FLORIDA INTERNATIONAL UNIVERSITY

Miami, Florida

# THE IMPACT OF THE AFFORDABLE CARE ACT ON CLINICALLY RECOMMENDED PREVENTIVE CARE SERVICES AMONG MEDICARE BENEFICIARIES 65 YEARS AND OLDER

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To: Dean Tomás Guilarte
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This dissertation, written by Michelle Fields, and entitled The Impact of the Affordable Care Act on Clinically Recommended Preventive Care Services Among Medicare Beneficiaries 65 Years and Older, having been approved in respect to style and intellectual content, it is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

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ABSTRACT OF THE DISSERTATION

THE IMPACT OF THE AFFORDABLE CARE ACT ON CLINICALLY RECOMMENDED PREVENTIVE CARE SERVICES AMONG MEDICARE BENEFICIARIES 65 YEARS AND OLDER

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Despite attempts at health reforms to increase the utilization of preventive care services among adults 65 and older, chronic conditions continued to prevail. Current health reforms eliminating cost-sharing aligned with clinically recommended preventive care services could effectively control avoidable chronic diseases and reduce mortality. This study aimed to assess the impact of the Affordable Care Act (ACA)'s removal of cost barriers and mandated coverage of grade A and B USPSTF (United States Preventive Services Task Force) preventive care services among adults 65 years and older on utilization of services. The study also explores whether the ACA provisions have reduced gaps in healthcare disparities associated with race/ethnicity and income. Data came from the Medical Expenditure Panel Survey (MEPS), a nationally representative survey that includes healthcare expenditures, utilization, payment sources, and insurance coverage among noninstitutionalized populations. The research sample was limited to

adults 65 years and older enrolled in Medicare's plan Part B. Respondent information for ten preventive care services was identified from 2006-2016 to assess differences before and after Medicare adopted the ACA's provisions on January 1, 2011. Post-ACA, the utilization rates among older adults increased for nine out of ten preventive services. We also found the alignment of Medicare coverage policy was consistent with seven out of eleven USPSTF clinically recommended grade A and B guidelines, but not for certain cancer screenings (breast, cervical, prostate, and colon). However, relevant inequities in healthcare utilization by race and income continue to exist among older Black men for colon and prostate screenings. Although the ACA has made significant improvements in accessing needed preventive services previously impeded by cost-sharing requirements, other factors contribute to the suboptimal utilization of recommended preventive services for adults 65 years and older.

TABLE OF CONTENTS

CHAPTER PAGE

CHAPTER I……1
Introduction…….....1
Significance of Dissertation……..…….....1
Study Purpose.....2
Research Questions.....5
Background and Theory.....7

CHAPTER II - Paper One……..…...23
Introduction…….....23
Literature Review.....28
Methods….....44
Preliminary Results.....58
Results.....60
Discussion….....72
Conclusion.....74

Chapter III – Paper Two…….....76
Introduction….....76
Literature Review.....79
Methods….....89
Preliminary Results.....103
Results.....107
Discussion….....119
Conclusion….....124

Chapter IV – Paper Three……....126
Introduction…….....126
Literature Review.....129
Methods….....143
Preliminary Results.....154
Results.....159
Discussion….....174
Conclusion….....183

REFERENCES.....149

APPENDICES.....175

VITA.....215

LIST OF TABLES

TABLE PAGE

1. Medicare Wellness Visit vs. Routine Physical and Office Visit…….9

2. Expected effects of ACA provision by Medicare characteristics…….....13

3. Medicare Part B coverage of Preventive Services…….....13

4. Differences in Medicare Part B coverage…….……16

5. Medicare beneficiary cost-sharing for Primary Care ……....17

6. USPSTF recommended preventive screenings for adults 65+……..48

7. Descriptive Characteristics of sample MEPS ……..….61

8. Descriptive Characteristics by Preventive services……...62

9. USPSTF definition of assigned letter grades (A, B, C, D, or I) ….……..74

10. Comparison of adherence vs. nonadherence to USPSTF guidelines…….97

11. Modified Comorbidity Index……...……...….175

12. CCI Descriptive……..…….176

13. Female 65+ Cancer Screening Preventive services…….177

14. Number of Women 65 + Cancer Screening Preventive services…….178

15. Number of Men 65+ Cancer Screening Preventive services.……...…...179

16. Adults 65 + and Influenza (Flu) Vaccine…….....180

17. Logistic Regression Medical Preventive Services……...…180

18. Logistic Regression for Cancer screenings …….....181

19. Logistic Regression Odds Ratio for All Cancer Related ….……..…..187

LIST OF FIGURES

FIGURE PAGE

1. The relationship between cost-waiving and access to preventive care.....11

2. Law of Supply and Demand – preventive care…….....…….…19

3. MEPS – pooled data 2006-2016…….….44

4. MEPS Medical Conditions file vs. MEPS Disease Diagnosis……...….53

5. Adjusted Predictive Margins for preventive care outcomes - 2006-2016…...65

6. UPSTF recommended preventive screenings – Pre & post ACA….....…...93

7. The ACA policy provisions- gaps in disparity……..128

8. CCI Index by Race ……155

9. Differences in receipt of preventive care services by Race/Ethnicity…...…138

10. Differences in receipt of preventive care services by income……...140

# CHAPTER I – INTRODUCTION AND BACKGROUND

## Introduction:

Current health reforms eliminating cost-sharing aligned with clinically recommended preventive care services could effectively control avoidable chronic diseases and reduce mortality. (Agirdas et al., 2018; Goodwin et al., 2012; Hamman et al., 2015; Lesser et al., 2011; Lissenden et al. 2017; Sabatino et al., 2012 Xu et al., 2020). It is particularly relevant among adults 65 years and older, whose health is most vulnerable to chronic conditions as they age.

In 2010, the Centers for Disease Control and Prevention (CDC), the Agency for Healthcare Research and Quality (AHRQ), and the Centers for Medicare and Medicaid Services (CMS) reported that less than half of adults ages 65 and older had received clinically recommended preventive care services (CDC, 2011). Despite the implementation in prior years of health reforms intended to increase the utilization of preventive care services among adults 65 and older to avoid incidence and improve health outcomes, chronic conditions continued to prevail (Ashkenazy et al., 2006; Haffer et al., 2003; Hoffman et al., 2007; Ward et al., 2017). The Title IV, Prevention of Chronic Diseases, and Improving Public Health, of the Affordable Care Act (ACA) aims to increase the use of preventive care services, recognizing that they are critical for older Medicare beneficiaries (Koh et al., 2010). One of the key facets of increasing access to these services was to remove financial barriers. (Title IV, section 4104).

Although the removal of financial barriers could help achieve increased access to preventive care services, the ACA also aimed to improve inconsistencies between Medicare's preventive care coverage policy and the United States Preventive Services Task Force (USPSTF) clinically evidence-based practice guidelines for grade A and B screenings. Nonadherence to USPSTF recommended clinical practice guidelines for adults 65 years and older could be a significant health policy concern leading to harm with false-positive results and unnecessary care or missed opportunities for treatment (Cooper et al., 2017; Han et al., 2015; Lesser et al., 2011; Xu et al., 2020).

Another objective of the ACA provision was to reduce gaps in health disparities found to impact health outcomes among vulnerable lower-income Medicare beneficiaries (Chen et al., 2007; Peek et al., 2007). Although cost is a significant barrier, other factors have been found to impact access to preventive care services, such as race/ethnicity, the type of insurance coverage, poverty status, and preexisting chronic health conditions (Adepoju et al., 2015; Card et al., 2008; Chung et al., 2018; Cunningham et al., 2017; Hamman et al., 2015; Li et al., 2017; Lissenden et al., 2017; Wan et al., 2015; Ward et al., 2017). Inequities in access to preventive care screenings among older Medicare beneficiaries can impact the well-being of those in marginalized communities.

Much of the controversy surrounding the ACA's cost-eliminating provision was the presumption of moral hazard in the overuse of unnecessary healthcare services (Dave et al., 2009; Tang et al., 2010). Moral hazard refers to the tendency of individuals to use more healthcare services when they bear a smaller share of the costs due to access to insurance. Insurance plans that reduce or eliminate cost-sharing will tend to produce

more moral hazard (Dave et al., 2009; De Preux et al., 2011; Einav et al., 2018; Finkelstein et al., 2011; Geyman et al., 2007; Mendoza et al., 2016; Newhouse et al., 1993). Thus, eliminating cost-sharing for Medicare beneficiaries with only Part B benefits is expected to increase the utilization of preventive care services due to increase in demand associated with the lower price faced by the individuals, but also due to moral hazard associated with a change in behavior that promotes overuse (prevention beyond the medically necessary).

This study will reexamine previous research on the effects of the ACA's cost-waiving benefit on the utilization of recommended preventive care services among adults 65 years and older (Jensen et al., 2015; Toseef et al., 2020). Both studies used the Medical Expenditure Panel - Household survey data (MEPS-HC) to assess the impact of the ACA on the utilization of preventive care services among older Medicare beneficiaries. MEPS is a nationally representative survey that collects data on healthcare utilization, expenditures, payment sources and insurance coverage among noninstitutionalized populations. Jensen et al. examined the early effects of the ACA before (2008-2010) and after (2012 only) its implementation. They found no significant association between preventive service use and cost-sharing elimination among older Medicare beneficiaries without supplemental insurance coverage. Toseef, et al. used MEPS-HC (2006-2016) survey data to examine the impact of the ACA's cost-waiving provision on the receipt of preventive care services among Medicare beneficiaries 65 years and older. They found only modest effects after the ACA cost-waiving provision was implemented. Reducing out-of-pocket, they concluded, should be only one of the

approaches considered as a means of improving the utilization rates of recommended preventive care.

This study aims to build on the limited existing data to identify the extent to which cost-sharing impacts or relates to access to preventive services among vulnerable adults 65 years and older (lower-income, without supplemental insurance coverage, or having one or more chronic conditions). Besides the recent study published by Toseef, et al., this will be the second known study to observe the extended effects of the ACA on utilization among Medicare beneficiaries by insurance type characteristics. While other researchers have analyzed only MEPS data to answer questions about cost-sharing and access to care among Medicare beneficiaries after the implementation of the ACA, this study incorporates analysis of the extent to which Medicare services align with USPSTF guidelines. It is beneficial to consider the USPSTF alongside the MEPS data in relation to the ACA and access to care. This study examines the long-standing (2006-2016) impact of the ACA's cost-waiving benefit (pre- and post-implementation) on the utilization of USPSTF clinically recommended preventive care services among Medicare beneficiaries 65 years and older. The hypothesis is that the relationship between cost-waiving and increased access to preventive care can result in increased utilization. It can also improve Medicare's policy alignment with USPSTF grade A and B recommendation and decrease gaps in disparities (Figure 1).

Unlike previous studies, this research will include controls for total healthcare expenditures, total out-patient office visits, source of payment, and whether one or more chronic conditions exist, which are not included in either Jensen's or Toseef's study

analysis. Vulnerable Medicare-only (e.g., lower-income and without supplemental coverage) beneficiaries are expected to experience the most significant impact since the majority of Medicare Advantage and private health plans already included some coverage for these services (Table 2).

Through the impact of the ACA cost-waiving provision, this study examines the validity and relevance of moral hazard in healthcare reform. It determines the effects of the cost-waiving benefit for unnecessary or overuse of preventive care services not clinically recommended among Medicare beneficiaries 65 years and older. The aim is to compare previously reported study effects of waiving health insurance cost-sharing for preventive services (e.g., RAND HIE; Oregon Health Insurance Experiment). This will be achieved by evaluating the impact of the ACA's cost-waiving provision on the utilization of preventive care services using a pooled (2006-2016) nationally represented survey data ((MEPS). Medicare enrollees 65 years and older with different insurance type characteristics (Medicare-only, Medicare Advantage, Medicare + Private, Medicare + Medicaid) are compared for measured differences in the utilization of clinically recommended preventive services before (2006-2010) and after (2012-2016) the implementation of the ACA provision on January 1, 2011.

The most significant study limitations include using self-reported responses within MEPS data and the inability to measure the receipt of these services during the Welcome-to-Medicare Visit or Medicare's Annual Wellness Visit.

This research will answer three questions:

1) Has the ACA's cost-waiving provision impacted the utilization rates of USPSTF clinically recommended preventive care services among all Medicare beneficiaries 65 years and older? This study hypothesizes that the ACA's requirement for cost-waiving has led to an increase in the utilization rates of USPSTF grade A and B clinically recommended preventive care services among Medicare beneficiaries 65 years and older.

2) Has the ACA improved the alignment of Medicare's preventive care service coverage policies with USPSTF grade A and B clinically recommended practice guidelines among adults 65 years and older? This study hypothesizes that the ACA provisions have improved inconsistencies between Medicare's preventive care policy coverage and USPSTF grade A and B clinically recommended practice preventive care services guidelines among adults 65 years and older.

3) Has the ACA's cost-waiving provision improved gaps in health disparities among Medicare beneficiaries 65 years and older? This study hypothesizes the ACA's cost-waiving requirement has improved utilization rates and adherence to clinically recommended Preventive care services. It has reduced gaps in health disparities associated with race/ethnicity and income among Medicare beneficiaries 65 years and older with different insurance type characteristics.

The dissertation will consist of three papers. Paper One (Chapter II) will examine trends in the utilization rates of age-specific clinically recommended preventive care

services among Medicare beneficiaries 65 years and older before and after adopting the ACA cost waiving provision. These include USPSTF grade A and B clinically recommended preventive care practice guidelines for adults 65 years and older. Paper Two (Chapter III) will observe whether the ACA cost elimination and coverage of evidence based USPSTF clinically recommended preventive services provision has improved alignment with Medicare's Preventive care service coverage policy. Paper Three (Chapter IV) will explore whether the ACA's cost waiving provision has reduced gaps in health disparities among vulnerable Medicare beneficiaries 65 years and older in receipt of clinically recommended preventive services.

Background and Theory:

The 2010 Patient Protection and Affordable Care (PPACA) and the Health Care and Education Reconciliation Acts (H.R.4872) are jointly known as the ACA. The ACA was to shift the focus from the treatment of diseases to disease prevention with value-based reimbursement measures.

As of September 23, 2010, the ACA required all non-grandfathered group health plans (operational before March 23, 2010), defined as individual private plans, to begin coverage for the Ten Essential Health Benefit categories (Office of the Insurance Commissioner, Washington State). The categories include ambulatory care, patient services, emergency services, hospitalization, maternity, newborn care, mental health services, substance abuse treatment, prescription drugs, rehabilitative care services, laboratory services, preventive and wellness services, chronic disease management, and

pediatric services (including vision and dental) described in 45 CFR 147.130 (Section 2713, as the Public Health Service Act (PHS Act), amended by the ACA enactment).

In conjunction, Medicare was required to eliminate cost-sharing for USPSTF clinically recommended preventive services by January 1, 2011 (Title IV, Section 4104). These preventive services included evidence-based screenings and services that have a rating of "A" (strongly recommended) or "B" (recommended), based on current guidelines from the United States Preventive Services Task Force (USPSTF). Immunizations for routine use in adults are also covered under preventive services and recommended by the Advisory Committee on Immunization Practices of the Centers for Disease Control and Prevention (ACIP).

The USPSTF recommends clinical practice guidelines that influence policymakers and providers and impact insurers' reimbursement decisions (e.g., Medicare). It was created in 1984 and is an independent group made up of 16 national experts (mostly primary care physicians) appointed every four years. Recommendations made by the USPSTF are independent of the U.S. Government. Although it is an independent and volunteer body, it's convened through the AHRQ and regularly reports to Congress. Since 1988, the AHRQ has been authorized by Congress to convene the USPSTF and provide ongoing scientific, administrative, and dissemination support, and each year, the USPSTF provides reports to Congress that identify critical evidence-based gaps in research related to clinical preventive care services and also recommends priority areas that deserve further examination (USPSTF, 2012). The USPSTF has sole responsibility for reviewing the evidence-based studies provided by the AHRQ when

making policy recommendations for best clinical practice. These services are recommended with a grade "A" or "B" when there is high certainty that the net benefit will be moderate to substantial and include age-specific screening intervals or frequency guidelines.

Similarly, the ACIP also has an advisory committee that guides the effective control of vaccine-preventable diseases in the U.S. population. It was established in 1964 and recommends routine immunization (e.g., influenza) schedules for age-appropriate populations. The ACA cost-waiving provision, along with aligning Medicare with recommended evidence-based clinical practice guidelines (Table 2: complete list of clinically recommended USPSTF grade A and B preventive care services for adults 65 years and older), has led to an essential change in health reform that could enhance care coordination, improve health outcomes, and potentially save Medicare millions in unnecessary healthcare expenditures (Cubanki et al., 2018; Skinner et al., 2016).

The ACA eliminated cost-sharing for clinically recommended preventive services and created new innovative delivery care models to increase Medicare beneficiaries' access to these services. The one-time Welcome-to-Medicare Visit (WMV) and the ACA's introduction of the Annual Wellness Visit (AWV) provide opportunities to align best clinical practice guidelines with improved quality of care (Table 1). Both visits are cost-free and allow Medicare beneficiaries access to primary care providers (PCP) to develop and update a personalized prevention plan based on current health and risk factors. While the WMV is a complete physical exam, the AWV was developed as an intervention to ensure access to evidence-based and "medically necessary" clinically

recommended screenings and vaccines. The AWV includes baseline measures for cognitive, functional assessments, and health risk factors. The patient completes a self-reported health risk questionnaire, and the provider reviews medical and medication history and chronic medical conditions and then provides a written personalized plan of care.

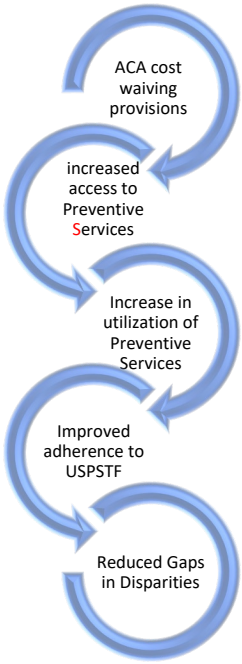
Table 1: Medicare Wellness Visit vs. Routine Physical and Office Visit

| **Medicare Wellness Visit** | | | **Routine office visit/exam** |
|---|---|---|---|
| **Welcome to Medicare visit*** | **Annual wellness visit (AWV)** | **Preventive physical exam** | **Evaluation and management visit** |
| Medicare pays 100%. Covered only once in a lifetime; must be provided within the first 12 months of patient's enrollment in Medicare. | Medicare pays 100%. Initial AWV covered 12 months after enrollment in Medicare or 12 months after the Welcome to Medicare visit. Subsequent AWVs may be provided annually. | Not covered by traditional Medicare but may be covered by Medicare Advantage plan; provided at patient's request. | Subject to the patient's deductible/coinsurance/co-pay. |
| A focused physical exam, review of the patient's health, and development of a plan to keep the patient healthy. Not a comprehensive, "head- to-toe" physical. | A focused physical exam, review of the patient's health, and development of a plan to keep the patient healthy. Not a comprehensive, "head-to- toe" physical. | A comprehensive, not focused, "head-to-toe" physical exam. | A problem-oriented visit; may be described by patient or physician as follow-up appointment or recheck. |

Although AWV's are currently underutilized, they might be a good idea since this intervention aims to slow down the progression of chronic diseases with strategies targeted to improve the senior population's health. It could also allow both the provider and patient to focus on health risks that can impact the quality of life and are modifiable. The intent is to promote healthy lifestyles and improve the quality of care while simultaneously addressing the financial burden Medicare expenditures have on the U.S. Economy (NHE 2019).

Although not covered in this research, it is worth noting that ACA provisions' focus on Medicare beneficiaries also offer opportunities to implement innovative strategies to improve health services delivery and increase utilization of preventive care services. These include physician financial incentives, value-based reimbursement payment models (e.g., Patient-Centered Medical Homes and Accountable Care Organizations), the increased geographical capacity of primary care providers in underserved areas, and a continuous evaluation of community-based preventive services.

Figure 1: The relationship between cost-waiving and access to preventive care




Prior to the ACA cost-waiving provision, adults 65 years and older with Medicare-only coverage had access to healthcare, but barriers continued to exist in receiving preventive care services. These barriers were associated with not having an established relationship with a healthcare provider, transportation, wait times, and out-of-pocket costs that can be a burden for some lower-income Medicare beneficiaries who cannot afford supplemental insurance (Blustein et al., 1995; Carrasquillo et al., 2001; Diamant et al., 2004; Gross et al., 1999; Okoro et al., 2005). Because of these barriers, some adults 65 and older made decisions on types of Medicare health plan coverage that included characteristics advantageous to the beneficiary's perceived health risk level (such as cost-waived preventive care) and many opted for some supplemental coverage (Table 3).

