

We used the Medical Expenditure Panel Survey-National Health Interview Survey (MEPS-NHIS) linked data to identify women aged 41 years and older. Medical Expenditure Panel Survey (MEPS) collects data from a sample of families and individuals in selected communities, drawn from a nationally representative subsample of households that participated in the prior year's National Health Interview Survey (NHIS). The NHIS is an in-person household survey of the civilian US population. Within sampled households, one adult per family is randomly selected to complete the “sample adult” questionnaire. We obtained person-level data covering three calendar years (2008-2010) from the linked data. Women aged 41 years or older were asked about mammography use every year. Together, these linked data provide detailed information about cancer screening behaviors, general health, health insurance, source of health care, immigration status, and demographic information.

We stratified women into three age groups: 41 to 49, 51 to 74, and 76 years and older. For each respondent, the outcome of interest was if the woman received any mammography in the past year. Women were first surveyed from January to October of 2008 in NHIS (Appendix Figure 1). They were later surveyed in the Panel 14 of MEPS,

and mammography questions were asked in the round 3 and 5: from August 2009 to May 2010 and from August to December of 2010 (Appendix Figure 2). The MEPS data do not allow us to study the exact survey dates of the third and fifth rounds. For women reporting a past-year mammogram in round 3 of Panel 14, most of them may have received a mammogram before the guideline changes since the new USPSTF guideline was released and widely reported on November 16th of 2009. However, some may have received a mammogram after the guideline changes. For women who reported a past-year mammogram in round 5 of Panel 14, we assume that a good majority of them should have received a mammogram after the guideline changes.

We first described the sample and estimated trends of the percentage of women who reported a mammogram in the past year by age group. We estimated logistic multivariate regression models with person-specific fixed effects to compare self-reported mammography screening in each of the three years.[12] This approach uses within-person variability to estimate associations in public health research.[13-15] This model controls for any stable personal characteristic that could bias our result. Variables in the regression analyses include age, survey year, household income compared to federal poverty line (<100%, 100%–199%, >=200%, and unknown), insurance status (private insurance, public insurance, and uninsured), whether the respondent has a usual source of care, and self-rated health status measure (poor/fair, good, very good/excellent). Age was included to control for the influence of aging of the study cohort. Because race and education attainment did not change in the study period, they were not controlled in the fixed effects regression. Insurance status was not controlled in the analyses of the age group 75 years of older because the vast majorities are Medicare beneficiaries. The model

included person-specific fixed effects to account for unobservable characteristics (e.g., ethnic belief, personal preferences) that could bias our estimates of mammography utilization. Regression coefficients and standard error were computed and reported from the regression models. A significant positive coefficient indicates a positive effect of the independent variable on receipt of mammography screening. All statistical analyses were conducted in SAS 9.3.

In a sensitivity analysis, we re-estimated the models with interaction terms to test whether usual source of care and insurance status varied by survey year (results not shown). Insured women and women who had a usual source of care may be more likely to follow physician recommendations for annual screening and therefore less likely to change behavior whereas uninsured women and women who did not have a usual source of care may be more inclined to follow the new guideline. These estimates were not statistically significant ($p>0.05$). Therefore, we focus our discussion on the main effects by survey year.

## RESULTS

### Sample description

The sample comprises 388 women aged 41 to 49 years, 790 women aged 51 to 74 years, and 193 women aged 76 years or older in 2008 who were asked mammography utilization questions during the study period. The median ages in 2008 of these three age groups were 45.5, 60.8, and 81.7, respectively (Table 1). The majority of women were non-Hispanic White with low rates of poverty (less than a quarter of the sample in all three age groups). About half of the women reported excellent/very good heath status in

these three age groups. A fifth of the women were in the 41 to 49 age group and 10% of 51 to 74 years old women were uninsured. Few women were immigrants (16% in age 41 to 49 years, 15% in age 51 to74 years old, and 8% in age 76 years or older) and most had at least a high school diploma (84% in aged 41 to 49 years, 80% in aged 51 to74 years old, and 68% in aged 76 years or older).

**Trends in mammography utilization**

The percentage of women who reported a mammogram in the past year rose from 53% in 2008 to 57% ($p<0.05$) in the study cohort. Figure 1 shows the trend of self-reported mammograms in three age group. In the 41 to 49 age group, the percentage of women reporting a past-year mammogram rose from 46% in 2008 to 56% in 2010. ($p<0.05$). In contrast, the mammography rates in older women changed from 58% to 60% (51 to 74 age group years) and 47% to 48% (aged 76 years or older). These changes in mammography rates among older women was not statistically significant.