Medicare beneficiaries aged 65 years and older are automatically eligible for Part A insurance (e.g., hospital care) if they or their spouse worked and paid Medicare taxes for at least ten years. Coverage under Part B (out-patient services) is optional and usually includes a monthly premium and a 20% deductible. Supplemental private insurance comes from either retiree benefits or can be purchased under Medigap. It covers cost-sharing under Part B. Other insurance options come from Medicare Advantage (MA) or Part C (e.g., HMO, PPO) contracts with private plans to provide Part A and Part B benefits. The beneficiary has the option of choosing an integrated insurance plan which usually includes prescription coverage and additional services (e.g., vision, dental). All MA plans are different, so the premium cost depends on the coverage level (Table 4 & 5). One of the many benefits of MA plans is not being susceptible to additional risk-related cost-sharing.

As of 2014, more than 30% of adults 65 years and older are enrolled in a managed care plan, up from 16% in 2006 (Davis et al., 2015). In 2018, 94.1% of adults 65 years and older were covered by a public plan (Medicare), and 52.4% had private insurance coverage. An estimated 6% had military-based health insurance, and Medicaid covered around 6%, but 1% of this subpopulation remains uninsured (ACL, 2020). Within the same year, the average out-of-pocket annual healthcare expenditures were $6,802 (up 48% since 2008) compared to the total population average of $4,968. Older Adults also spent 11.9% of their total expenditures on health compared to 8.1% of the total population's average. Enrollment in private plans has increased since Medicare's Modernization Act of 2003, allowing managed care plans to expand coverage to include

prescription drugs, preventive health services, and other added benefits such as vision and dental procedures (CMS., 2018).

**Table 2: Expected effects of ACA Cost waiving provision on receipt of preventive care services for adults 65 and older, by Medicare characteristics:**

| *Types of Medicare plans | Increase Utilization of preventive services | Increase adherence to USPSTF Grade A and B | Reduce Gaps in Disparities |
|---|---|---|---|
| **Medicare only** | **X** | **X** | **X** |
| **Medicare + any private** | | **X** | **X** |
| **Medicare + Medicaid HMO** | | **X** | **X** |
| **Medicare Advantage Care** | | **X** | **X** |
| **Uninsured** | | | |

***except for non-grandfatherly plans – before 2010**

Table 3 Medicare Part B Coverage of Preventive Services

| Medicare Part B coverage of Screenings including those Not Recommended USPSTF GRADE A or B for Adults > 65 | | | | |
|---|---|---|---|---|
| Type of Screening | USPSTF RECOMMENDED | Cost-waived - Pre ACA | Coverage Frequency | Cost -Waived Post ACA |
| Abdominal aortic aneurysm screening | ✓ | NO | 1-time only | YES |
| Alcohol misuse screenings & counseling | ✓ | NO | Once a year | YES |
| Bone mass measurements (bone density) | ✓ | YES | Every two years | YES |
| Cardiovascular disease screenings | ✓ | NO | Every five years | YES |
| Cardiovascular disease (behavioral therapy) | ✓ | NO | Once a year | YES |
| Cervical & vaginal cancer screening | ✓ | YES | Every two years, if high risk Annually | YES |
| Colorectal cancer screenings:<br>Multi-target stool DNA tests<br>Screening barium enemas<br>Colonoscopies<br>Fecal occult blood tests<br>Flexible sigmoidoscopies | ✓ | YES | <br>Every three years<br>Every four years<br>Every ten years or three years if high risk<br>Every 12 months<br>Every four years | YES |

| | | | | |
|---|---|---|---|---|
| Depression screenings | ✓ | NO | Annually | YES |
| Diabetes screenings | ✓ | YES | Two screenings each year if high risk | YES |
| Diabetes self-management training | ✓ | NO | 10 hrs. of initial diagnosis, 2 hrs. a year follow-up. | NO – 20% DEDUCTABLE |
| Hepatitis B shots<br><br>Hepatitis B Virus (HBV) infection screening | ✓ | NO | If high risk and have diabetes, renal end-stage or have come in contact | YES |
| Flu shots<br><br>Hepatitis B shots<br><br>Pneumococcal shots | ✓ | YES<br><br>NO<br><br>YES | Annually<br><br>1-time if high risk | YES<br><br>YES<br><br>YES |
| Hepatitis C screening test | ✓ | NO | 1-time if high risk | YES |
| HIV screening | ✓ | NO | Once a year up to age 65 | YES |
| Lung cancer screening | ✓ | NO | Annually if meeting high-risk conditions | YES |
| Mammograms (screening) | ✓ | YES | Every 12 months – women over 40. Diagnostic screening 20% copay | YES |
| Prostate cancer screenings<br><br>PSA<br><br>Digital Rectal Exam | | <br><br>YES<br><br>NO | <br><br>PSA test annually<br><br>Digital rectal exam 20 % co-deducible and copay required | <br><br>YES<br><br>NO |
| Sexually transmitted infections screening & counseling | | NO | | YES |
| Obesity screenings & counseling | ✓ | NO | BMI>30 | YES |
| Nutrition therapy services | ✓ | NO | diabetes or kidney disease, or you've had a kidney transplant in the last 36 months. | YES |
| Glaucoma tests | | NO | Annually | NO – 20% DEDUCTABLE |
| Tobacco use cessation counseling | ✓ | NO | Covers 8 visits Annually | YES |

| | | | | |
|---|---|---|---|---|
| One-time “Welcome to Medicare” preventive visit | | YES | 1-time visit within 12 months of initial Medicare enrollment | YES |
| Yearly "Wellness" visit | | N/A | Annually | YES |

Older adults have generally always paid higher out-of-pocket costs due to increased needs for healthcare services as they age. Most recently, CMS reported that out-of-pocket spending grew 4.6% to $406.5 billion in 2019, or 11% of the total U.S. National Health Expenditures. In 2006 adults 65-84 years old spent an estimated $466,239 million in out-of-pocket costs, increasing to $678,910 million in 2014. Adults 85 years and older spent $140,988 million in 2006 and $202,161 million in 2014 (CMS., 2021).

Cost-sharing or out-of-pocket cost was initially designed to discourage “nonessential” healthcare services and reduce escalating Medicare expenditures. Continuous debates surrounding cost-sharing for preventive healthcare services stem from the economic theory that cost-free healthcare will encourage “moral hazard” (Dave et al., 2009; Einav et al., 2011) among specific populations, such as the elderly, a significant demographic group in the United States (U.S.). Conventionally this theory maintains that waiving any cost-sharing would impose detrimental effects, adversely increasing demand and resulting in overconsumption of care, waste and, ultimately, a decline in societal welfare.

Table 4: Differences in Medicare Part B Coverage

| | Original Medicare | Original Medicare with Supplemental Insurance (*Medigap A, B, C, D, F, G, K, L, M, N) | Medicare Advantage | Medicare/Medicaid |
|---|---|---|---|---|
| Costs | Part A and Part B costs, including monthly Part B premium paid to Government Sponsored/Medicare<br><br>20% coinsurance for Medicare-covered services after meeting the deductible. | Only eligible with Traditional Medicare, not with Medicare Advantage. Choice of high to lower deductibles dependent on coverage. Most plans (excludes K, L) cover 100% of coinsurance for Part B services after Medicare Part B deductible has been paid.<br><br>Some plans pay Medicare deductible, copays, and co-insurance<br><br>(C and F) but are no longer available to new beneficiaries as of 1/1/20. | Part A and Part B costs, including monthly Part B premiums paid to Private Insurance via Medicare. Cost-sharing for premium, deductible, or coinsurance varies depending on the plan.<br><br>Usually, pay a copayment for network care.<br><br>Plans may charge a monthly premium in addition to Part B premium. | Medicaid pays Medicare premiums and cost-sharing expenses and provides expanded benefits, including long-term care.<br><br>Traditional Medicare and Medicare Advantage both eligible.<br><br>Medicare Savings Programs (MSPs). MSPs cover costs such as Part A premiums and Part A and B deductibles, coinsurance, and copayments, depending on the program. |
| Supplemental insurance | Have the choice to pay an additional premium for Medigap to cover Medicare cost-sharing. | n/a | Cannot purchase a Medigap policy. | n/a |
| Provider access | Can see any provider and use any facility that accepts Medicare (participating and non-participating). | Can see any provider and use any facility that accepts Medicare (participating and non-participating) | Usually, can only see in-network providers (e.g., HMO, PPO) | Can see any provider and use any facility that accepts Medicare (participating and non-participating). |
| Referrals | Do not need referrals for specialists. | Do not need referrals for specialists. | Need referrals for specialists. | Do not need referrals for specialists. |
| Drug coverage | Medicare D at additional cost- $6,350 out-of-pocket in 2020, you're out of the coverage gap | Some plans | the plan provides prescription drug coverage (you may be required to pay a higher premium). | Medicare Part D premiums, deductibles, and other cost-sharing for prescription drugs up to a state benchmark is covered. Beneficiaries pay lower copays, and those eligible for Low-Income Subsidy (LIS) program sharing |
| Other benefits | Does not cover vision, hearing, or dental services. | Hospital deductible - Skilled nursing facility coinsurance, Part B deductible Emergency care outside the U.S., At-home recovery, Preventive care that Medicare does not cover, Excess physician's charges | May cover additional services, including vision, hearing, and/or dental (additional benefits may increase your premium and/or other out-of-pocket costs). | Long term care |
| Out-of-pocket limit | No out-of-pocket limit | No out-of-pocket limit | Annual out-of-pocket limit = $6,700 | $0 if under 100% poverty line or no capped 5% of total family annual income |
| Vaccination Coverage | Medicare Part B covers influenza, Pneumonia shots, | Cannot have Medicare Part D if Medigap | Medicare Advantage | Medicare Part B covers influenza, Pneumonia |

| | | | | |
|---|---|---|---|---|
| | Hepatitis B (only if at high risk) but does not cover Tdat (protects against tetanus, diphtheria, and pertussis (whooping cough)), Shingles or meningitis (high mortality rate – sepsis) –covered only if Medicare Part D for an additional cost | supplemental covers Prescription<br><br>Medicare Part B covers Influenza, Pneumonia shots, Hepatitis B (only if at high risk) but does not cover Tdat (protects against tetanus, diphtheria, and pertussis (whooping cough)), Shingles or meningitis (high mortality rate – sepsis) –covered only if Medicare Part D for an additional cost | usually covers all vaccines | shots, Hepatitis B (only if at high risk) but does not cover Tdat (protects against tetanus, diphtheria, and pertussis (whooping cough)) Shingles or meningitis (high mortality rate – sepsis). Other vaccines covered at lower or no costs with Medicare Part D |

* Medigap 10 plans. F covers similar to MA plan (C & F no longer available for beneficiaries eligible after 1/1/2020.

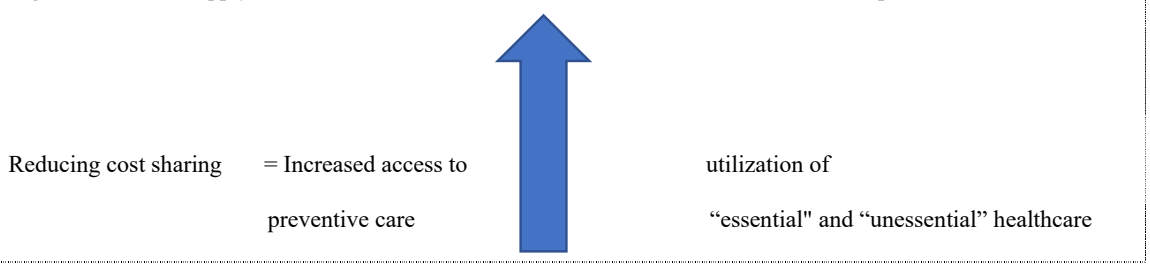
Table 5: Medicare beneficiary cost-sharing for Primary Care

| Insurance | Cost-sharing/per Visit | Maximum Out of Pocket | ACA Safety Net –Annual Wellness Visits |
|---|---|---|---|
| Medicare only | 20% co-insurance after reaching deductible ($185) | No cap | Cost waived |
| Medicare Advantage | Maximum Copay $4. 10%-20% co-insurance. The total amount of premiums and cost-sharing incurred by all individuals in a Medicaid household may not exceed 5% of the family's monthly or quarterly income. | $6,700 in-network, $10,000 out of network | Cost waived |
| Private | Premium variations - insurance. Higher fees out of pocket | Individual - $7,900/per year | Cost waived |

The 1972-1982 RAND Health Insurance Study (HIS) and the 2008 Oregon Experiment were landmarks in cost-sharing experimental studies that addressed the economic theory that cost-free healthcare services will cause "moral hazard" and increase unnecessary healthcare utilization. Both examined the effects of expanded insurance coverage and cost-sharing on health service use, quality of care, and health outcomes.

Reducing cost-sharing was found to increase essential and unessential health services without impacting the quality of care or causing adverse health outcomes. These findings provide the framework for predicting the effects of health policy reforms on National and State policies (Finkelstein et al., 2012; Newhouse et al., 1993). Opposing research found the value of "moral hazard" consumption three times greater than its costs. Due to cost-sharing changes, income transfer effects may dominate the price effects of increased healthcare services utilization (Figure 2). Ultimately waiving cost-sharing can be positive because it increases essential or necessary care but can also have unintended detrimental effects when unnecessary services are provided or overutilized (Chernew et al., 2008; Nyman et al., 2003).

**Figure 2:** Law of Supply and Demand – **Moral Hazard** of health insurance in the case of preventive care:




The moral hazard effects of cost-free healthcare can have positive outcomes if it increases the use of necessary preventive care services among older adults sought in this research. The purpose of this study is to determine if moral hazard has effectively increased the demand for clinically recommended preventive care services. The purpose is also to determine if Medicare has improved alignment with USPSTF clinically recommended grade A and B practice guidelines and reduced the overutilization of

unnecessary screenings for adults 65 years and older. This study will also note moral hazard effects have increased the demand for Preventive care among vulnerable populations, thus reducing gaps in disparities.

Despite concerns about eliminating cost-sharing and due to moral hazard effects, the increasing number of chronic conditions associated with age and early mortality prompted Congress to initiate mandated preventive services coverage reforms (ACA, 2010). These reforms, designed to relieve some of the financial barriers associated with receiving certain recommended preventive services, benefit older adults. Investing in prevention would also help curb skyrocketing Medicare costs associated with avoidable hospital and ER visits.

During the 1990s, the Balanced Budget Act (BBA) expanded access to certain preventive services with reduced cost-sharing (deductible only) for mammograms and pap smears. By 2000, the Benefits Improvement and Protection Act (BIPA) expanded mammograms and pap smears coverage from once every three years to two years. The provision also added coverage for glaucoma screenings, colonoscopy screenings, and medical nutrition therapy services for diabetes and renal disease beneficiaries. However, the effectiveness of these prior health reforms in improving access to preventive services among senior Medicare beneficiaries was unknown.

In 2002 Congress requested the U.S. General Accountability Office (GAO) to identify what actions CMS had taken to increase the use of preventive services among the Medicare population. Furthermore, it was to provide evidence-based reports examining

the extent to which Medicare beneficiaries used these newly covered preventive services (under the BBA and BIPA). Although beneficiaries were found to be more likely to receive at least one covered preventive benefit, few received additional preventive services under Medicare. For example, of the 91% of female Medicare beneficiaries who received at least one preventive service, only 10% of those beneficiaries were screened for cervical, breast, and colon cancer or received vaccinations against flu and pneumonia. Of the 44% of males receiving the flu and pneumonia vaccine, only 27% were found to have received a colorectal screening (GAO-02-422).

Differences in access to healthcare among certain sociodemographic populations was also evident. The GAO found evidence that preventive services varied widely for an individual by state (most states had higher screening rates for breast and cervical cancer than for colorectal screens). Disparities in access was also found to be associated with demographic characteristics such as race/ethnicity (Blacks are less likely to receive recommended vaccines or screenings than all other ethnic groups; Pneumococcal Vaccine 37% vs. 57% and Influenza Vaccine 37% vs. 70%). There were also differences based on income, and education. Overall findings concluded that current utilization of preventive care services among Medicare beneficiaries was minimal, with 30% not receiving the influenza vaccination and 37% never having a pneumococcal vaccination, as recommended under current guidelines for people aged 65 years and older. The GAO also concluded that most Medicare beneficiaries were unaware of the health benefits associated with clinically recommended preventive care services (GAO-02-777T).

Congresses' continued efforts to help promote and improve access to preventive care prompted the 2003 Medicare Modernization Act (MMA), which introduced the Welcome-to-Medicare benefit for new enrollees within six months of initial enrollment. The prescription drug benefit Medicare Part D was also added to improve medication access and close the coverage gap. Medicare Advantage plans (Medicare Part C) were also redesigned to allow private competition and expanded to include prescription benefits.

Before the ACA implementation, one of the last attempts to improve health reform and increase access to preventive care was the 2008 Medicare Improvement for Patients and Providers Act (MIPPA) reform, which expanded the initial MMA one-time Welcome-to-Medicare visit from six to twelve months. It focused on improving access to preventive care by requiring Medicare to extend clinically recommended preventive services to include bone density screening and addressed renal end-of-life disease with increased outreach and education programs to promote awareness. State grant funding was also implemented to provide outreach and assistance to lower-income Medicare beneficiaries to access benefit programs that help lower the costs of their Medicare premiums, deductibles, and prescriptions (Public Law 110–275—July 15, 2008).

In the years preceding the implementation of the ACA, a variety of policy changes were introduced intended to address access and coverage gaps for Medicare beneficiaries. Although these prior reforms provided the preliminary steps needed to promote preventive care, they had no significant impact on improving access to preventive services, aligning Medicare preventive coverage policy with clinically recommended guidelines, or reducing gaps in health disparities. Disparities in access to

care continued among vulnerable populations leading to significant inequities in care. The ACA cost-waiving intervention attempts to address these concerns.

# CHAPTER II – PAPER ONE

## The effectiveness of the Affordable Care Act on improving the utilization of USPSTF grade A and B clinically recommended preventive care services among Medicare beneficiaries 65 years and older.

### Introduction:

Legislation promoting access to clinically recommended preventive healthcare services can prolong life expectancy and improve the quality of care for adults 65 years and older (Farley et al., 2010; Maciosek et al., 2010; Satcher et al., 2010). However, underutilization of clinically recommended preventive care services continues to be a significant public health concern. This is especially relevant among the elderly population who are disproportionately vulnerable to illness and certain chronic diseases (Bagatini et al., 2018; Castle et al., 2000; Weyand et al., 2016).

Some of the most common chronic diseases for adults 65 years and older include hypertension, high cholesterol, ischemic heart disease, diabetes, chronic kidney disease, and chronic obstructive pulmonary disease (CDC., 2020). Between 50,000-100,000 deaths per year for adults 65 years and older could be prevented through optimal use of clinically recommended preventive services (Farley et al., 2010; Maciosek et al., 2010; Satcher et al., 2010). In 2020 the Centers for Disease Control and Prevention (CDC) reported that over 80% of adults 65 years and older have at least one chronic condition, and 77% have at least two (CDC., 2020). Within the same year, the Centers for Medicare & Medicaid Services (CMS) reported that more than two-thirds of Medicare's FFS beneficiaries have two or more chronic conditions, and 37% have four or more chronic

conditions. Those with two or more chronic conditions accounted for 93% of Medicare spending in 2010 and identified increases in comorbidities with age (CMS 2020).

Before the 2010 Affordable Care Act (ACA), access to preventive care for clinically recommended preventive screenings was unavailable to some older Medicare beneficiaries. Office visits and services were susceptible to the 20% co-deductible, additional diagnostic costs, and costly copays, known to broaden gaps in health disparities contributing to existing financial barriers (Adepoju et al., 2015; Chen et al., 2006; Griffith et al., 2017). Historically, Medicare Part B enrollees (Medicare-only) were required to pay more when seeking preventive care, a trend exemplified by increases in premiums, deductibles, and copayments. Lower or waived cost-sharing (copays) are typical of Medicare Advantage and some private insurance plans. Medicare beneficiaries with supplemental health insurance are likely to have higher utilization rates of certain preventive services than those with Medicare-only (Carrasquillo et al., 2001; Landon et al., 2004; Misra et al., 2018; Sloan et al., 2012).

Previous research has examined the impact of cost-sharing on the utilization of clinically recommended preventive care services (Finkelstein et al., 2011; Liang et al., 2004; Rezayatmand et al., 2013; Solanki et al., 1999; Trivedi et al., 2008). Some research demonstrates that higher cost-sharing can adversely impact older, lower-income Medicare beneficiaries who may forgo needed preventive care services due to financial constraints (Chandra et al., 2010; Meeker et al., 2011; Rice et al., 2004). Others have found barriers to access associated with the beneficiary's type of insurance coverage characteristics, resulting in lower utilization rates of preventive services amongst these

groups (Adepoju et al., 2015; Baicker et al., 2004; Chen et al., 2007; Chou et al., 2007; Fox et al., 2007; Griffin et al., 2017; Moy et al., 2008; Peek et al., 2007).

Congress has made previous attempts to promote the utilization of preventive services for adults 65 years and older. Over the last three decades, there have been health policy endeavors to improve access, such as the 1997 Balanced Budget Act (BBA), the 2003 Medicare Modernization Act (MMA), and the 2008 Medicare Improvement for Patients and Providers Act (MIPPA). They introduced limited cost-waiving (deductible only) provisions to expand coverage, increasing access to cancer screenings (breast cancer, cervical cancer, colon cancer, and prostate cancer screenings) and screening for osteoporosis (bone density). The MIPPA provision also implemented interventions such as the one-time physical (Welcome-to-Medicare visit) for newly eligible enrollees within the first six months, outpatient self-management education, and diabetes management. Unfortunately, partial cost-waiving, limited to specific screenings, was found to have minimal impact on increasing the utilization of clinically recommended preventive care services (Augustus et al., 2018; Flowers et al., 2013; Goodwin et al., 2012; Hamman et al., 2015; Wan et al., 2015; Ya-Chen et al., 2006; Xu et al., 2020). Although prior health reforms eliminated some cost-sharing for certain preventive services, most Medicare beneficiaries were still susceptible to out-of-pocket costs and perceived economic burdens.

In 2011, the Affordable Care Act (ACA) addressed perceived shortfalls of previous legislation related to costs and access. Title IV of the Act removed financial barriers associated with receiving Medicare's clinically recommended preventive services

(Section 4104 - Removal of barriers to preventive services in Medicare). The Centers for Medicare and Medicaid Services (CMS) also improved service delivery by expanding the initial Welcome-to-Medicare Visit enrollee timeline from six to twelve months and introducing the Annual Wellness Visit. The Medicare Annual Wellness visit, according to CMS, provides a forum for coordinated care, separate from other billable services (Title 42 CFR 410.15.). Annual Wellness Visits (AWV) not only increase access to Preventive care services, but are also associated with reducing gaps in health disparities attributed to income and race (Adepoju et al., 2015; Buchmeller et al., 2016; Chen J et al., 2017; Chung et al., 2015; Lissenden et al., 2017; NCI-AA., 2021; Wan et al., 2015).

Current research has observed a significant association between Medicare beneficiaries participating in cost-free Annual Wellness Visits with increases in certain USPSTF recommended clinical preventive services (Camacho et al., 2017; Fox et al., 2015; Han et al., 2015; Jiang et al., 2018; Misra et al., 2018; Shen et al., 2017). The USPSTF recommends clinical practice guidelines that influence policymakers and providers and impact insurers' reimbursement decisions (e.g., Medicare). It was created in 1984 and is an independent group made up of 16 national experts (mostly primary care physicians) appointed every four years. Recommendations made by the USPSTF are independent of the U.S. Government. Although it is an independent and volunteer body, it's convened through the AHRQ and regularly reports to Congress. Since 1988, the AHRQ has been authorized by Congress to convene the USPSTF and to provide ongoing scientific, administrative, and dissemination support. Each year the USPSTF provides reports to Congress that identify critical evidence-based gaps in research related to

clinical preventive care services and also recommends priority areas that deserve further examination (USPSTF, 2012). The USPSTF has sole responsibility for reviewing the evidence-based studies provided by the AHRQ when making policy recommendations for best clinical practice. These services are recommended with a grade "A" or "B" when there is high certainty that the net benefit will be moderate to substantial and include age-specific screening intervals or frequency guidelines. Adults 65 years and older who received clinically recommended preventive services were more likely to experience improved health outcomes and quality of life (Goodwin et al., 2012; Han et al. 2015, Jensen et al. 2018; Mullins et al., 2013; Sabatino et al., 2016; Xu et al., 2020). However, removing financial barriers was found to impact utilization rates of clinically recommended preventive services only modestly amongst lower-income Medicare beneficiaries indicating other barriers continue to exist (Augustus et al., 2018; Flowers et al., 2013; Goodwin et al., 2012; Hamman et al., 2015; Jensen et al., 2015; Toseef et al., 2020; Wan et al., 2015; Xu et al., 2020; Ya-Chen et al., 2006).

This study aims to fill the research gap between the impact of the Affordable Care Act cost-waiving provision and the utilization of USPSTF grade A and B clinically recommended preventive care services among vulnerable adults 65 years and older. It is important to ensure that older adults are not only getting care, but that they are getting the highest priority care. The study uses Medical Expenditure Panel Survey (MEPS-HC) data to observe trends in the utilization of preventive care services before (2006-2009) and after (2012-2016) the ACA's cost-waiving provision for Medicare beneficiaries on January 1, 2011. MEPS is a national survey that assesses representative estimates of

healthcare use, expenditures, sources of payment, and health insurance coverage for the U.S. non-institutionalized population. The Household Component (HC) estimates respondents' health status, demographic and socioeconomic characteristics, employment, access to care, and satisfaction with healthcare. The following literature review will address limitations and gaps observed in previous research. Some of these studies either excluded self-reported data, had shortened timelines (unable to measure the impact of health reform for long-term effects), excluded adults 65 years and older, or did not compare differences within all Medicare insurance type coverage characteristics. Unfortunately, there remains a limited amount of robust research targeting vulnerable Medicare beneficiaries 65 years and older who were previously susceptible to higher cost-sharing when seeking preventive care services.

## Literature Review

This literature review focuses on the impact of cost-eliminating provisions on the utilization of preventive healthcare services among adults 65 years and older before and after the introduction of the Affordable Care Act (ACA). Since the implementation of the ACA, there has been an increasing interest in whether cost-waiving provisions have effectively improved access to healthcare, reduced gaps in disparities, or improved overall health outcomes among all populations. The following literature provides general studies on cost-sharing and access.

Prior research such as the RAND and Oregon Health Insurance Experiments (HIE) had a substantial impact on influencing previous health reforms with suggestions

that waiving health insurance cost-sharing has both beneficial and detrimental effects on the utilization of preventive services. However, these landmark studies of cost-sharing and access to care exclude the elderly, this research's population of interest. The RAND Health Insurance Experiment (RAND, 1982) was renowned for predicting the impact of health insurance reforms on medical spending. The randomized controlled study conducted from 1974 to 1982 recruited 2,750 families selected randomly and then assigned to five different health insurance plans. One was cost-free (Fee-for-Service), three had different cost-sharing levels of 25%, 50%, 95% (5%-15% for lower-income), and an HMO plan (free for those assigned). The study also capped out-of-pocket costs at $1,000. The effects of cost-sharing relative to those participating in an HMO were compared to those in the free care plan to examine health behavior relative to healthcare costs, utilization, and health outcomes. The study found that cost-sharing reduced both highly effective (preventive) and less effective (inappropriate hospitalizations and prescription drugs) services. Access to office visits increased by 59% for cost-free participants compared to 52% for those assigned cost-sharing. Lower-income beneficiaries enrolled in cost-free plans also had improved health outcomes and higher patient satisfaction than those assigned to an HMO. One of the most significant findings was that all patients responsible for cost-sharing levels used fewer preventive care health services than those given free care (Brook et al., 2006). The first of its kind, the RAND study provided strong evidence that eliminating cost-sharing could foster increased "inappropriate or unnecessary" overutilization of medical care, but also reduced barriers to "appropriate or needed" medical care. Although this study is criticized for the lack of generalizability within comparisons between HMO and Fee-For-Service (FFS)

beneficiaries and for not including uninsured participants, it remains the "gold standard" for evidence-based research on the topic. One of the RAND study's most significant limitations was excluding adults 65 years and older, most susceptible to chronic conditions and price sensitivity.

Another experimental study that influenced health reform was the 2008 Oregon Study. Comparable to the landmark RAND research, this study assessed whether expanding public insurance (Medicaid) impacted utilization of healthcare use, financial strain, and mental and physical health. The randomly selected participants had to be uninsured within the last six months, under the 100% income poverty line, between ages 19 and 64. They also had to be ineligible for other public insurance. The Medicaid managed care plan covered cost-sharing for all health-related services and copays based on income ($0-$20). The 2008 Oregon study found health insurance coverage was associated with increased healthcare use for hospital (30%) and emergency room admissions (40%) and increased likelihood of receiving certain recommended preventive care services. Conversely Baicker's (2013) re-examination of the 2008 Oregon study found the spillover effects of expanding public insurance were associated with improved access to care with increased utilization for mammogram screenings (60%) among women aged 40-64. The researchers found no significant outcomes for depression, high blood pressure, elevated cholesterol, high glycated hemoglobin levels, or long-term cardiovascular risk screenings (Baicker et al., 2013). Similar to the RAND HIS study, the 2008 Oregon study excluded adults 65 years and older which limited the ability to

generalize the impact of cost-sharing on older adults' health outcomes susceptible to preexisting multiple chronic conditions.

In contrast, others have reexamined findings from the RAND and Oregon experiments and found no evidence of "ex-ante moral hazard" behavioral effects of unnecessary healthcare use associated with reduced or eliminated cost-sharing. Ex-ante moral hazard defines the behavioral change of a policyholder before an event occurs. For this study, the reference is to behavioral changes among adults 65 and older with increased rates of unnecessary or overutilized preventive services because cost-sharing was eliminated. For example, suppose a person knows his/her insurance (which costs no $ to use) will provide his/her with preventive care services. In that case, he/she may participate in more unhealthy behaviors or not participate in annual wellness exams. A National Bureau of Economic Research Study(NBER) study reexamined the RAND study's findings that associated cost-waiving healthcare services with ex-ante moral hazard. They found insurance coverage selection that offered cost-waiving benefits for certain healthcare services increased the risk of moral hazard and was associated with the probability that an individual behavioral response would encourage higher utilization rates for those with higher health risk levels, thus increasing demand based on health expectations (Einav et al., 2011). Another study observed the price elasticity in medical spending was associated with out-of-pocket costs by -0.2-point price elasticity of demand. However, that study's limitations included substantial bias, mainly due to uncertainty about the impact of different insurance plans on medical spending and price sensitivity (Aron-Devine et al., 2013).

In the reexamination of evidence from the 2008 Oregon experiment, one study found the moral hazard (10%) effects were observed only during the lottery's first day. They concluded that free plans were associated with higher healthcare utilization (hospital, outpatient, and drugs). However, they also increased compliance with some recommended preventive care services, lowered out-of-pocket costs, and improved physical and mental health outcomes (Finkelstein et al., 2012). Another study found the impact of providing healthcare benefits for previously uninsured Social Security Disability Insurance (SSDI) beneficiaries comparable to the Oregon experiment. The study observed the cost-waiving effects on the utilization of preventive care among pre-eligible SSDI beneficiaries (not eligible for other public insurance and were susceptible to early insurance coverage effects). They found that this cost-waiving benefit increased the utilization of outpatient preventive care, hospital admissions, and prescription drugs, but had no substantial impact on emergency room use. The study limitations included a short one-year intervention period and possible selection bias as some SSDI beneficiaries in the sample were already halfway through their uninsured coverage period (Michalopoulos et al., 2012).

While many studies have researched the impacts of cost-sharing on access and exclude older Americans, some have assessed its impact on Medicare beneficiaries with different insurance type characteristics. A published literature review of twenty-two relevant studies investigated the impact of cost-sharing on healthcare service use. These studies concluded that cost-sharing reduces the utilization of preventive care screenings and adversely affects the health outcomes among older adults (Rice et al., 2004). A

similar study concluded that cost-sharing was associated with reducing mammogram screenings amongst older women enrolled in Medicare Advantage plans. They found that a copayment of more than $10 was associated with a 10% reduction in mammogram utilization and increased the likelihood of forgoing services (Trivedi et al., 2008). A similar study examined Medicare claims from1991-1992 and found that the lack of supplemental coverage among older female Medicare beneficiaries was associated with substantially low mammogram screenings following the first two years Medicare began coverage of mammograms in 1991. They concluded that the requirements of copayments for preventive services is an obstacle to the effective screening of older women at high risk for breast cancer, with a higher probability of not receiving screenings due to financial barriers associated with cost-sharing. Only 36.9% of U.S. women 65 years and older had a mammogram during the first two years of the introductory Medicare benefit, with only 14.4% without supplemental insurance receiving screenings compared to 44.7% with supplemental insurance, 40.1% with private, and 23.9% of those with Medicaid supplemental insurance (Blustein et al., 1995). Although prior research concludes that waiving cost-sharing can increase unnecessary healthcare use, it is also associated with positive outcomes, such as increased access to clinically recommended preventive care, fewer unmet medical needs, fewer out-of-pocket costs, and improved health status. The most significant contribution from previous research was the finding that any cost-sharing for older lower-income Medicare beneficiaries could have adverse effects of persistent barriers to preventive services.

Preceding research has associated cost-sharing with the reduced likelihood of receiving certain preventive services among Medicare beneficiaries with differences in insurance-type coverage characteristics. One study examined differences in utilization rates of preventive services among Medicare beneficiaries by insurance plan type and found those with Medicare supplemental private insurance were 71% more likely to receive the influenza vaccine compared to those with supplemental Medicaid (dual-eligible (62%)) and those with Medicare-only (56%) coverage. For colorectal cancer screenings, 69% with private supplemental insurance had received recommended screenings compared to those who were dual-eligible (55%) or had Medicare-only (53%) coverage. Mammogram screenings for beneficiaries with private supplemental insurance were higher (83%) compared to those dual-eligible (71%) or who had Medicare-only (62%) coverage. By comparison, uninsured beneficiaries' utilization rates across all three services were 40% lower (Chen et al. 2005). A comparable study examined utilization rates of seven recommended preventive services among Medicare beneficiaries by insurance type (Private Supplemental, Medicare-only, and Dual-eligible (Medicare/Medicaid HMO)). They found that Medicare-only beneficiaries were more likely to receive five out of the seven recommended services with utilization rates 10% lower than those with private supplemental and Medicare-Medicaid coverage (Carrasquillo et al., 2001). Managed care beneficiaries were more likely to report receiving preventive service vaccines for influenza, pneumococcal disease, and smoking cessation counseling than Medicare-only beneficiaries (75% vs. 60%). Interestingly, the Medicare-only beneficiaries had higher satisfaction rates for the quality of care and fewer problems getting needed care than those in managed care plans (Landon et al.,

(2004)). Before the ACA's cost-waiving provision, there were barriers to accessing certain recommended preventive services for lower-income beneficiaries without supplemental insurance coverage. These studies observed how the receipt of certain preventive services can be associated with differences in Medicare coverage plan type characteristics. Those who could afford additional coverage were more likely to receive needed healthcare services.

The following literature examines assessments of pre-ACA Health reforms intended to expand access. Healthcare reforms such as the 1997 Balanced Budget Act (BBA), the 2003 Medicare Modernization Act (MMA), and the 2008 Medicare Improvement for Patients and Providers Act (MIPPA) reduced cost-sharing for certain preventive services (e.g., mammogram, colonoscopy). The effects of the BBA deductible cost-waiver for mammograms and pap smear utilization rates were examined among female Medicare Fee-For-Service (FFS) beneficiaries 65 years and older. They found that reducing out-of-pocket costs for this preventive service was associated with higher utilization rates of mammograms, but found pap smear screenings reduced within the same period. However, it concluded that confounding effects, such as higher perceived risks and clinical guidelines recommended screening women 65 years and older for mammograms, attributed to positive results. The decreased utilization of pap smears was attributed to non-recommended clinically recommended guidelines for women over 65 years and older (Goodwin et al., 2012). A similar study evaluated the BBA provision's impact on high-risk Medicare beneficiaries' preventive cancer screenings utilization rates. They found that colorectal screenings were associated with a 3.5% increase in utilization,

and prostate cancer screenings were associated with a 6% increase. Although they found slow uptake for utilization rates for colonoscopies, the updated recommendations from the American Cancer Society and the U.S. Preventive Task Force during the same year may have attributed to the findings. Unfortunately, they also found that substantial disparities in utilization rates were associated with financial barriers to accessing healthcare and sociodemographic characteristics, concluding that the provision had little effect on increasing utilization among lower-income Medicare beneficiaries (Xu et al., 2015). Overall, the study showed that sociodemographic characteristics represent statistically significant access barriers, even after controlling for income. The Medicare & Medicaid Research Review examined the effect of waving cost deductibles for mammograms, and Pap smears on service utilization rates from 1995-to 2003 for Medicare FFS beneficiaries 65 years and older. They found that the elimination of cost-sharing deductibles increased utilization of certain preventive services. Mammograms increased by almost 40% after waiving cost-sharing, but other services, such as pap smears, significantly decreased during the same study period. There was a 25% long-term increase in the probability of having had a mammogram in the four years following the BBA 1997 deductible waiver. (Goodwin et al., 2012).

The Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA) added coverage for several preventive services, including a one-time preventive care examination (WMV) for new enrollees during the first six months. It also authorized blood tests to screen for cardiovascular disease and diabetes. The MMA provision intended to improve the health outcomes and wellbeing of beneficiaries with

the Welcome- to-Medicare physical examination to increase access to certain clinically recommended preventive screenings. One study examined if colorectal cancer screening increased for Medicare FFS beneficiaries after implementing the Medicare Prescription Drug, Improvement, and Modernization Act and concluded that the policy eased budget constraints for seniors, making endoscopic colorectal screenings more affordable (Mobley et al., 2017). In contrast, a 1996–2008 Health and Retirement Study examined the effects of offering the Welcome-to-Medicare visit coverage on the use of mammograms, breast examinations, pap smears, prostate cancer screenings, cholesterol screenings, and flu vaccinations among beneficiaries new to Medicare's Part B coverage and found the one-time preventive visit had no significant effects on increasing utilization rates among new beneficiaries (Peng et al., 2017).

The MIPPA reform aimed to improve older adults' access to preventive services by extending the initial one-time Welcome-to-Medicare visit from six to twelve months. Prior research measured the effectiveness of expanding the initial visit to receive preventive care services during the first year of Part B enrollment coverage. These included mammograms, breast self-exams, pap smears, prostate cancer screenings, cholesterol screenings, and the flu vaccine. They found no significant association between the extended period for the initial one-time Welcome-to-Medicare visit and the receipt of preventive screenings (Petroski et al., 2017). A similar study examined whether the introduction of the WMV was associated with increased cancer screening utilization rates among newly enrolled women entering Medicare. They also found no significant evidence of an increase in the likelihood of receiving preventive visits for

mammograms or pap smears. The study attributed the underutilization of preventive services (3% usage among Medicare beneficiaries) to the lack of physician financial incentives to deliver preventive services and reimbursement issues due to non-alignment with current USPSTF evidence-based recommendations. The underutilization of the Welcome-to-Medicare Visit (WMV) was also significantly associated with the lack of information regarding Medicare's Benefits (Salloum et al., 2013). Another study found that out of the 3% of beneficiaries who had received the WMV, most (60%) perceived it was the standard annual physical under managed care coverage (Petroski et al., 2009). There were also substantial inequities in receipt of WMV services with less likelihood of receiving the benefit if over 75 years old, Black (15% lower utilization rates), had lower income, and had no supplemental private (35% lower utilization rates) coverage (Sloan et al., 2012). The consensus of most research examining the effects of introducing the WMV before the ACA was implemented concluded it had no significance in increasing the utilization of preventive services among Medicare beneficiaries 65 years and older.