**Likelihood of mammography**

Table 2 reports the regression coefficients and standard errors for the likelihood of reporting a past-year mammogram. Women aged 41 to 49 years (odds ratio=17.1, $p<0.01$) were more likely to report a past-year mammogram in 2010 than in 2008. In contrast, for women aged 51 to 74 and 76 or older, the odds ratios of reporting a past-year mammogram were 2.1 and 0.5 but was not statistically different from 2008 to 2010. For women aged 41 to 49 years, the likelihood of reporting a past-year mammogram tended to decrease with age (odds ratio = 0.4, $p<0.05$). For women aged 51 to 74 years, those who had a usual source of care (odds ratio =2.8, $p<0.05$) were also more likely to report mammography in the past year than other women.

## Discussion

Four years have passed since the USPSTF updated their breast cancer screening guidelines. The overall significance of the Task Force's decision remains undetermined. By following the same cohort of women from 2008 to 2010, we found that mammography screening rates did not decrease in any age group after the 2009 issuance of guideline changes. Contrasting to a downward trend in mammography rates between 2000 and 2008,[16,17] the percentage of women reported a past-year mammogram was higher in 2010 than in 2008 in women aged 41 to 49 years. The mammography rates were unchanged in other age groups. The evidence does not show any short-term response to the USPSTF guideline recommendations for women and if anything, a slight positive response to screening frequency in younger women was observed following the 2009 guideline update.

Many factors may have rendered the USPSTF guidelines ineffectual in a short term. First, unlike other preventive service recommendations such as screening for colorectal cancer and lipid disorders in adults, the guidelines were ignored by insurers.[5,7,8] Second, the evidence presented on the harms of frequent screening was unconvincing. For example, women regarded false-positive results as rare and unlikely to cause significant harm.[18] Third, some researchers argue that mammography campaigns by patient advocate groups are mission driven to increase utilization, and may minimize screening risks and overstate the benefit of mammography.[19] Last, advocates for breast cancer screening were successful in persuading the public that they were more at risk for breast cancer with the new guidelines,[3] and there was no consensus among healthcare

providers on the appropriateness of mammography screening frequency. Together, the evidence regarding the initial non-response to the USPSTF guidelines highlights the challenges associated with altering physician and patient behavior in a widely accepted practice, particularly when the evidence of harms is unconvincing and downplayed by the advocates.

The next USPSTF breast cancer screening recommendations are due to be released in 2014. We should be prepared for an ongoing debate about balance of benefit and harms, the age at which screening should begin and end, and issues of over-diagnosis/over-treatment. Patients, doctors, and the panel of experts agree on the principle of early detection of breast cancer, but they disagree about age at which screening should commence and stop, screening intervals, and screening tools. Based on the response immediately following the 2009 guideline update, changes in practice patterns are unlikely unless the USPSTF can produce new evidence and present their findings more convincingly to patients, providers, and advocates.

Four limitations to the analysis are noteworthy. First, we only observe three years of self-reported mammography utilization data, which provides a strong indication of immediate behavior following the change in guidelines, but whether these behaviors are sustained over the long-term is unknown. Second, we did not have information on mammography use before the study period. Women who used mammography screening before the study period may be less likely to follow the new guideline than women who never used mammography. Third, our analysis used self-reported mammography rates, which were found to have good sensitivity, but poor specificity if compared to claims data or chart review data.[20] Utilization of mammography could be over-reported, but it

does not bias our main results because women's actual reporting behavior is expected to be stable across time. Last, we did not have information of respondents' breast cancer risk level, which would upwardly bias screening behavior in a small percentage of women. However, given that the data are nationally representative, we believe the impact of these women on the results to be trivial.

In conclusion, mammography rates did not decline for women in 2010 after the 2009 debate about the frequency of mammography screening. This may be because the vigorous debate raised the awareness of breast cancer screening, and resulted in no effect on insurance coverage, physician practice, and patient behavior. Continued analysis of mammography rates with more years of longitudinal data will inform whether there is a long-term impact of the 2009 guidelines on screening rates, and ultimately breast cancer mortality in the United States.