Consequent to the introduction of the Affordable Care Act Title V (Section 4104) provision, there have been relevant research studies that examined the effects of eliminating cost-sharing (deductibles and copays) on the use of clinically recommended preventive screenings (including the influenza vaccine). One study found an association between the cost-waiving provision and colonoscopy screening behavior changes among Medicare beneficiaries ages 66–75 years old. Using the Behavioral Risk Factor Surveillance System (BRFSS), they evaluated changes in annual colonoscopy rates before and after ACA cost-waiving provision, assessing the impact on lower-income

socioeconomic groups. The most significant associations were the largest among the socioeconomically disadvantaged groups, with the likelihood of receiving a colonoscopy within the past year increasing by 20%. Overall screening rates increased by 9.2 % among those reporting not having seen a physician within the past year. However, the study found no significant change for older women. Screenings also significantly increased among household incomes of $25,000– $34,999, but not among men whose income was less than $20,000 annually. Among beneficiaries with less than high school education, the screening rates increased by 7.5% among men and 2.2% among women (Hamman et al., 2015). A similar study found that the ACA's provision increased cancer screening rates among late-stage colorectal cancer diagnoses for men (increased by 10.3%, P < 0:05). However, there were no significant improvements in screenings for early breast cancer diagnosis (Lissenden et al., 2017). Another study used the National Health Interview Survey to examine whether cost-sharing increased breast and colonoscopy screening prevalence among privately and Medicare-insured adults. They found the ACA cost-waiving provision increased colonoscopy screening from 57.3% to 61.2% between 2008 and 2013 (P<0.001) among low-income Medicare-only beneficiaries, but found no significant differences for those screened for breast cancer (70.5% in 2008 vs. 70.2% in 2013). They did find, however, an association between income and the prevalence of low-income beneficiaries' screening following the ACA's removal of financial barriers (Fedewa et al., 2019).

Evidence suggests that since the implementation of the ACA's cost-waiving provision in conjunction with the Annual Wellness Visits (AWV) intervention, there has been an increase in utilization rates for clinically recommended preventive care services,

though results vary. The AWV was developed as an intervention to ensure access to evidence-based and "medically necessary" clinically recommended screenings and vaccines. The visit includes baseline measures for cognitive and functional assessments and health risk factors. The patient completes a self-reported health risk questionnaire, and the provider reviews medical and medication history and chronic medical conditions and then provides a written personalized plan of care. A recent study examined whether those who participated in AWVs were more likely to utilize preventive screening services. They found that those who did not participate were less likely to receive any of the seven services (prostate cancer screening, bone density test, diabetes screening, breast cancer screening, colorectal cancer screening, cardiovascular disease screening, and vaccines) than AWV recipients. Those who did participate in AWVs received 62% more preventive care services than nonrecipients (Camacho et al., 2017). A related study assessed receipt of eight preventive services associated with AWVs and found beneficiaries were most likely to receive subsequent preventive services within a year with an adjusted odds ratio (95% CI) of 1.46 to 2.4 (Jiang et al., 2018). Another study found the receipt of preventive services for Medicare-only beneficiaries' during annual preventive visits (AWV) increased significantly from 1.4% to 27.5% compared to those with supplemental coverage that included Medicare Advantage (7.9%); private fee-for-service (3.5%), and those with private HMO (0.5%) coverage (Chung et al., 2015). Other studies also concluded that the ACA's cost-free annual wellness visit is significantly associated with improving access to preventive screenings among adults 65 years and older (Chung et al., 2015; Han et al., 2015). In 2013 CMS examined Medicare beneficiaries' utilization of cost-free preventive services by state. An estimated 37.2

million people with Medicare took advantage of at least one preventive service with no cost-sharing, including an estimated 26.5 million people with Medicare-only and more than 4 million who took advantage of the Annual Wellness Visit. Over 74% of Medicare-only enrollees had at least one preventive service, and 12% had an Annual Wellness Visit during 2013 (CMS). As exemplified in the literature, the ACA Annual Wellness Visit intervention has increased access and utilization of preventive services among some older Medicare beneficiaries that participate in AWVs. This visit, dedicated to addressing preventive health with a personalized preventative care plan, helps to identify early diagnosis and provides the opportunity to manage chronic conditions with patient-provider discussions on maintaining healthier lifestyles.

However, there have been mixed reviews on whether the ACA's Annual Wellness Visit has been an effective intervention among older adults with suboptimal utilization rates and a perceived lack of knowledge regarding the new Medicare benefit. A previous study using MEPS Household (HC) data measured the short-term effects of the ACA's cost-waiving provision on the utilization of preventive services for adults 64 years and under. The study found the receipt of recent screening for hypertension (i.e., blood pressure measurement), cholesterol screenings and the flu vaccination increased significantly from 2009 to 2011/2012 among the privately insured population aged 18–64 years. The results found the adjusted odds prevalence ratios (95% confidence intervals) increased by 1.03 (1.01–1.05) for blood pressure check, increased by 1.13 (1.09–1.18) for cholesterol check and increased by1.04 (1.00–1.08) for flu vaccination ($p = <0.05$). However, the results found no significant differences in cancer screening or changes in

preventive care utilization among the uninsured population before and after the ACA implementation (Han et al., 2015). A similar study using 2012 MEPS survey data observed effects of the ACA provision among adults 65 and older. It found the introduction of the AWV had no effects on preventive service utilization for cholesterol, blood pressure, colonoscopy, prostate, breast examinations, mammography screenings, or the flu vaccination among Medicare beneficiaries with traditional Medicare and no other supplemental insurance. The main predictor was the change in rates of preventive service utilization among beneficiaries with traditional Medicare-only compared to those with supplemental or private insurance before and after the ACA provision took effect. The study concluded that the extended Medicare benefits had little effect on Medicare seniors' preventive service utilization in 2012, including those with traditional Medicare and no supplemental insurance. They concluded that the slow uptake of utilizations was attributed to the fact that most seniors already had supplemental insurance that covered preventive services. Barriers included the lack of educating and incentivizing physicians about the need to promote services and increasing knowledge among seniors about the importance of preventive care screenings (Jensen et al., 2015). A more recent study used MEPS data to observe the effects of the ACA cost-waving provision among Medicare beneficiaries 65 years and older and concluded the ACA's cost-waiving provision had no substantial effects on increasing the utilization of preventive care services among Medicare beneficiaries. Like the Jensen et al. study, they attributed low utilization rates to the lack of physicians promoting the benefits of preventive care services, beneficiaries already having coverage of most services, and beneficiaries' lack of awareness of cost-waived screening benefits for preventive services (Toseef et al., 2020).

According to the literature, AWVs have not been an effective intervention for improving the utilization rates among older adults due to suboptimal participation, education regarding the benefit, and lack of physician promotion. But unlike this research, some of these prior studies had limitations that included excluding older adults in the sample, having shortened study periods making it difficult to measure effects, or excluding significant variables (e.g., health expenditures) which could impact outcomes.

The ACA's provisions aim to incentivize healthcare interventions that target patients, providers, payors, and health organizations to increase the utilization of preventive services to improve health outcomes. However, some argue that there remains an unexplainable gap in the suboptimal utilization rate of U.S. Preventive Task Force clinically recommended preventive service and use of AWVs among older adults (Adepoju et al., 2015; Cunningham et al., 2017; Ward et al., 2017). Eliminating cost-sharing for preventive services is just one factor impacting Medicare beneficiaries' low usage of preventive services. Other factors include the type of insurance (Jensen et al.,2015; Misra et al., 2018), provider and beneficiary education (Gorbeniko et al., 2017; Jensen et al., 2015; Misra et al., 2018; Peng et al.,2017), race and ethnicity (Chen et al., 2016; Peek et al., 2007). Research suggests there may be factors, other than costs, attributing to the slow uptake in the receipt of WMVs and subsequent AWVs signifying continued research gaps exist. The focus on multiple factors and how they interact could improve quality outcome measures and address constraints that influence barriers to access. Annual preventive care services through "wellness" visits can provide an opportunity to enhance clinical practice and offer older adults more comprehensive, cost-

effective screening and preventive measures than in any previous time. These interventions aim to achieve this goal by: 1) Slowing down the progression of chronic diseases with clinically recommended screenings, vaccines, and risk assessments; 2) Use health management strategies targeted to improve senior population health; and 3) Provide an opportunity for both the provider and patient to focus on health risks that can impact the quality of life (Espiridion et al., 2016; Ganguli et al., 2017; Jiang et al. 2018).

To summarize, disparities associated with race/ethnicity, income, education, and type of insurance characteristics could affect preventive screening utilization rates. Previous research implies that Medicare-only beneficiaries are more likely to be affected due to cost-waiving benefits without additional private supplemental insurance or managed care. However, prior research (before and after the ACA) has also indicated that health disparities continue to exist, providing evidence that cost is only one factor impacting health service delivery (Hamman et al., 2015; Xu et al., 2015.) Whether or not the ACA cost-waiving provision goals have slowed down the prevalence of chronic diseases, increased access to preventive services, reduced disparities, and healthcare expenditures is still up for debate. Research suggests that following annual preventive care services such as screenings and vaccines with early detection and disease management would improve the quality-of-life adjusted years (Blumenthal et al., 2015; Zuckerman et al., 2012).

Methods:

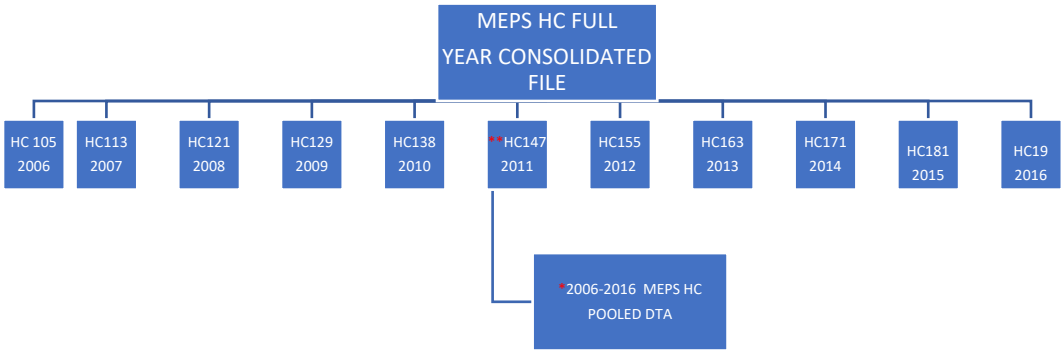
Research Design and Data:

This 11-year repeated cross-sectional study design consists of U.S. adults 65 years and older, using MEPS Household Component survey (MEPS-HC) from 2006-2016, which involves the collection of data from many different individuals at a single point in time. The database is sponsored by the Agency for Healthcare Research and Quality. The Medical Expenditure Panel Survey (MEPS-HC) is a nationally representative survey of the U.S. civilian noninstitutionalized population. The sampling frame is drawn from respondents to the National Health Interview Survey (NHIS) and administered by the National Center for Health Statistics.

The MEPS-HC collects data from a nationally representative sample of households through an overlapping panel design. A new panel of sample households is selected each year, and data for each panel are collected for two calendar years. The two years of data for each panel are collected in five rounds of interviews that take place over a two-and-a-half-year period. This provides continuous and current estimates of healthcare expenditures at both the person level and household level for two panels for each calendar year. For each year, MEPS-HC gathers from across the nation comprehensive information on respondents' health services utilization, healthcare expenditures (including out-of-pocket/self-pay), socioeconomic characteristics, health insurance coverage, health status, and health behaviors.

For this study's analysis and reporting, the data was pooled and adjusted for person-level weight to reflect the mean annual subpopulation size, healthcare utilization and expenditures for the 11 years within each cycle (Figure 3).

Figure 3: MEPS-HC Pooled Data, 2006-2016.




*2011 predictor year – ACA-Medicare implemented cost-waiving provision

Human Subjects, Animal Subjects, or Safety Considerations

MEPS-HC data files are publicly available and deidentified, so the current study is exempt from institutional review board (IRB) approval, per the U.S. Department of Health and Human Services guidelines. This study is conducted with secondary analysis using public MEPS household panel data. Secondary analysis of existing data was approved under IRB exemption because it does not fall within the regulatory definition of

research involving human subjects. No animal subjects or safety considerations will be used in this study (IRB Exemption Approval #: IRB-21-048).

Study Setting

Using an observational study design, this research aims to establish an association between the utilization rates of preventive care services and the implementation of the ACA provision among Medicare beneficiaries 65 years and older with different insurance type characteristics (Medicare-only, Medicare Advantage, Medicare + Private, and Medicare + Medicaid), using pooled survey data (years 2006-2016). Quantitative methods using multinomial regression with marginal effects measured yearly utilization trends for the categorical outcomes of clinically recommended preventive care screenings. These included: Blood pressure, Cholesterol, Aspirin use, Pap smears, Mammograms, Breast exam, Prostate (PSA), Colon cancer screenings (colonoscopy and sigmoidoscopy), and the Influenza (flu) Vaccine. The study observed trends in utilization before and after the ACA's cost-waiving provision controlling for sociodemographic characteristics, type of insurance coverage, total out-patient office visits, total health expenditures, and source of payment, which included total out-of-pocket costs. Other controls included general health status, usual source of care provider, and chronic conditions. The complex sample design measured self-responses to whether Medicare beneficiaries received screenings during the Past Year, Within Two Years, Three Years, Five Years, Five+ years, Ten Years, Ten+ years, or Never. This enabled the analysis to account for stratification, clustering, multiple stages of selection, and disproportionate sampling.

The dataset represents a national population of 323,141,687 with 34,655 observations that include preventive care services, healthcare expenditures, and self-reported health status. It is a good representative sample of race and ethnicity. The sample will represent around 12% of Medicare beneficiaries 65 years and older. The combined average annual response rate for 2006, 2007, 2008, 2009, and 2010 was 57.4%, and for 2011, 2012, 2013, 2014, 2015, and 2016 was 51.03%, respectively.

Sample Size Calculation

MEPS data sample size calculation breaks down the number of persons and families listed in the overall sample size by age, adults, elderly, race, race/ethnicity, income level, insurance status, and panel. The subpopulation sample size is 39,780,150 for ages 65 years and older. The cumulative data sample observations are as follows: 2006 (32,577), 2007 (29,370), 2008 (31,262), 2009 (34,920), 2010 (31,228), 2011 (33,622), 2012 (37,182), 2013 (35,068), 2014 (33,162), 2015 (33,893), and 2016 (33,259).

Study Subjects

The study sample will only include Medicare beneficiaries 65 years and older continuously enrolled in the Medicare Part B plan with different Medicare coverage types (Medicare-only, Medicare +Private Supplemental, Medicare Advantage (MMC), Medicare + Medicaid (dual-eligible) and those Uninsured.

Outcome Variables:

This study will examine the trend of yearly utilization rates of USPSTF clinically recommended grade A and B guidelines (Table 6), specific to adults 65 years and older. Due to differences in cost-sharing requirements between Medicare's coverage plans, variations in the utilization of preventive care services are predicted to improve among those previously susceptible to higher cost-sharing with an increased demand for preventive health services (predictive of moral hazard effects on insurance). The data includes dependent variables, and panel responses that coincide with the USPSTF clinical recommendations. Blood pressure (Grade A - 2015), Cholesterol-lipid panel test (Grade A - 2015), Body mass index BMI (Grade B - 2018) screenings and Aspirin use (Grade B/C -2016 recently updated to D - 2022), measure for risks of hypertension, heart disease, stroke, and diabetes. Mammogram screenings (Grade B-2016) are recommended for women ages 50-74 years old every two years, in response to whether services are received within the past two years or less and colorectal cancer screenings (Grade A-2016) are recommended for adults 50-75 years old every ten years, and responses include whether screened within the past ten years or less. Sigmoidoscopy screenings are recommended every five years, and response includes whether received within the past five years or less. For the influenza vaccine the ACIP recommends routine annual influenza vaccines for adults 65 years and older. Adherence to clinically recommended practice screening guidelines for prevalence of chronic conditions among older adults at high risk is essential.

Table 6: USPSTF recommended preventive screenings for adults 65+

| | USPSTF A and B Recommended Screenings for Adults > 65 | | | |
|---|---|---|---|---|
| Type of Screening | Grade (Year of Recommendation) | Age Range | Screening Frequency | MEPS survey definition for adherence of preventive screenings |
| Colonoscopy | A (2016) | 50-75 years | Every ten years | within past ten years or less |
| Sigmoidoscopy | A (2016) | | Every five years | within past five years or less |
| Abdominal Aortic Aneurysm: Screening | A (2019); C (2019); D | 65–75-year-old men who smoked, 65-75 who never smoked; not recommended for women never smoked | 1-time screening | Not collected in MEPS data |
| Abnormal Blood Glucose and Type 2 Diabetes Mellitus: | B (2015) | 40 to 70 years who are overweight or obese | Every three years | Blood glucose was collected only in ACA post-era.<br><br>BMI screening - within the past year or less<br><br>Blood Pressure screening within the past year or less.<br><br>Cholesterol screening within the past year or less |
| High Blood Pressure in Adults: Screening | A (2015) | >18 years | Annual screening >40 years old | within the past year or less |
| Hepatitis C Virus Infection in Adolescents and Adults: Screening | B (2020) | 18-79 years old | 1-time screening | Not collected in MEPS data |
| Screening for Hepatitis B Virus Infection in Adolescents and Adults | B (2020) | adults at increased risk for infection | The USPSTF found no evidence to determine optimal screening intervals. Periodic screening-high risk | Not collected in MEPS data |
| Human Immunodeficiency Virus (HIV) Infection: Screening | A (2019) | 15-65 years old | 3, 6, or Annual screenings (depends on risk) | Not collected in MEPS data |
| Lung Cancer: Screening Low-dose computed tomography | A (2013) | 55-80 with a history of smoking | Annually- | Not collected in MEPS data |
| Osteoporosis to Prevent Fractures: Screening | B (2018) | Women 65 years and older | Annually | Not collected in MEPS data |
| Unhealthy Drug Use: Screening | B (2020) | >18 | Annually | Not collected in MEPS data |

| | | | | |
|---|---|---|---|---|
| Unhealthy Alcohol Use in Adolescents and Adults: Screening and Behavioral Counseling Interventions | B (2018) | >18 | Annually | brief screening instrument (e.g., SASQ or AUDIT-C), c |
| Latent Tuberculosis Infection: Screening | B (2016) | >18 - populations at increased risk (e.g., living in Nursing Homes and ADL) | 1-time screening | Not collected in MEPS data |
| Depression in Adults: Screening | B (2016) | All Adult General population | Annually | Patient Health Questionnaire PHQ-2 tests for symptoms for depression mood and anhedonia |
| Chlamydia and Gonorrhea: Screening | B (2014) | Older women at risk | Annually | Not collected in MEPS data |
| Syphilis Infection in Nonpregnant Adults and Adolescents: Screening | A (2016) | persons who are at increased risk for infection | Annually | Not collected in MEPS data |
| Cervical Cancer Screening (Pap Test) | A, C (2016) | 25-65 years, < 65 years | Within the past three years or less. Not recommended for women over 65 | PAPSMR53 - HOW LNG LST PAP SMEAR TST (>17) - RD 5/3 |
| Breast Cancer Screening and Exam-Mammogram[3] | B (2016) | 50–74 years | Every two years | Within the past two years or less |
| Physical | n/a | | Annually | Within the past year or less |
| Cardiovascular: Metabolic screening for Diabetes and Heart Disease: | B (2015) | 40-70 years old | Annually | Within past year or less |
| Blood Pressure | A (2015) | 18 years and older | Annually | Within the past year or less |
| Weight Loss to Prevent Obesity-Related Morbidity and Mortality in Adults: Behavioral Interventions BMI | B (2018) | 18 years and older | Annually | Within the past year or less |
| Healthy Diet and Physical Activity for Cardiovascular Disease Prevention in Adults with Cardiovascular Risk Factors - Behavioral Interventions. Cholesterol | B (2020) | 18 years and older | Annually | Within the past year or less |
| Influenza Vaccine -ACIP/CDC | A (2020) | 65 and older – high risk | Annually | Within the past year or less |

Main predictors:

The main predictor is the yearly change in utilization rates of USPSTF recommended screenings and the flu vaccine among adults 65 and older between 2006-2016, before and after the implementation of the ACA cost-waiving provision. Those with Medicare-only are expected to benefit the most from the Part B enhancements. For

this study the USPSTF recommended preventive clinical screenings for adults 65 years and older are categorized by: 1) Blood conditions screenings (includes risk of heart disease, stroke, and diabetes); 2) Aspirin use; 3) Vaccinations (flu/influenza); and 4) Cancer screenings. Survey subpopulation analysis was used for the statistical analysis of the panel survey, to ensure accurate estimation accounts for cluster and stratification of MEPS data. The effects of the ACA cost-waiving provision among Medicare beneficiaries with different types of insurance coverage will be examined using self-reported panel responses that correspond to USPSTF recommended grade A and B preventive care services from 2006-2016. Each preventive service effect will be analyzed using multivariate and logistic regression models (unadjusted and adjusted) for the pre-ACA period (2006-2010) and the post-ACA period (2012-2016). The year 2011 will be the main predictor variable for changes before and after ACA's cost-waiving intervention. The comparison group design will include Medicare-only vs. Medicare beneficiaries with private supplemental insurance, Medicare Advantage Care beneficiaries (HMO), Medicare beneficiaries with supplemental public insurance (Medicaid HMOs) and those Uninsured. Economic theory suggests the different forms of cost-sharing (deductibles and copays) can have varying effects on preventive care use among beneficiaries with different types of insurance coverage. Before the ACA some Medicare beneficiaries were responsible for the 20% deductible for office visits and applicable copays. Cost-free care is expected to increase demand for both "essential" and "non-essential" healthcare services (moral hazard). The assumption of expanding requirements for the initial Welcome-to-Medicare Visit and introduction of the Annual Wellness Visit should increase the utilization rates for recommended preventive services

post-ACA. The removal of financial barriers and innovative service delivery is expected to increase needed screenings previously delayed or avoided.

Covariates:

All outcome variables (Table 6) are controlled for socio-demographics that includes sex, race/ethnicity, education level, marital status, poverty status and geographical location (Northeast, Midwest, South, West). Controls also included self-reported responses to types of insurance coverage, total healthcare expenditures, source of payment, perceived health status, whether they have a usual source of care provider for preventive services and if they have at least one or two or more chronic conditions.

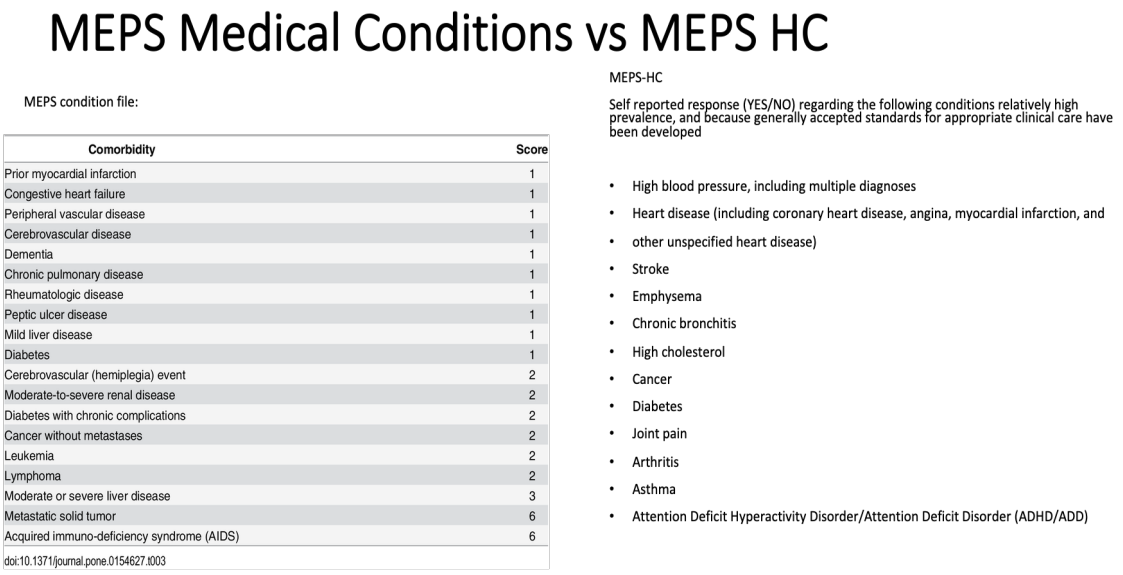
Stata SE 15 includes a module to create a Charlson Comorbidity Index (CCI) helpful in determining if adults 65 years and older, with medical comorbidities, are receiving USPSTF clinically recommended preventive care screenings. The CCI is included in the analysis to account for at least one chronic disease or long-term condition common in adults 65 years and older. The Charlson scoring Index is included in the analysis to account for at least one chronic disease or long-term condition common in adults 65 years and older. The CCI categorizes patients' comorbidities based on the International Classification of Diseases (ICD) diagnosis codes under 17 categories. Each comorbidity category has an associated weight (from 1 to 6) based on the adjusted risk of mortality or resource use. The sum of all the weights results in a single comorbidity score for a patient. For example, a score of zero indicates that no comorbidities were found, and the higher the score, the more likely the predicted outcome will result in mortality or higher resource use. In this study, the CCI index is used as a predictor

covariate within the analysis to understand better the association of chronic disease diagnosis with the utilization rates of recommended preventive healthcare before and after the ACA policy. The CCI was developed (appendix) for the present using the diagnosis of chronic disease responses provided by the MEPS-HC component, which asks for a response of YES/NO to being diagnosed with a chronic condition. Only those conditions listed under the 17 commodities according to the CCI were used, which determined the categories for the dummy variable (gcci2) recorded as (1): no comorbidity, (2) at least one long-term condition, and (3) ≥2 long-term conditions present (Figure 4).

Relevant studies have used a modified CCI predictor variable when assessing the relationship between preventive services and existing chronic conditions. In 1992 Deyo (1992) adopted a clinical comorbidity index designed for using medical records data from the International Classification of Diseases (ICD-9-CM) diagnosis and procedure codes. The association of CCI with health outcomes and resource use was examined among Medicare beneficiaries who underwent lumbar spine surgery in 1985. The CCI index was associated with predicted postoperative complications, mortality, blood transfusion, discharge to a nursing home, length of hospital stay, and hospital charges (Deyo et al., 1992). Similarly, Wallner (2017) used a modified CCI to compare the rates of preventive services among Prostate cancer survivors five years before and after diagnosis to men without Prostate cancer. They found the rates of preventive services were lower among men diagnosed with Prostate cancer vs. men not diagnosed (Wallner et al., 2017). Schonberg (2008) used a modified CCI as a predictor variable when examining the use of preventive health services among older women to assess how age and illness burden

influence care patterns. Illness burden was measured using the CCI. They found cancer screenings improved among older women in poor health, but lacked screenings for depression or counseling about exercise, falls, or incontinence (Schonberg et al., 2008). Chung (2018) used a modified CCI when investigating the utilization of preventive visits before and after the introduction of ACA's Annual Wellness Visit (AWV). They found older adults with multiple chronic conditions were less likely to make a separate preventive visit and preferred receiving preventive care during their problem-oriented visits (Chung et al., 2018).

Figure 4: MEPS Medical Conditions File vs. MEPS Disease Diagnosis.




Statistical Analysis:

The initial data analysis was thorough and included careful univariate, bivariate, and multivariate assessment using svy: estimation, which fit statistical models for a complex survey design. Multicollinearity was evaluated for possible correlations among

the independent variables using Seeming Unrelated Regression (SUR) for multiple regression analysis to assess multivariate outliers, excluding outliers and unrelated outcome variables predicted by sets of predictor variables. Once determined, multiple OLS or multivariate analysis was performed for the best R-Squared ($R^2$ coefficient of determination) to determine the proportion of variance in the outcome variables that can be explained by the covariates and determine the goodness of fit in the regression model.

For this study, multivariate analysis (OLS) was used only for preliminary descriptive statistics of the survey characteristics and to determine the best fit of the likelihood model before using multinomial logistic regression. The maximum likelihood estimation is used to evaluate the probability of categorical membership and best assess if there are any differences (marginal effects) in the yearly utilization rates of clinically recommended preventive care services among adults 65 and older before and after the ACA policy implementation in 2011.

The OLS model (Appendix -Table 12-14) reflects age-sex screening outcomes among adults 65 years and older, controlling for socio-demographic characteristics, total out-patient physician/provider visits, total healthcare expenditures, source of payment, insurance type coverage, perceived health status, whether they have a usual source of care provider, and if they currently have at least one chronic condition. It also includes dummy variables for the predictor years 2006-2016. The model also included an interaction between office visits and self-pay/out-of-pocket costs to determine the final model used to assess which significant predictors should be used in the logit model for further analysis. The Wald test was used following regression analysis to determine if explanatory variables in the model were significant. These predictors were then used to

continue the analysis after finding that the parameters for the explanatory variables were not zero.

Multinomial logistic regression is used to predict the categorical outcome variable and relevant predictor variables within the model for multiple survey responses, which measure the receipt of USPSTF clinically recommended preventive care services among adults 65 years and older. The decision to use multinomial logistic regression is due to its ability to test for the assumption of independence with the Hausman-McFadden test and the non-perfect separation of the predictors. The multinomial logit model also satisfies the probabilistic version of the assumption of the independence of irrelevant alternatives (IIA), implying that the ratio of the probabilities for two alternatives does not depend on what other alternatives are available (Hausman et al., 1984).

The multinomial regression confirms the OLS svy: regression by predicting the categorical placement of the outcome variable for the probability of category membership on the dependent variable based on multiple independent variables. Since the covariates are both continuous and categorical, the multinomial logistic regression uses maximum likelihood estimation to evaluate the probability of categorical membership by estimating the log odds of each category. The "Never been screened" category is the reference category for this study, and the multinomial regression estimates k-6 and k-7 regression functions.

The fully adjusted statistical model for preventive care screenings among adults 65 years and older for each categorical outcome is reflected in the Appendix. The option "base" indicates the category to use for the baseline comparison group. In this model, "Never been screened" is used as the baseline category.

The results show the logistic coefficient (B) for each predictor variable for each alternative category of the outcome variable. The logistic coefficient is the expected amount of change in the logit for each one-unit change in the predictors. The logit is predicted, and it is the odds of utilization rates of recommended grade A and B USPSTF preventive screenings in the category used for the majority of the outcome variables (PAST YEAR, WITHIN TWO YEARS, WITHIN THREE YEARS, WITHIN FIVE YEARS, FIVE OR MORE YEARS OR NEVER). The Baseline category is the last value: 6 (Never) was specified, rather than the alternative values (1-5). For colon screening, the category of outcomes (PAST YEAR, WITHIN TWO YEARS, WITHIN THREE YEARS, WITHIN FIVE YEARS, TEN YEARS, TEN YEARS OR MORE YEARS OR NEVER). The Baseline category is the last value: 7 (Never) was specified, rather than the alternative values (1-6).

A. Preliminary Results

Descriptive Characteristics

Survey estimation analysis provided the descriptive characteristics for the subpopulation and is summarized in Tables 7 and 8 (Appendix) by Insurance type (Medicare-only, Medicare Advantage, Medicare + Private insurance, and Medicare + Medicaid) and preventive services for adults 65 years and older. There are significant differences within insurance groups by socioeconomic status for receipt of preventive care services (95% CI). The screenings reflect the pooled proportion of beneficiaries that received preventive services within the Past Year, Within Two years, Three Years or more, or Never.

For Medicare-only enrollees, over 98% of adults 65-74 and 87% of adults 75 years and older have Medicare coverage. Of these groups 55% are female, and 43.3% are male. For Race, the majority are White and Asian. Over 75% have less than a college degree, and more than half are married (54%) and live in the South (37%). The majority are either in the middle or high-income category (84%), and 92% have a usual source of care provider (USC). Over 60% have a perceived health status of very good or good, but 76.3% have at least one chronic condition, with almost 40% having between 11-14 outpatient physician visits annually. Of this category 95.4% have total healthcare expenditures, with 56.8% in out-of-pocket costs. For the screenings, 94% had blood pressure screenings during the past year, 34% were obese as per BMI check, 88% had cholesterol screening during the past year, half of the beneficiaries were recommended Aspirin use, and 89% had their Blood Cholesterol checked. Over 70% reportedly had the flu vaccine, and 56% had a mammogram and breast exam during the past year. Eleven percent of males had a prostate-specific antigen test (PSA) within the last two years, and 19% of adults 65 years and older had a colonoscopy within five years and 13% within 10 years. Twenty percent never had a colonoscopy, and 83% never received a sigmoidoscopy.

For those with Medicare Advantage, 29% enrolled are between 65-74, and 28% are 75 years and older. Of this category 17.2% are female, and 13% are male. Most of the enrollees are White or Asian (23%), and most participants have less than a college education. Over 50% are married, live in the South, and have middle and higher incomes. Over 29% reportedly have a USC, and 20% reported they are in very good or

good health, but over 24% have at least one chronic condition. The annual outpatient physician office visits range from 4-6 and spend around 30% on total healthcare expenditures, with 20% out-of-pocket. About 30% had blood pressure screenings in the past year, most are overweight according to a BMI, and 28% reported having Cholesterol screenings. Half of the participants were recommended Aspirin use, 22% had the flu vaccine, 18% of women had a mammogram and breast exam in the past year, 19% of men had a PSA in the past year, and 6% of the enrollees had a colonoscopy within five years and 4.5% within ten years. More than 6% reported never having a colonoscopy, and 27% reported never receiving a sigmoidoscopy.

For those with Private Supplemental Insurance, 49.4% enrolled are between 65-74, and 35.8% are 75 years and older of which 23.9% are female and 21.7% are male. Most of the enrollees are White or Asian (41%), and most participants have a high school (13.2%) or a college (13.4%) education. Most are married (30%), live in the South, and have middle and higher incomes. Over 43.5% reportedly have a USC, and 15.6% reported they are in very good health, but over 34% have at least one chronic condition. The annual outpatient physician office visits range from 4-6 visits and spend around 45% on total healthcare expenditures with 28% out-of-pocket. For screenings, around 44% had Blood Pressure screenings in the past year, 16.3% are overweight according to a BMI, and 41.5% reported having Cholesterol screenings. Half of the participants were recommended Aspirin use, 34% had the flu vaccine, 28% of women had a mammogram and breast exam in the past year, 35% of men had a PSA in the past year, and 9% of the enrollees had a colonoscopy within five years and 7% within last ten years. One percent

reported having a sigmoidoscopy within five years and 1.6% within 10 years. More than 8% reported never having a colonoscopy, and 38% reported never receiving a sigmoidoscopy.

For Dual-eligible enrollees (Medicaid supplement), 7% are between ages 65 -74 years old, and 6.9% are 75 years and older. More than half are female, and most are Hispanic, with the majority having less than a high school education. Most are reportedly widowed and live in the South, and the majority reported they are under the poverty line (poor). Most have a USC with a perceived health status ranging from fair to poor and have at least one chronic condition (6.3%). Outpatient physician office visits range from 2-3 to 4-6 annually, and 7.3% have total health expenditures with less than a third with out-of-pocket costs (2%). For screenings, the majority (7%) had Blood Pressure screenings during the past year, most are either overweight or obese as per BMI check, 6.8% had cholesterol screenings. Half of the enrollees are recommended Aspirin use. Most had the flu vaccine during the past year, and only 1% had a colonoscopy, with more than 3% having never received one, and most enrollees never received a sigmoidoscopy (6.5%).

Around 1% of adults 65 years and older are uninsured. Most are either middle or higher income, 0.28% have less than high school education, and the majority are White or Asian, married, and live in the West. More than half have a USC, and 0.75% reported they are in excellent health. Less than one percent (0.29%) have at least one chronic condition, and most have no outpatient physician office visits (0.4%). Less than one percent (0.37%) have healthcare expenditures with 0.19% in out-of-pocket costs. For the

screenings, 0.4% had Blood Pressure screenings during the past year, BMI for most enrollees is normal, and 0.31% had Cholesterol screenings in the past year. Most were not recommended Aspirin use (0.14% vs. 0.39%), and 0.18% had the flu vaccine. Less than one percent (0.12%) had a mammogram and breast exam five years or more ago, with 0.16% never receiving a mammogram and 0.08% not receiving a breast exam. Less than one percent (0.12%) of men received a PSA during the past year, and 0.3% reported never receiving it. Of the enrollees, 0.04% reported having a colonoscopy Within the last Five Years and 0.03% Within Ten Years. Less than one percent (0.3%) never had a colonoscopy, and 0.49% never received a sigmoidoscopy.

Results: Change in overall preventive care utilization rates from 2006-2016.

The utilization rates for each yearly outcome for each preventive care service are reflected in the logistic regression calculation for the prevalence of odds ratios (Appendix 7.2) and the adjusted prediction graphs (Figure 5). All show differences in the utilization for post-ACA implementation years (2012 - 2016). Marginal effects were used to observe the change in the probability that the screenings outcome occurs as the risk factor changes by 1 unit, while holding all the other explanatory variables constant. It represents the change in the probability that the outcome occurs, associated with a 1-unit change in the risk factor across years 2006-2016. They are intuitive because they are expressed as the change in the predicted probability that the outcome occurs that is associated with a 1-unit change in the risk factor. Grouped dummy year variables represent the predictors, pre-ACA (2006-2010) and post-ACA (2012-2016) periods, created to measure the differences before and after the ACA implementation. The

marginal effect of the 1-unit changes in the risk factor, for the predictor years, changes the predicted outcome and likelihood of utilization rates of preventive screenings during the Past Year, Within Two Years, Within Three Years, Within Five Years, Five or More, Ten Years, Ten Years or More vs. Never (baseline).

The average marginal effects reflect the differences before (2006-2010) and after (2012-2016) the predictor year 2011. For Past Year Blood Pressure screenings, the utilization rates averaged 89% (P<0.000) pre-ACA vs. 90% post-ACA (difference 1%). Past Year Cholesterol screenings were 72%(P<0.000) pre-ACA vs. 75% post-ACA (difference of 3%). Aspirin recommended use was 28%(P<0.000) pre-ACA vs. 29% post-ACA (difference 1%). The flu vaccine was 44%(P<0.000) pre-ACA vs. 49% post-ACA (difference 5%).

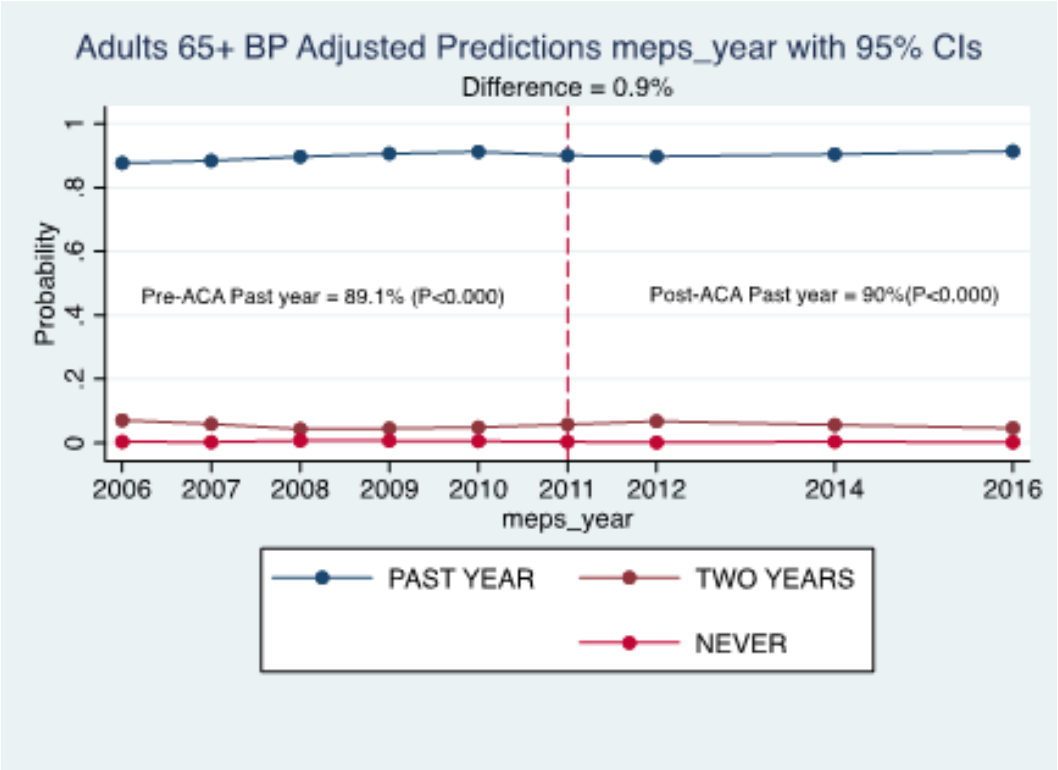
Pap smears in the Past Year for ages 65-74 was 24%(P<0.000) pre-ACA vs. 17% post-ACA (difference -9%). For biennial Pap smear screenings, it was 21% (P<0.000) pre-ACA vs. 20% post-ACA (difference -1%). For women 75 years and older, Past Year screenings were 18% (P<0.000) pre-ACA vs. 12% post-ACA (difference -6%). Within Two Years it was 12% (P<0.000) pre-ACA vs. 10% post-ACA (difference -2%). For Past Year mammogram screenings for women ages 65-74 it was 43% (P<0.000) pre-ACA vs. 43% post-ACA (difference 0%). Within Two Years it was 16%(P<0.000) pre-ACA years vs. 17% post-ACA (difference 1%). Past Year mammogram screenings for women 75 years and older was 39% (P<0.000) pre-ACA vs. 34% in post-ACA (difference -5%). Within Two Years it was 23%(P<0.000) pre-ACA vs. 24% post-ACA (difference 1%). Past Year breast exams for women ages 65-74 was 48% (P<0.000) pre-ACA years vs. 44% post-ACA years (difference -4%). Within Two Years it was13%

(P<0.000) pre-ACA vs. 12% post-ACA (difference 1%). Past Year screenings for women 75 years and older was 44%(P<0.000) pre-ACA vs. 40% post-ACA (difference -4%). Within Two Years it was 17% (P<0.000) pre-ACA vs.16% post-ACA (difference -1%). Past Year Prostate cancer screenings (PSA) for men 65 years and older was 53%(P<0.000) pre-ACA vs. 50% post-ACA (difference -3%). Within Two Years it was 16% (P<0.000) pre-ACA vs. 17% post-ACA (difference of 1%). Ten-year colonoscopy screenings were 16% (P<0.000) for adults ages 65-74 pre-ACA vs.17% post-ACA (difference of 1%). Adults 75 years and older were 17% (P<0.000) pre-ACA vs. 19% post-ACA years (difference 2%). For Five-Year sigmoidoscopies for adults ages 65-74 and 75 years and older, no significant differences were found between the pre- and post-ACA years.