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**Table 1.**

**Characteristics of Women Aged 41 Years and older by Age group, 2008**

| Age group | 41-49 | 51-74 | 76+ |
|---|---|---|---|
| **Sample size** | 388 | 790 | 193 |
| **Age, mean (std)** | 45.5 (2.4) | 60.8 (6.6) | 81.7 (3.5) |
| **Income/Poverty Ratio, N(%)** | | | |
| <100 % of FPL | 60 (15.5) | 115 (14.6) | 32 (16.6) |
| 100–199 % FPL | 66 (17.0) | 116 (14.7) | 41 (21.2) |
| >=200 % of FP | 229 (59.0) | 460 (58.2) | 83 (43.0) |
| Unknown | 33 (8.5) | 99 (12.5) | 37 (19.2) |
| **Self-reported health, N(%)** | | | |
| Excellent/very good | 213 (54.9) | 372 (47.1) | 81 (42.0) |
| Good | 104 (26.8) | 225 (28.5) | 60 (31.1) |
| Fair/poor | 71 (18.3) | 193 (24.4) | 52 (26.9) |
| **Had Usual Source of Healthcare, N(%)** | 322 (83.0) | 711 (90.0) | 187 (96.9) |
| **Insurance, N(%)** | | | |
| Private | 242 (62.4) | 477 (60.4) | |
| Public | 72 (18.6) | 238 (30.1) | |
| Uninsured | 74 (19.1) | 75 (9.5) | |
| **Race, N(%)** | | | |
| White | 202 (52.3) | 480 (61.2) | 135 (70.0) |
| Black | 66 (17.1) | 113 (14.4) | 11 (5.7) |
| Asian | 95 (24.6) | 155 (19.8) | 33 (17.1) |
| All other race groups | 23 (6.0) | 36 (4.6) | 14 (7.3) |
| **Immigrants, N(%)** | 63 (16.3) | 119 (15.1) | 15 (7.8) |
| **Educational level, N(%)** | | | |
| Less than high school | 60 (15.5) | 160 (20.3) | 62 (32.1) |
| High school | 103 (26.6) | 204 (25.8) | 56 (29.0) |
| Some college | 119 (30.7) | 224 (28.4) | 47 (24.4) |
| Bachelor or more | 104 (26.8) | 198 (25.1) | 28 (14.5) |

Source: Authors' analysis based on data from Medical Expenditure Panel Survey (2009-2010) and National Health Interview Survey (2008).

**Table 2.**

**The Odds Ratio (95% CI) in the Logistic Regressions**

| Age group | 41-49 | 51-74 | 76+ |
|---|---|---|---|
| N | 388 | 790 | 193 |
| Age | 0.44* (0.21-0.92) | 0.81 (0.54-1.23) | 1.12 (0.7-1.78) |
| Survey wave [a] | | | |
| 2008 | 1.00 (reference) | 1.00 (reference) | 1.00 (reference) |
| 2009/2010 | 7.16** (1.78-28.77) | 1.72 (0.80-3.72) | 0.57 (0.25-1.31) |
| 2010 | 17.09** (2.31-126.54) | 2.13 (0.71-6.35) | 0.53 (0.20-1.41) |
| Income/Poverty Ratio | | | |
| <100 % of FPL | 1.00 (reference) | 1.00 (reference) | 1.00 (reference) |
| 100–199 % FPL | 1.08 (0.46-2.55) | 1.14 (0.68-1.89) | 0.58 (0.22-1.57) |
| >=200 % of FP | 2.56 (0.85-7.74) | 1.02 (0.60-1.75) | 0.43 (0.14-1.29) |
| Unknown | 2.55 (0.57-11.31) | 0.60 (0.25-1.42) | 0.33 (0.08-1.43) |
| Self-reported health | | | |
| Excellent/very good | 1.00 (reference) | 1.00 (reference) | 1.00 (reference) |
| Good | 0.95 (0.35-2.62) | 0.95 (0.57-1.59) | 1.58 (0.58-4.31) |
| Fair/poor | 0.79 (0.42-1.48) | 0.84 (0.57-1.24) | 1.30 (0.56-3.03) |
| Usual Source of Care | | | |
| Yes | 1.11 (0.56-2.19) | 2.85* (1.61-5.06) | 1.80 (0.42-7.8) |
| No | 1.00 (reference) | 1.00 (reference) | 1.00 (reference) |
| Insurance [b] | | | |
| Private | 2.16 (0.76-6.14) | 1.26 (0.61-2.58) | |
| Public | 1.06 (0.23-4.79) | 1.64 (0.78-3.46) | |
| Uninsured | 1.00 (reference) | 1.00 (reference) | |