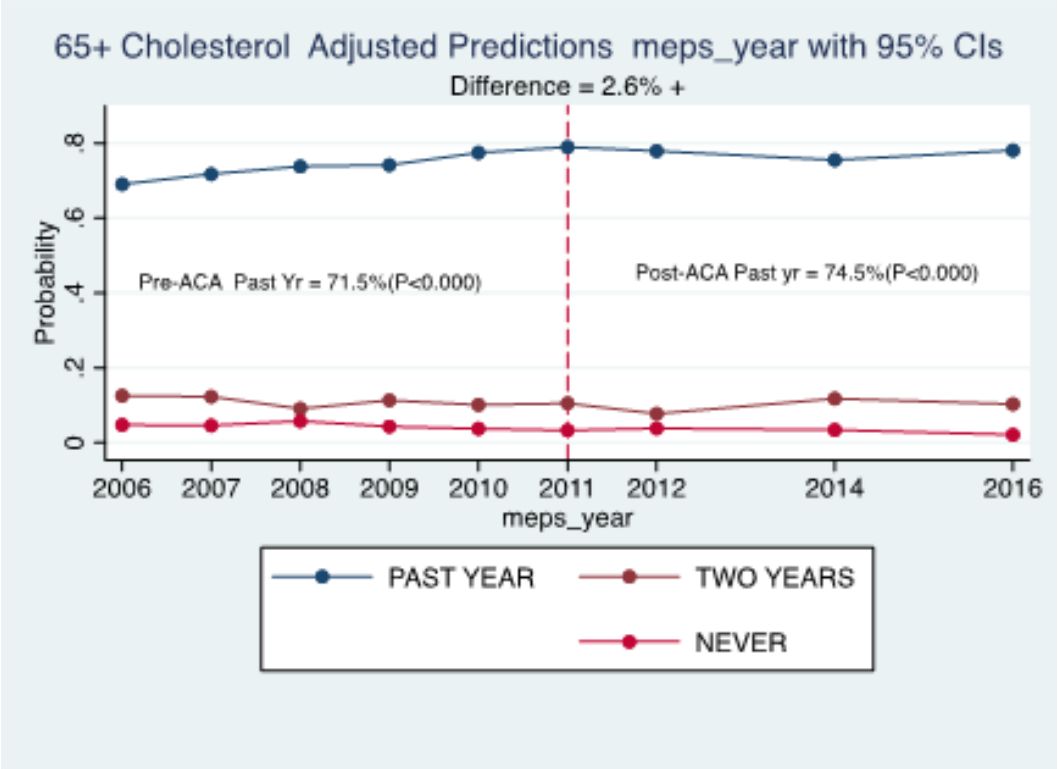
Figure 5: Adjusted Predictive Margins for Preventive Care Outcomes - 2006-2016

1) Screenings for Blood conditions:

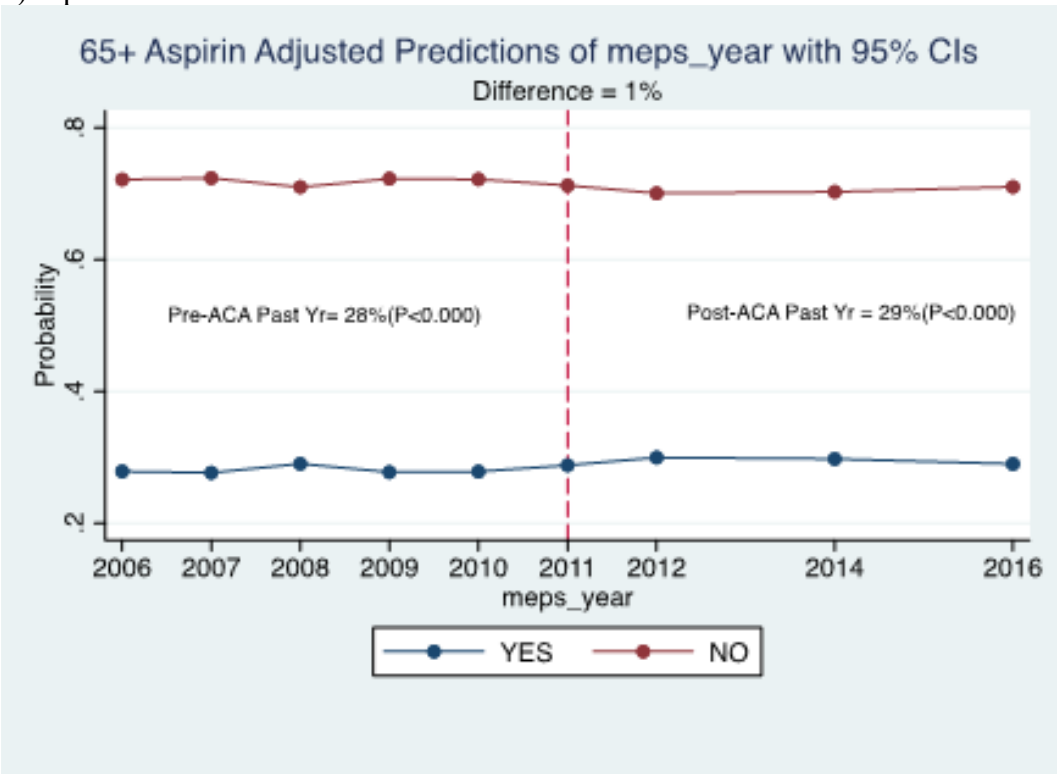
Blood Pressure



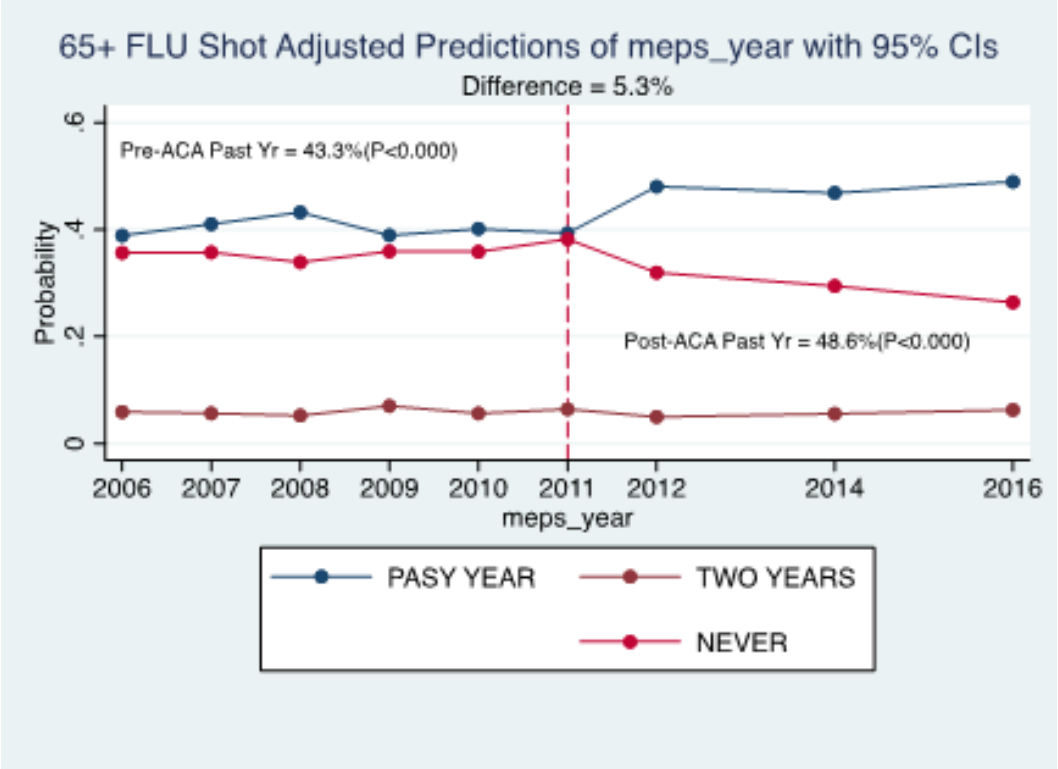
Cholesterol




2)Aspirin Use

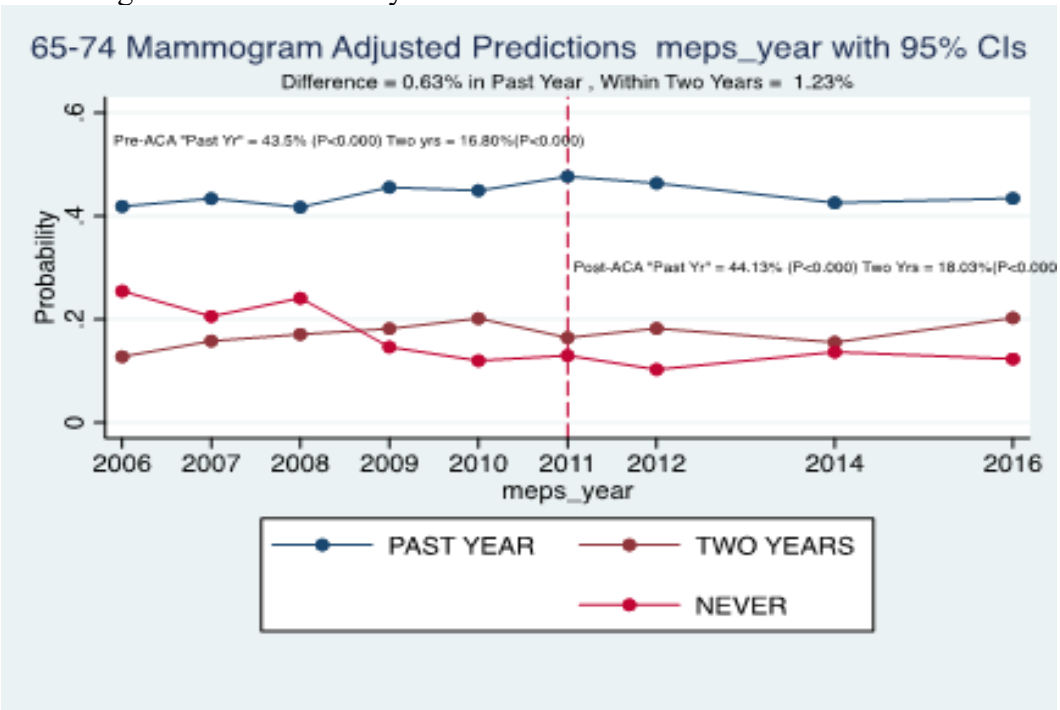


3)Influenza (Flu) Vaccine

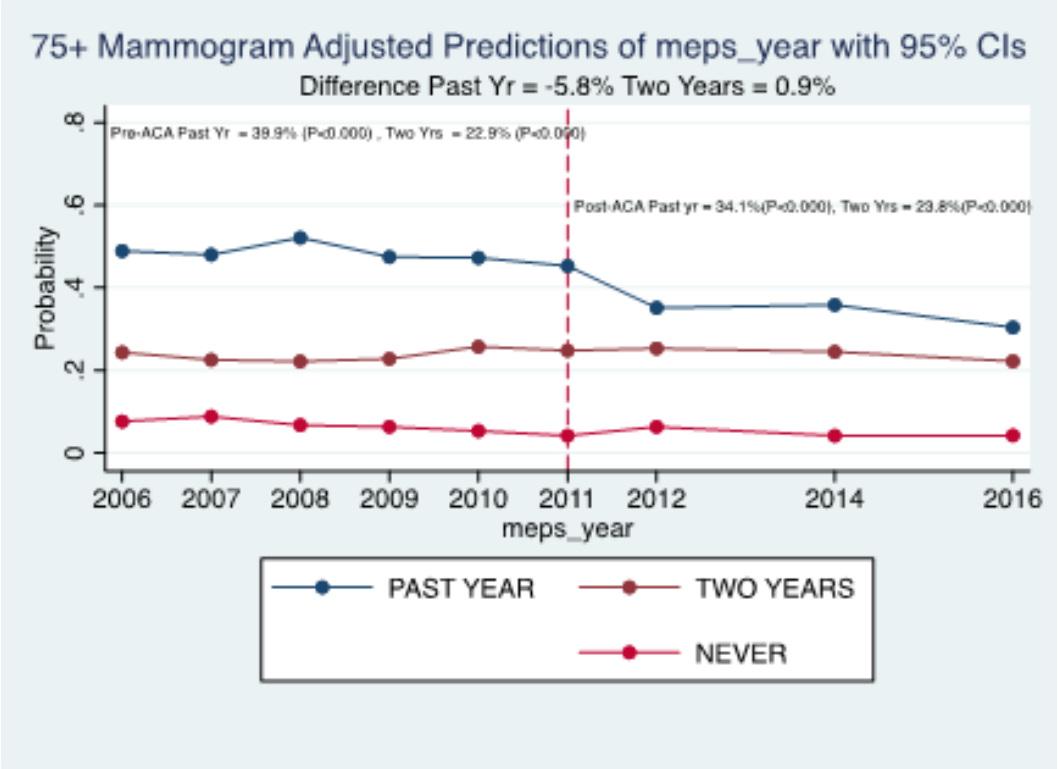



4) Cancer Screenings:

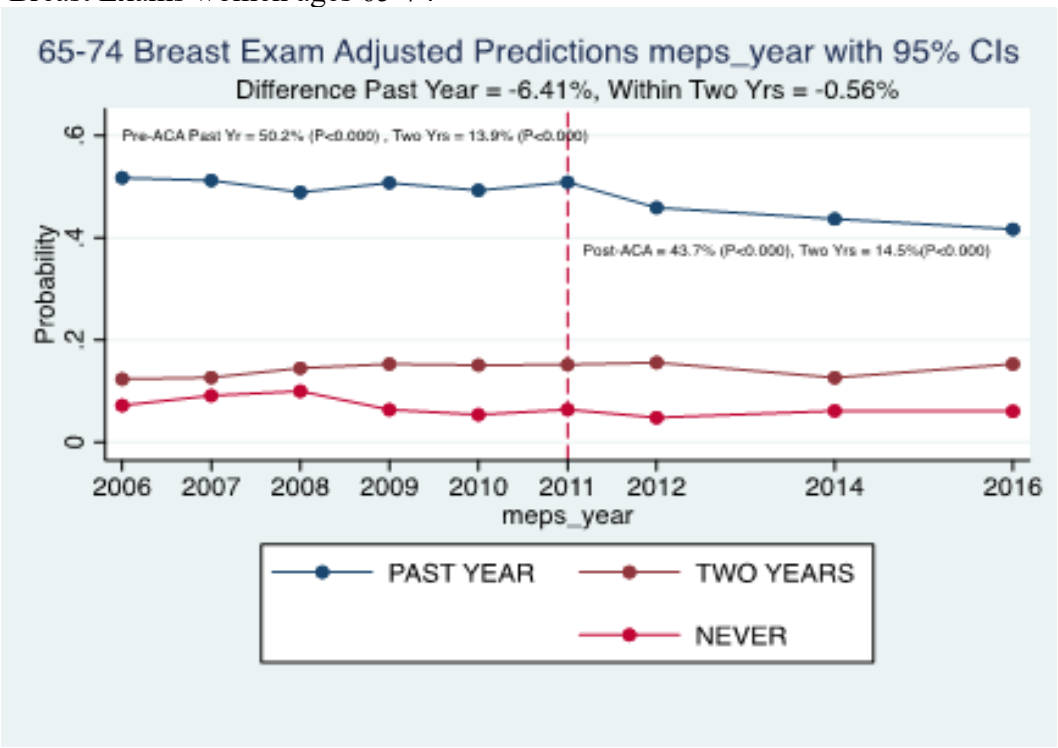
Mammograms women 65-74 years



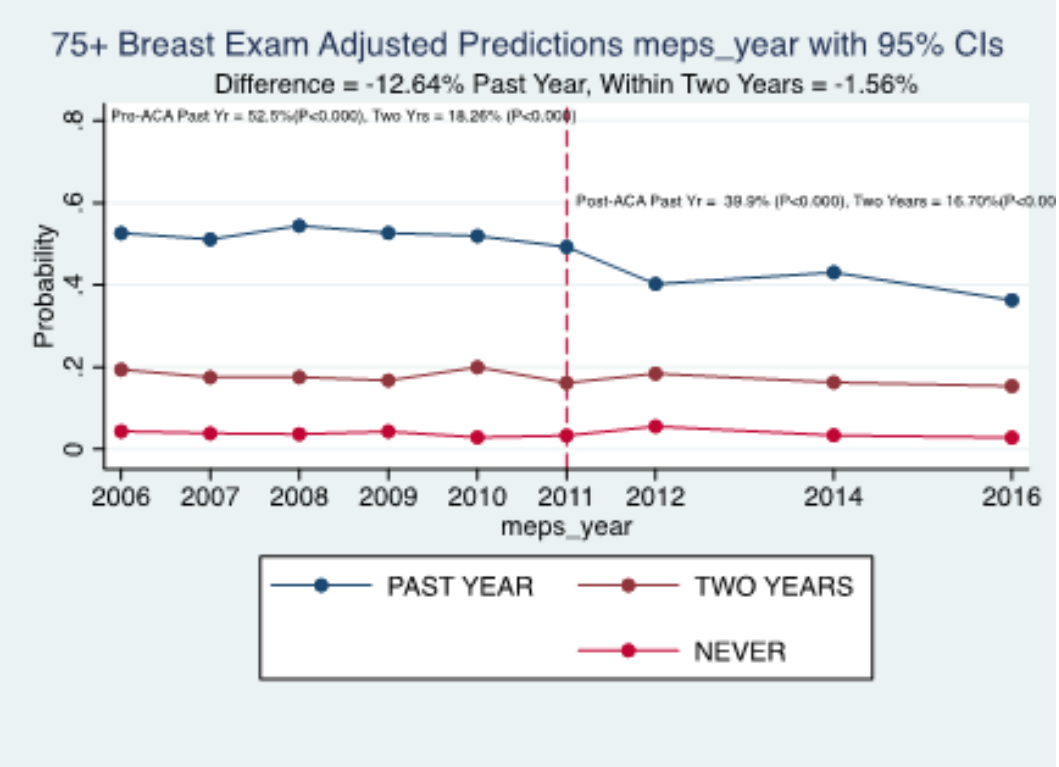
Mammograms women 75 years and older



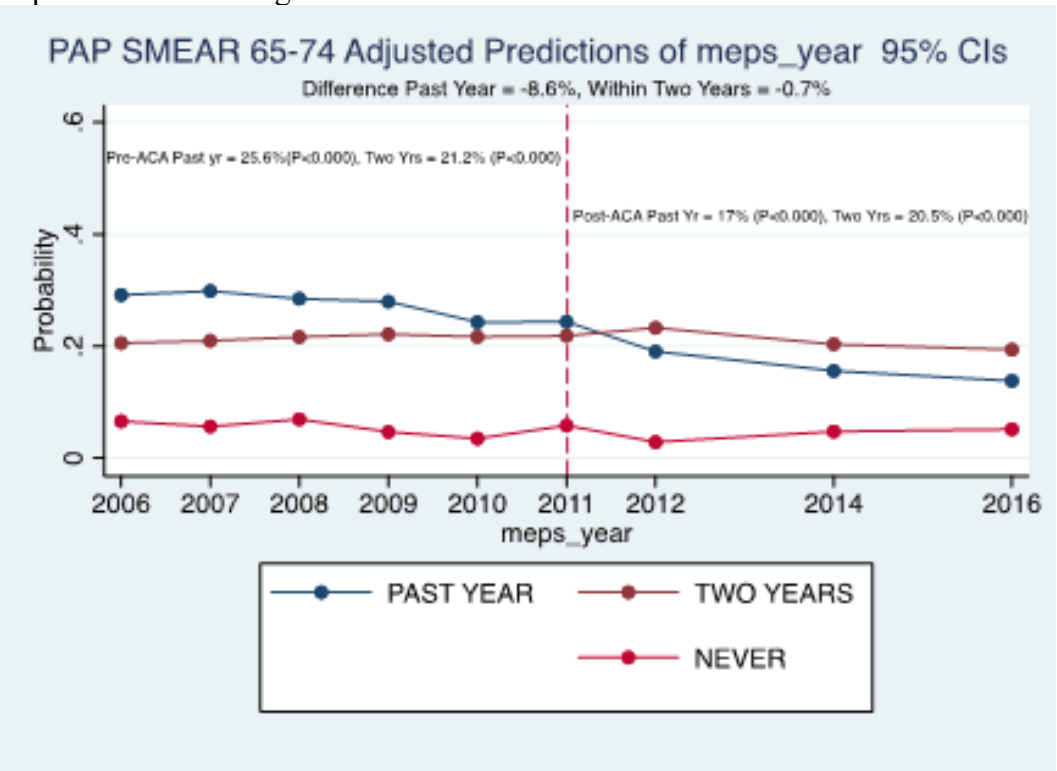

Breast Exams women ages 65-74



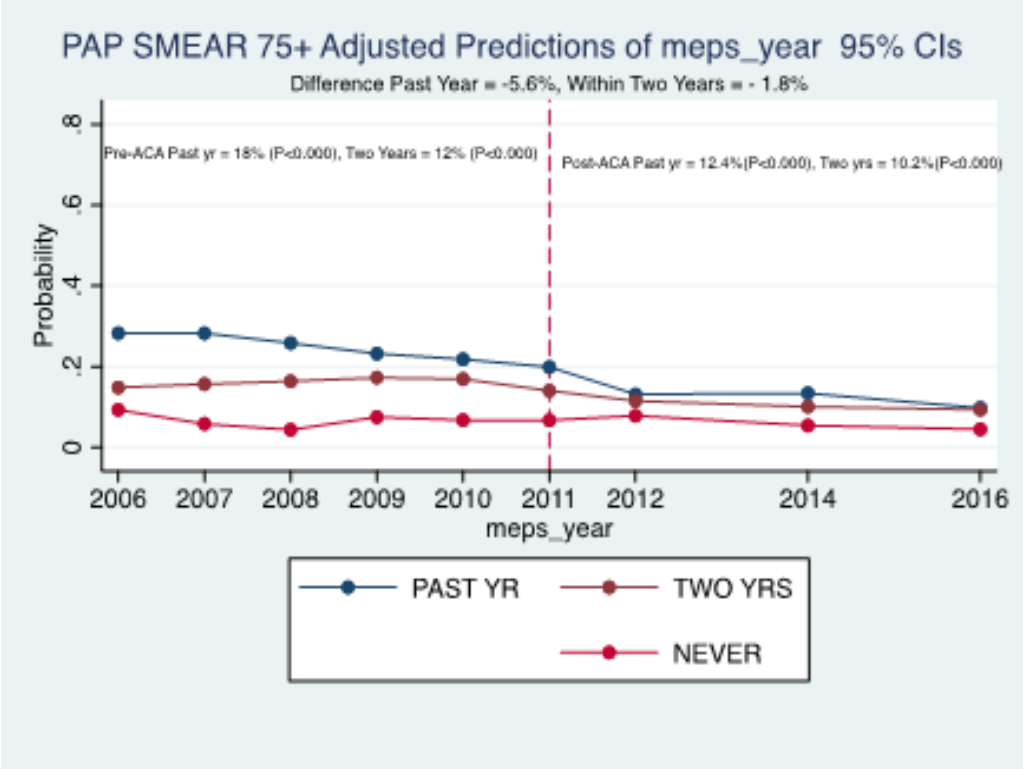
Breast Exam women 75 years and older



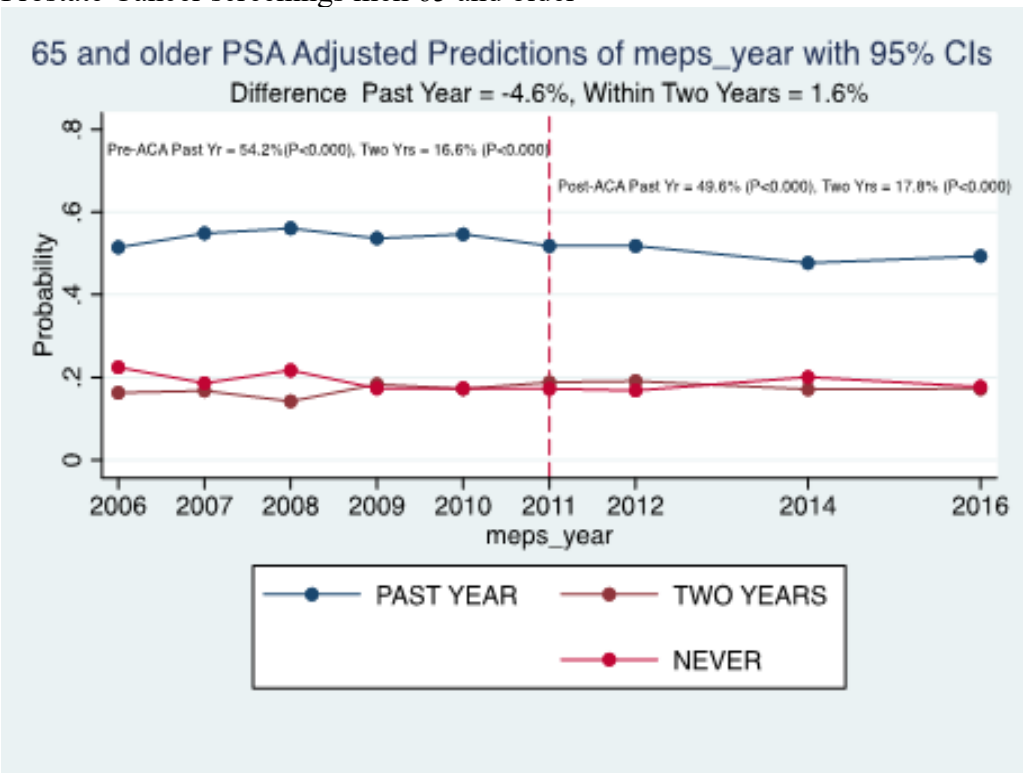

Pap Smears women ages 65-74



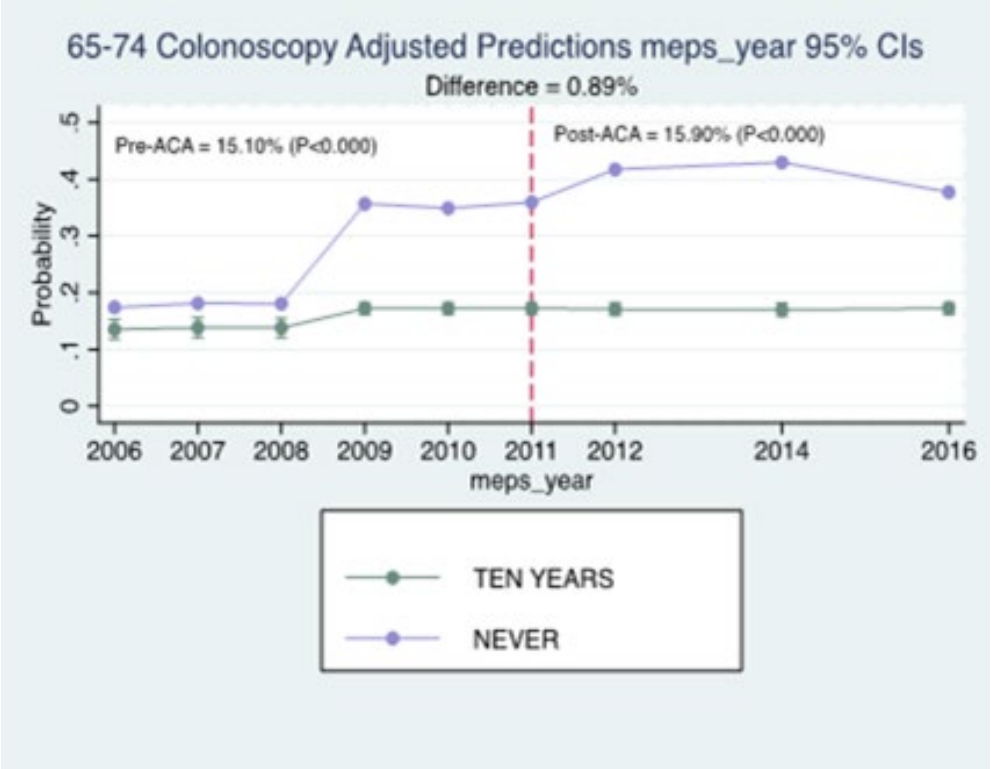
Pap Smears women 75 years and older



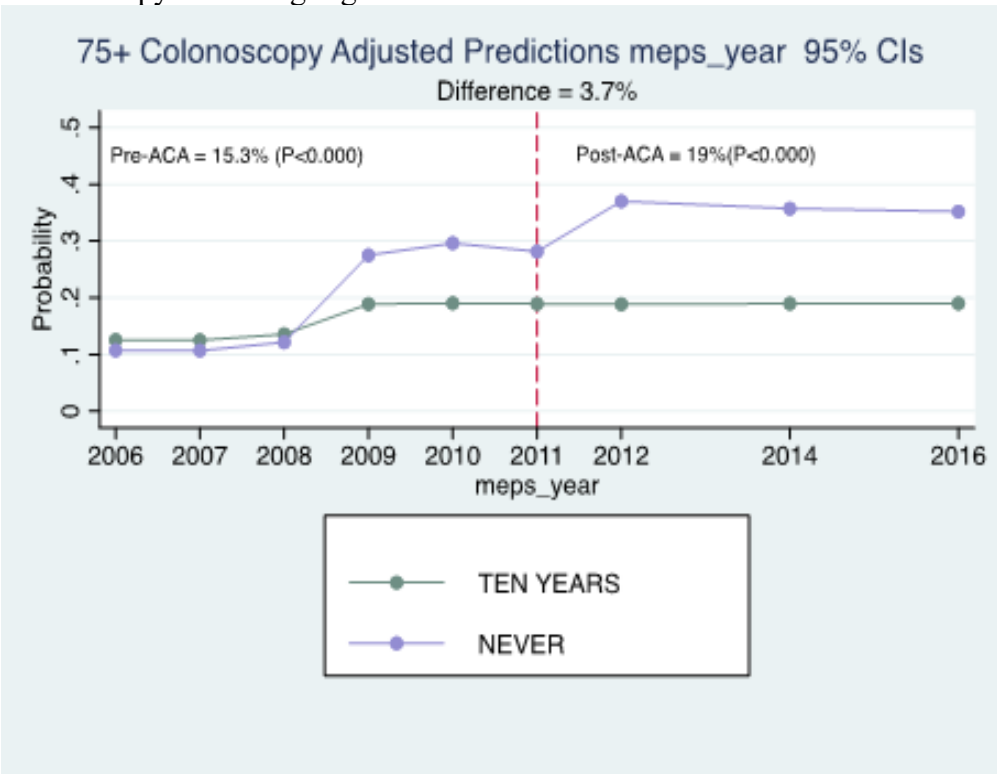

Prostate Cancer screenings men 65 and older



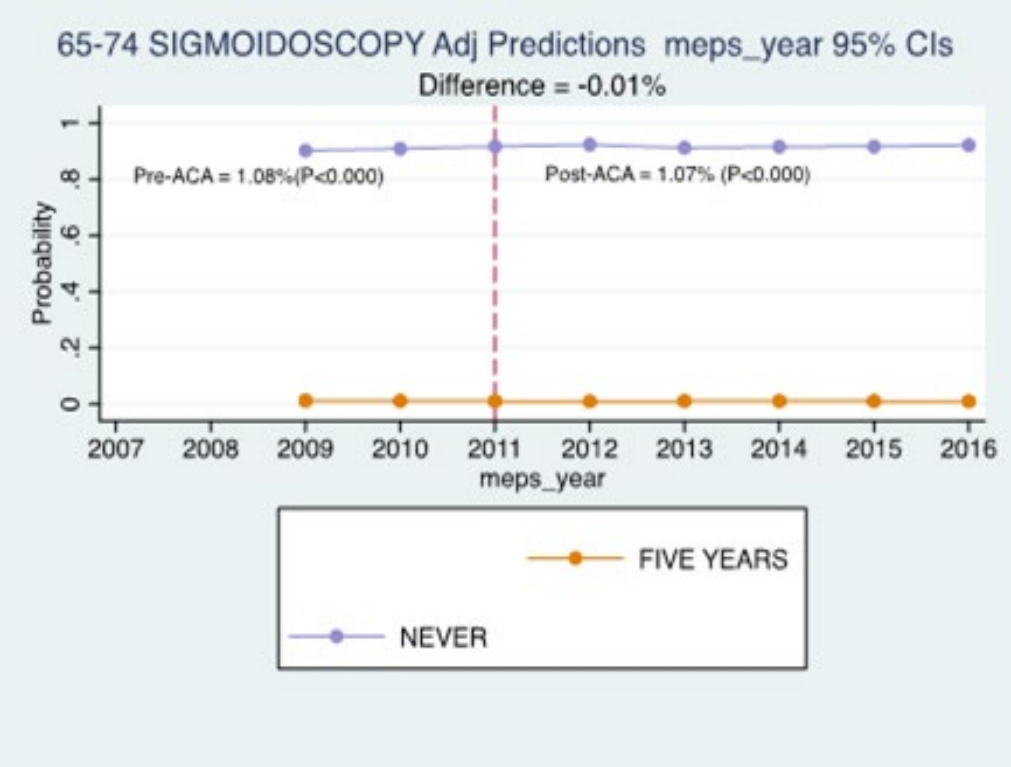
Colonoscopy screenings adults ages 65-74



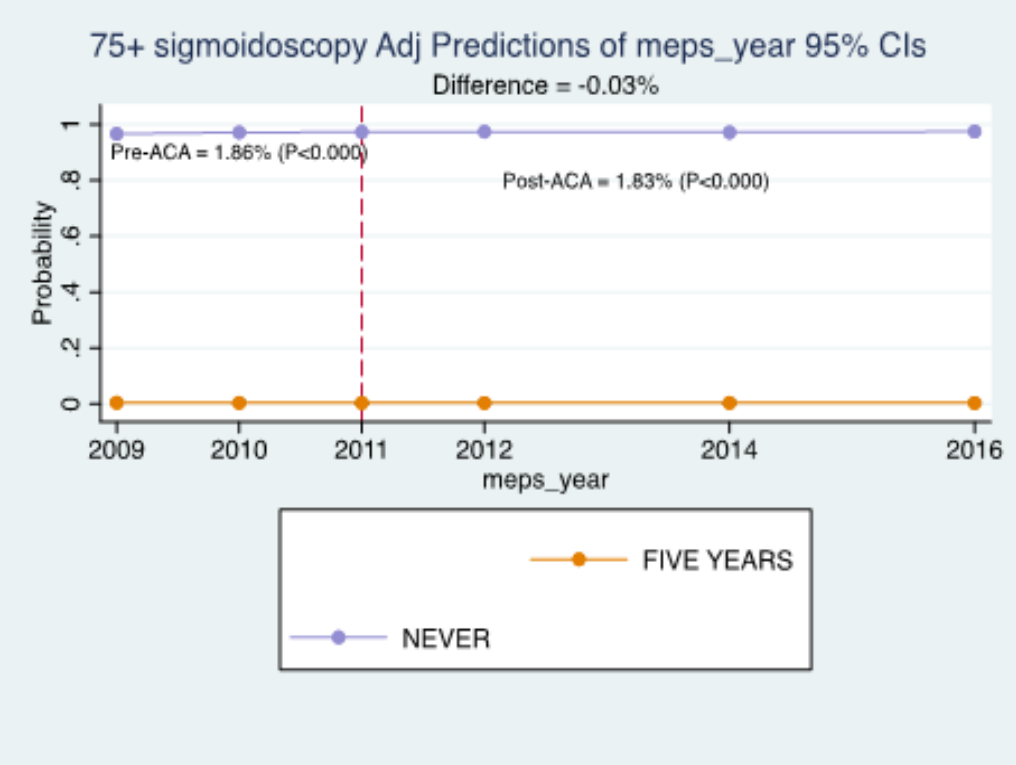

Colonoscopy Screenings ages 75+



Sigmoidoscopy ages 65-74




Sigmoidoscopies age 75+



Discussion

This research confirms previous studies (Jensen et al., 2015; Toseef et al., 2020) that the ACA cost-waving provision has impacted utilization rates of preventive care services among Medicare beneficiaries 65 years and older. Statistically significant differences were found for all ten USPSTF-recommended preventive care services among the subpopulation sample (39,780,150), post-ACA. Mammograms and pap smears had an expected decrease in utilization for annual screenings, most likely due to updated USPSTF guidelines recommending biennial screenings (USPSTF 2009). Statistically significant increases were found in physician office visits with simultaneous increases in total healthcare expenditures (except for colonoscopies, where the total health expenditures decreased), but not to the point of "ex-ante moral hazard." The most significant ($P<0.05$) predictors were outpatient physician office visits, total healthcare expenditures, source of payment expenditures (except Medicaid expenditures reduced for most preventive services) and having Medicare Advantage and Private insurance coverage. Being married also increased the odds of preventive screenings, while having less than a high school education decreased the likelihood. Poverty status (poor, near-poor) decreased the odds of preventive screenings and prevalence of one or more chronic conditions increased the odds. The study limitations included using self-reported responses and not having access to Annual Wellness Visit data, which may reflect higher utilization rates. However, in addition to examining variables included in previous studies (Jensen et al., 2015; Toseef et al., 2020), this study's predictor variables also included: total expenditures, source of payment, and prevalence of chronic conditions, resulting in significant differences from pre-ACA outcomes with increased probability

for receipt of USPSTF grades A and B recommended preventive care services post-ACA implementation. The diverse variance in outcomes in post-ACA years for some cancer screenings may be due to updated adherence to USPSTF recommendations or differences in Medicare's coverage policy recommendations. Although USPSTF recommends pap smears every 3-5 years up to age 65, Medicare covers every 24 months, except if there is an abnormal pap smear within three years, it is covered annually. Although USPSTF recommends mammograms every two years, Medicare annually covers women 40 and older. Medicare also covers annual breast exams. The USPSTF recommends PSA screenings for men ages 55- 69 and it is an individual's choice (grade C), but does not recommend it for men 70 years and older (grade D). However, Medicare will cover annual PSA screenings for men with no age requirement. The USPSTF recommends colonoscopies for adults aged 50 to 75 (grade A) and 76-85 (grade C) every ten years and for flexible sigmoidoscopy every five years. However, Medicare covers screening colonoscopies once every 24 months if at high risk for colorectal cancer and every ten and five years after a flexible sigmoidoscopy with no minimum age requirement.

While the utilization of preventive care services has increased among adults 65 years and older, a substantial increase was expected in cancer-related screenings following the ACA provision, especially among those previously susceptible to copays. However, compared to other studies, it was also found that cost is not the only barrier impacting access to preventive healthcare services (Chandra et al., 2010; Meeker et al., 2011; Rice et al., 2004). There may be various factors impacting the sub-utilization of services which may be associated with age eligibility of USPSTF requirements

conflicting with other nationally recommended guidelines resulting in inconsistencies in screenings (Cooper et al., 2017; Han et al., 2015; Lesser et al., 2011; Xu et al., 2020) Beneficiaries from marginalized communities may not have access to facilities that offer Annual Wellness Visits or could have transportation issues impacting access (Blustein et al., 1995; Carrasquillo et al., 2001; Diamant et al., 2004; Gross et al., 1999; Okoro et al., 2005). The type of insurance characteristics also remains a significant factor impacting access (Adepoju et al., 2015; Baicker et al., 2004; Chen et al., 2007; Chou et al., 2007; Fox et al., 2007; Griffin et al., 2017; Moy et al., 2008; Peek et al., 2007). This study's findings also concluded that those with private supplemental insurance and Medicare Advantage plans increased the odds of receiving preventive services.