NOTE:

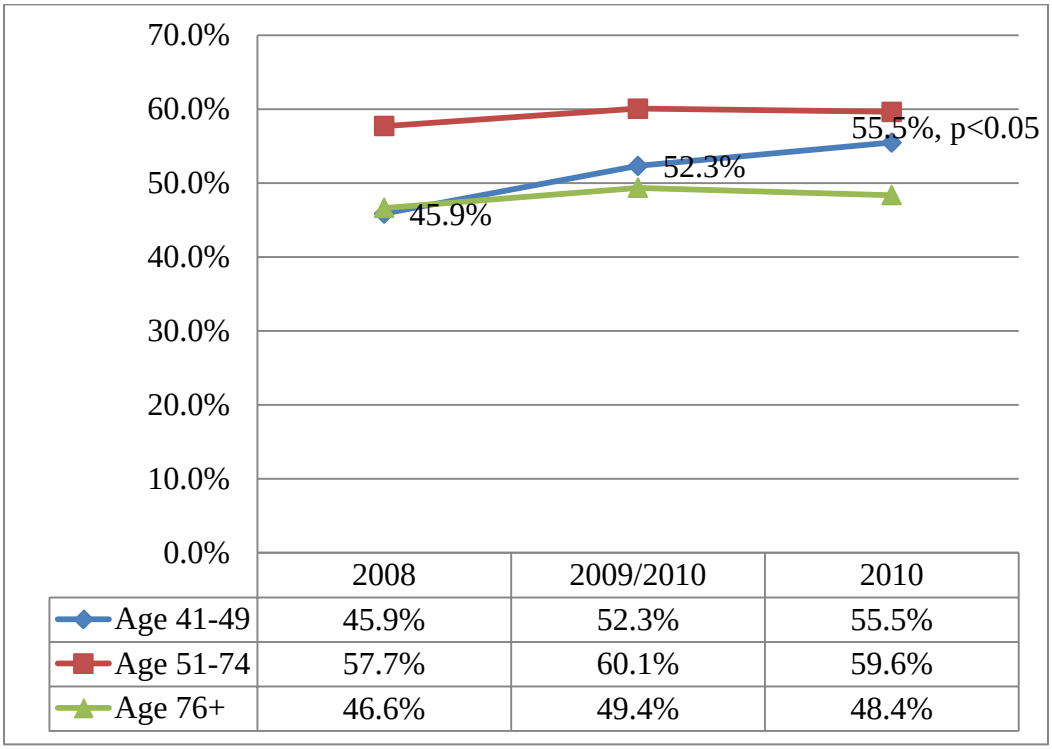
a. Women were first surveyed from January to October of 2008 in NHIS (Appendix Figure 1). They were later surveyed in the Panel 14 of MEPS, and mammography questions were asked in the round 3 and 5: from August 2009 to May 2010 and from August to December of 2010 (Appendix Figure 2).

b. Insurance status was not controlled in the analyses of the age group 76 years of older because most of them were Medicare beneficiaries during the study period.

Source: Authors' analysis based on data from Medical Expenditure Panel Survey (2009-2010) and National Health Interview Survey (2008).

**Figure 1.**

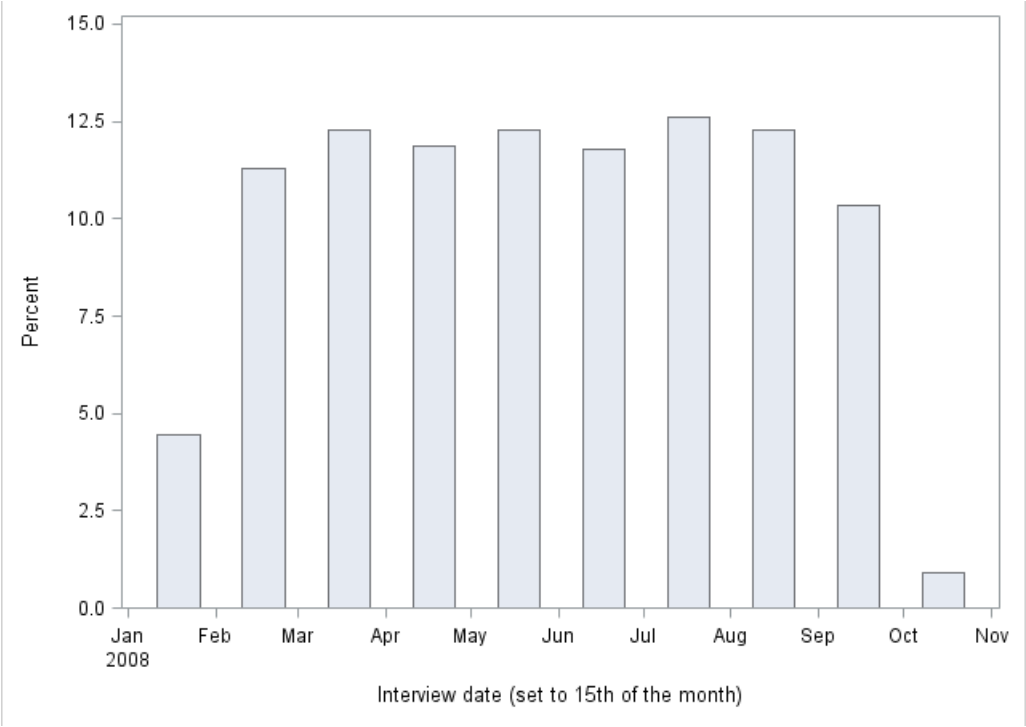
**Percentage of women reporting a past-year mammogram**



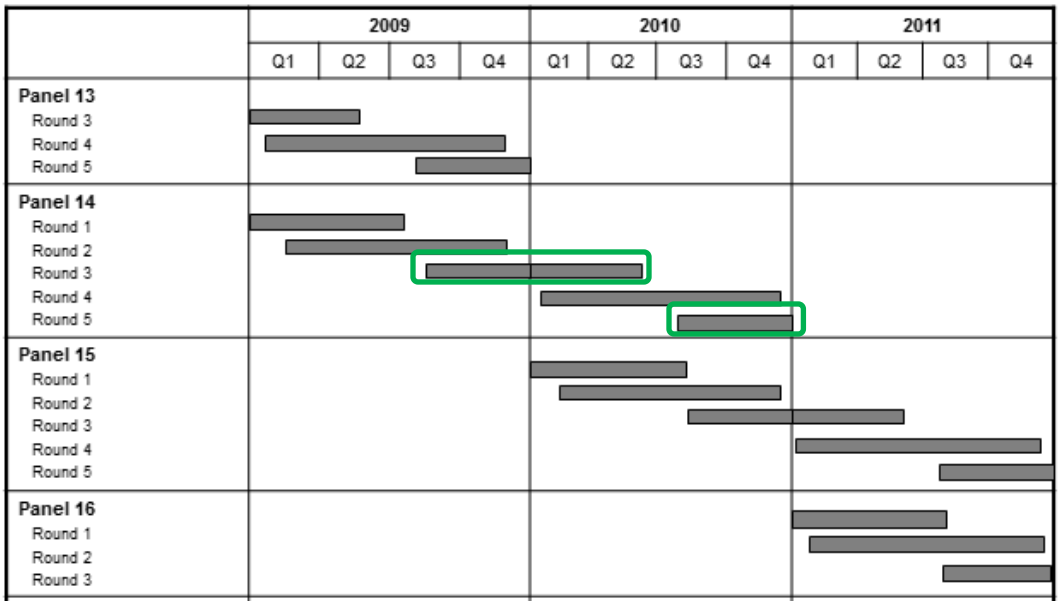

| | 2008 | 2009/2010 | 2010 |
|---|---|---|---|
| Age 41-49 | 45.9% | 52.3% | 55.5% |
| Age 51-74 | 57.7% | 60.1% | 59.6% |
| Age 76+ | 46.6% | 49.4% | 48.4% |

Source: Authors' analysis based on data from Medical Expenditure Panel Survey (2009-2010) and National Health Interview Survey (2008).

Appendix Figure 1. Interview dates of the 2008 survey (NHIS)




Appendix Figure 2. Interview dates of the 2009-2010 survey (MEPS)




Note: Mammography questions were asked in the third and fifth round of the Panel 14 (highlighted in green box )

Source: http://meps.ahrq.gov/survey_comp/hc_data_collection.jsp