Conclusion:

This study contributes to other relevant research assessing the impact of the ACA provisions on improving the utilization rates of preventive care services among adults 65 years and older. Comparable to previous studies (Chandra et al., 2010; Meeker et al., 2011; Rice et al., 2004)., this research concludes that cost can be a significant barrier impacting the use of preventive care. However, other factors, such as Medicare's alignment with USPSTF grade A and B recommended clinical guidelines, could not only impact identifying chronic conditions early in development, but may increase preventive care utilization amongst Medicare beneficiaries and avoid inconsistencies with different coverage policy guidelines impacting appropriate preventive care practices patterns (Chambers et al., 2014; Jiang et al., 2015). Future research is needed beyond this current

study to ensure that older vulnerable adults, susceptible to higher cancer prevalence risk, get access to grade C and D services which are not USPSTF recommended due to age requirements.

Key findings:

- The utilization of nine out of ten preventive care screenings had significant differences between the pre-ACA (2006-2010) and post-ACA years (2012-2016), except for cervical cancer screenings.
- Annual mammograms and pap smears had an expected decrease in utilization, most likely due to USPSTF updates to screening intervals and age requirements.
- Probability of screening was related to types of insurance coverage characteristics (Medicare Advantage and Private).
- Having less than a high school education and poverty status (poor, near-poor) decreased the odds of preventive care screenings.
- Having one or more chronic conditions increased the odds of preventive care screenings.

## CHAPTER III – PAPER TWO

### Impact of the Affordable Care Act on improving the alignment of Medicare's preventive care service coverage policy with USPSTF grade A and B clinically recommended practice guidelines among adults 65 years and older.

Introduction:

An effective way to address preventable disease and chronic conditions is by increasing awareness, providing uniform evidence-based preventive care services, and patient education. The USPSTF has age and sex-specific guidelines for relative risk outcomes supported by evidence-based research. If these recommended guidelines are not followed, older adults are at risk for false-positive results leading to unnecessary diagnostic tests and treatments, which can be detrimental (Chambers et al., 2014; Cooper et al., 2017; Lesser et al., 2011). Inconsistences in screening intervals can also be harmful, with missed opportunities to identify chronic conditions early in development (Jiang et al., 2015). Differences in national screening guideline protocols (e.g., American Cancer Society (ACS), American College of Obstetrics and Gynecology (ACOG), and Medicare (CMS)) can be confusing not only to patients, but to healthcare professionals.

In 2010 the Affordable Care Act, Title IV (Section 2713) mandated all health policy insurers to cover USPSTF grade A and B clinically recommended preventive care screenings. The USPSTF recommendations are guided by evidence-based research provided by the Agency for Health Care Research and Quality (AHRQ). AHRQ is the leading Federal agency responsible for improving the safety and quality of healthcare on a national level. They review and compile evidence-based research data needed to

improve the healthcare system to guide consumers, healthcare professionals, and policymakers to make informed health decisions (AHRQ 2022).

Medicare adopted Section 4105 of the ACA in 2011, which authorized expanding its prior coverage of preventive care services. These included evidence-based screenings practice guidelines consistent with the U.S. Preventive Services Task Force grade of A, B, C, or I recommendations (Table 9). But the ACA provision does not authorize Medicare to cover payment for services that have received a grade of D or I from the USPSTF. However, during and following the ACA implementation, there were evidence-based updates to the existing USPSTF screening guidelines for some preventive care services, which could impact appropriate care practices. These include changes to past age recommended requirements for certain cancer screenings, such as breast, colorectal (updated 2016), and cervical cancer screenings (updated in 2012 and 2018). Also, cardiovascular prevention, such as Aspirin use, was recently updated (2022 – Grade D) to not recommend routinely for adults 65 years and older. The Affordable Care Act requires insurers to cover these services with no cost-sharing (i.e., no deductible and no copay). The ACA's Title IV provision included Section 4103 to provide cost-free annual wellness visits, which consists of a yearly personalized prevention plan, and Section 4104, which removes financial barriers associated with preventive care services by eliminating cost-sharing. Although the ACA mandates insurers to cover USPSTF-recommended grade A and B services, it raises the question of whether all of these services are consistent with clinically recommended practice guidelines among Medicare beneficiaries 65 years and older.

This study seeks to evaluate whether there have been inconsistencies in the adherence of USPSTF clinically recommended guidelines among Medicare beneficiaries 65 years and older since the implementation of the Affordable Care Act. It is the first known study since the ACA's implementation to assess whether preventive services for Medicare beneficiaries aged 65 and older align with updated USPSTF recommended guidelines. A previous study by Lesser in 2011 evaluated the alignment of Medicare preventive services coverage with the USPSTF recommendations before the ACA health reform. The primary outcome measure was the percentage of recommended screening adherence between USPSTF recommendations and Medicare coverage. They found that although the USPSTF recommended up to fifteen preventive intervention services among adults 65 and older, Medicare had only fully reimbursed 7% and partially covered 93% of these services as part of the one-time Welcome-to-Medicare visit. When interpreting these study findings, the study's limitations of potential self-report bias and not measuring differences in utilization rates of preventive services relative to cost barriers among older Medicare beneficiaries should be considered (Lesser et al., 2011). The study's strengths included controls for total healthcare expenditures, source of payment (including out-of-pocket), outpatient provider office visits, type of insurance, socioeconomic characteristics, existing chronic conditions, and presence of an established healthcare provider.

Table 9: USPSTF definition of assigned letter grades (A, B, C, D, or I)

| Grade | Definition | Suggestions for Practice |
|---|---|---|
| A | The USPSTF recommends the service. There is high certainty that the net benefit is substantial. | Offer or provide this service. |
| B | The USPSTF recommends the service. There is high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial. | Offer or provide this service. |
| C | The USPSTF recommends selectively offering or providing this service to individual patients based on professional judgment and patient preferences. There is at least moderate certainty that the net benefit is small. | Offer or provide this service for selected patients depending on individual circumstances. Updated July 2012.<br><br>Prior July 2007: Offer or provide this service only if other considerations support the offering or providing the service in an individual patient. |
| D | The USPSTF recommends against the service. There is moderate or high certainty that the service has no net benefit or that the harms outweigh the benefits. | Discourage the use of this service. |
| I Statement | The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of the service. Evidence is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined. | Read the clinical considerations section of USPSTF Recommendation Statement. If the service is offered, patients should understand the uncertainty about the balance of benefits and harms. |

USPSTF: https://www.uspreventiveservicestaskforce.org/uspstf/about-uspstf/methods-and-processes/grade-definitions

Literature review

During and following the ACA implementation, there were evidence-based updates to the existing USPSTF screening guidelines for some preventive care services, which could impact appropriate care practices for adults 65 and older. Although the USPSTF has age-specific recommended grade A and B guidelines for relative risk outcomes supported by evidence-based research, Medicare's policy offers coverage for recommended (A, B) and non-recommended (C, D, and I) preventive care services. Older adults may be inappropriately screened, leading to false-positive results and unnecessary diagnostics.

The U.S. Preventive Services Task Force (USPSTF) is dedicated to improving population health by recommending effective ways to prevent disease, promote health, and prolong life. Following good clinical practice (GCP), these guidelines are developed to better incorporate medical ethics and used to guide the decision-making of healthcare professionals in their daily routines. They are updated whenever new research has proven it may be harmful to participants, have no relevant impact on health, or is unethical (U.S. Food & Drug Administration, 2021). The USPSTF guides primary care clinicians by offering guidelines to help prevent disease and promote good health by reviewing a vast array of scientific studies every year on preventive services that include screenings, counseling, and treatment. Evidence-based research is then offered as a guide for primary care providers to implement the best care for patients (USPSTF, 2021).

However, keeping current with clinical guidelines can challenge some providers with different practice patterns. Age requirements for certain cancer screenings were

updated following the ACA implementation, such as breast (updated 2012), colorectal (updated 2016), and cervical cancer screenings (updated in 2012 and 2018). Aspirin, known for cardiovascular prevention, was updated most recently (2022 - grade D) and no longer recommended for older adults. There is limited research on inconsistencies' between USPSTF updated age requirements for specific recommended guidelines and the impact it may have on good clinical practices applied to older Medicare beneficiaries. This literature reflects research examining the alignment of USPSTF preventive service recommendations with Medicare provider practices and variances in clinical practice guidelines among nationally recognized agencies for recommended cancer screenings.

Congress has attempted to align Medicare policy coverage of preventive services with the USPSTF grade A and B screenings. It is unknown if interventions such as Annual Wellness Visits have impacted healthcare provider practice in following these evidence-based clinical recommendations. Lesser et al. evaluated the alignment of coverage of Medicare Preventive care services and compared it to current USPSTF recommended guidelines before the ACA implementation. The adherence to evidence-based recommended preventive services for adults 65 years and older was measured against Medicare's preventive care coverage guidelines. They found a substantial disconnect between USPSTF recommended screenings compared to Medicare's coverage policy, impacting coordination of care and coverage of non-recommended services. Medicare covered at least seven non-recommended preventive services. They included: Abdominal aortic aneurysm in women; cervical cancer in women >65 yrs. and not at high risk; cervical cancer in women with hysterectomy for benign disease; colon cancer aged

>85 yrs.; coronary heart disease in low-risk patients; ovarian cancer and prostate cancer >75 years and older. The researchers concluded nonadherence to USPSTF recommended guidelines could cause harm with unnecessary screenings, false-positive results, and complications that include redundant follow-ups, testing, and increased Medicare expenditures (Lesser et al., 2011). One study assessed the clinical impact of the ACA's provisions for mammogram and colonoscopy screening rates among Medicare beneficiaries 70 years and older continuously enrolled in parts A and B using Medicare claims data. Although there were no significant changes in colonoscopy screenings, they did observe an uptake of screenings for mammograms since the introduction of the ACA's annual wellness visits among women 70 years and older. Subsequent annual screenings were significantly associated with beneficiaries already engaged in preventive practices. They concluded inconsistencies in practice adherence to USPSTF clinically recommended guidelines were most likely due to policy differences in age requirements from both Medicare and the American Cancer Society (ACS). Both agencies allow screenings for all women over 40 years old and recommend annual screenings, unlike the USPSTF, which only recommends mammogram screenings for ages 50-74 years old (grade B) and does not recommend (grade I) for all women (Cooper et al., 2017). A similar study examined trends in provider adherence to biennial recommended mammogram screenings before and after the USPSTF updated its guidelines in 2009. It was updated to recommend screenings from one year to two for women aged 40 and older, biennial screenings for women 50-74, and making no recommendations for women 75 and older, which conflicts with recommended guidelines from Medicare and the ACS. They found that subsequent screenings decreased for women 75 years and older who

chose to adhere to the new guidelines even though CMS covered annual screenings with no age limit. Inconsistencies in guideline recommendations can be a significant barrier to screening practices, and researchers concluded it might confuse provider decisions as to which appropriate screening intervals to follow (Jiang et al., 2015). Some screenings, however, were found to be consistent with clinically recommended guidelines. The USPSTF no longer recommends prostate cancer screenings for men over 70 (grade D), but for men ages 65-69; the guidelines state the choice should be up to the individual if the potential benefits and harms of screening have been discussed with his clinician. One study sought to determine the effect of the 2012 USPSTF update on the age-recommended guideline for prostate-specific antigen (PSA) screenings. PSA screening intervals from 2011-2016 among men 65 years and older were examined for comparable changes since 2012. They found improved consistencies with adherence to USPSTF guidelines, with PSA testing significantly decreasing for men 65 years and older (Magnani et al., 2014).

Differences between USPSTF and national screening guideline protocols (e.g., ACS, ACOG, and CMS) can be confusing not only to patients but to healthcare professionals. It could also lead to over or underusing recommended preventive care screenings. Numerous studies have examined provider adherence to updated USPSTF recommended guidelines before and after the ACA mandated coverage for all insurers. Corbelli et al. (2014) examined the extent to which physicians in different primary care specialties adhere to current USPSTF Mammogram screening guidelines and found that primary care providers, particularly gynecologists, have mixed practice patterns.

However, most women view gynecologists as primary care providers for women's health. Inconsistencies may be due to conflicting requirements from the American Cancer Society (ACS), the American College of Obstetricians and Gynecologists (ACOG), and Medicare which continues to recommend annual mammogram screenings for all women 40 and over the recommended age limitations. The study found that the conflicts arise due to continued practice beliefs (gynecologists vs. non-gynecologist primary care physicians) that yearly screening is consistent with the standard of care and fear that decreased screening will harm women at higher risk. The study concluded that mixed messages could confuse the provider in adherence to breast cancer screening and acknowledged continued nonalignment of Medicare coverage with updated 2009 USPSTF guidelines may impact mammography access, attitudes, and practices for both patients and providers (Corbelli et al., 2014). Another study examined breast cancer screening beliefs, recommendations, and practices using a nationally representative sample of primary care physicians (PCP). Comparing practice recommendations to USPSTF clinical guidelines in 2006 and 2007, they investigated reports from four types of PCPS (family medicine, general practice, internal medicine, and obstetrics/gynecology). The survey questions included:1) which tests they recommend for breast cancer screening, at what frequency, and for which age groups; 2) their beliefs about breast cancer screening effectiveness; and 3) physician and practice characteristics associated with recommending an age at which to no longer recommend screening. They observed variations in recommendations made by gynecologists vs. primary care physicians, following the updated USPSTF guidelines for mammogram screenings, which impacted practice patterns. They found obstetricians/gynecologists were

significantly less likely than other specialties to consider not recommending mammograms for older women and had higher breast cancer screening rates than other U.S. physicians. (Meissner et al., 2011). However, it is worth noting for this research that only a small proportion of older women continue to use gynecologists and are more likely to receive mammograms from their primary physician. Similar research used the National Survey of Primary Care Physicians' Cancer Screening Recommendations and Practices to assess differences in providers' self-reported attitudes toward the 2009 USPSTF updates for clinical practice guidelines for breast and cervical cancer screenings. The National Survey of Primary Care Physicians' Cancer Screening Recommendations and Practices is a nationwide survey of family and general practitioners, general internists, and obstetrician/gynecologists, sponsored by NCI, AHRQ, and the CDC (OMB No. 0925-0562). The researchers found one-third of providers reported that mammography screening practices for women ages 50–74 had not changed since the guideline revisions and that their patterns were not concordant with biennial screening USPSTF recommended guidelines. Reasons cited included: patient concern about the guidelines (74%), provider not agreeing with the guidelines (50%), health system measurement of a provider's screening practices measures that used conflicting criteria (40%), malpractice risk (33%), and inadequate time to discuss benefits and harms (17%). However, for cervical cancer screenings, most providers reported that their screening practices adhered to the updated USPSTF screening guidelines, with fewer reporting their practice patterns had not changed despite being nonconformant with the new guidelines. Reasons for nonadherence included patient concerns about the guidelines (36%), health system measurement of the provider's screening practices that use different criteria

(21%), provider not agreeing with the guidelines (14%), malpractice risk (11%), and inadequate time to discuss the benefits and harms of screening (8%). The study concluded the inconsistencies in practice patterns were associated with conflicting views in adherence to USPSTF recommendations, with providers reporting concerns expressed by patients about the guidelines, the use of contradictory performance measurement metrics, concerns about liability, and the lack of time to discuss the benefits and harms of screenings (Haas et al., 2016). Changes to USPSTF guidelines for breast and cervical cancer screening have created confusion and controversy for women and their primary care providers.

Literature also suggests clinicians may be uncertain or confused about which services to provide due to various conflicting nationally recommended clinical guidelines for preventive services. One study used three focus groups consisting of 26 primary care physicians from different regions in New Jersey to assess the clinicians' perceived barriers to implementing USPSTF guidelines. The aim was to better understand the organizational factors of primary care practices that may impact the delivery of USPSTF recommended preventive care services. The reported perceived barriers were associated with payment and cost issues with clinicians noting lack of reimbursement and increases in overhead (e.g., cost of performing flexible sigmoidoscopies); time spent providing preventive services (such as counseling) and referrals; legal issues associated with concerns of increased liability for colon cancer screening services they would prefer to refer to specialist (e.g., gastroenterologists); frustration over inconsistences in health practices tools with conflicting recommended guidelines; lack of internal guidelines

causing physicians to be unaware of updates to recommendations and concerns over patient-provider relationship perceived as lecturing or offensive. The study concluded there was a need to address clinician perceived barriers to guide implementation by promoting awareness of existing support of their health practice (Ayres et al., 2007). Salloum et al. (2014) assessed whether mammogram and pap smear screenings among Medicare beneficiaries aged 66–80 were influenced by changes in the 2002 U.S. Task Force's recommendation for grade B screenings for all women over 40 between 2001-2007. They controlled for socioeconomic characteristics using data from the Medicare Current Beneficiary Survey (MCBS). More than two-thirds of Medicare beneficiaries reported receiving a mammogram and more than one-third a cervical cancer screening (pap smear) in the previous two years. Although they found a significant change in breast and cervical cancer screening utilization following the changes in Task Force recommendations, they did observe underuse of the service despite the clinical guidance. More than 22.4% of women under 70 and 30.4% aged 70–80 years had not received a mammogram in the past two years, suggesting the removal of the age ceiling did not incentivize taking advantage of the benefit. They concluded that other factors might also be associated with screening behaviors, such as financial constraints and lack of physician recommendation among older Medicare beneficiaries for adherence to updated Task Force recommendations (Salloum et al., 2014).

Inconsistences between Medicare coverage of preventive services and USPSFT guidelines can be an issue if they may cause unnecessary discomfort, harm, and false-positive screenings resulting in distress. Feldman et al. (1990) studied the adverse effects

of unnecessary preventive screenings. They found that false-positive results lead to additional diagnostic and "therapeutic" procedures, with associated discomfort, costs, and risks. False-negative results impact an individual's sense of security, can delay seeking medical help when symptoms develop, and may cause a patient to not modify other risk factors because of a sense of security. The labeling of "impaired quality of life" by interpreting statistical "abnormalities" out of clinical context, the costs of screening, competing with the costs of diagnosing and treating symptomatic persons, and premature implementation of guidelines decreases physician and public confidence in prevention (Feldman et al., 1990). One study used a nationally representative survey of primary care physicians to evaluate the extent to which physicians' colorectal cancer screening practices such as fecal occult blood testing, flexible sigmoidoscopy, colonoscopy, and double contrast barium enema adhere to USPSTF-recommended guidelines. They found that 40% of physicians were consistent with guidelines, but almost the same percentage made CRC recommendations that were inconsistent with guidelines. They observed an overuse of screening intervals for younger adults, with 40% reporting screenings more frequently than recommended, which can be expensive, result in unnecessary follow-up testing, and increase the risk of complications. They also found screenings for patients over 50 had longer screening intervals than recommended which could result in late detection of early stages of cancer. They concluded that physicians' screening practices were mostly inconsistent with clinical guideline recommendations and reflected under and overuse of colon cancer screenings (Yabroff et al., 2010). One study used Medicare claims data to examine the rate of prostate-specific screenings among men 80 years old and older for variations in geographic regions. They found that men with no prior history

of cancer or symptoms that indicated a need for a PSA had a national rate of 17.2%, most recommended by specialists compared to primary care physicians. The highest rates of screening were associated with specialized end-of-life care. They concluded that adherence to PSA screening age requirements was inconsistent with USPSTF recommended guidelines. Screening for men over 70 is recommended with a grade D because men in this age range only have a 10-year survival rate. The study's implication suggests that older men are exposed to tests that pose more risk for harm (Bynum et al., 2010).

The literature has a controversial perspective on non-alignment with USPSTF recommended grade A and B guidelines. Inconsistences stem from other nationally recognized preventive disease agencies, such as the ACS and ACOG having conflicting recommendations, the differences in practice patterns of primary physicians vs. specialists, and Medicare's coverage of non-recommended preventive services without age restriction. Whether the ACA has improved Medicare's alignment with USPSTF clinically preventive recommended screenings is addressed in this study. The aim is to fill the gap between nationally recognized clinical practice recommendations and Medicare's preventive coverage policy. This research uses a nationally representative panel survey (MEPS-HC) to compare the alignment of screening intervals with USPSTF clinically recommended preventive screening guidelines for ten preventive services before (2006-2009) and after (2012-2016) the ACA's implementation.

Methods:

This research uses the Medical Expenditure Panel Survey (MEPS-HC), a nationally representative survey of the U.S. civilian noninstitutionalized population. The MEPS-HC collects data from households through an overlapping panel design. Each year, MEPS-HC gathers information nationally and comprehensively on respondents' health services utilization, preventive care screenings, healthcare expenditures (including out-of-pocket), socioeconomic characteristics, health insurance coverage, health status, and health behaviors. MEPS data breaks down the number of persons and families listed in the overall sample by age, race/ethnicity, income level, insurance status, and panel. The dataset represents a national subpopulation (12%) of 323,141,687 Medicare beneficiaries 65 years and older with 34,655 observations and has a good representative sample of race and ethnicity. The subpopulation sample size is 39,780,150. For ages 65 years and older, the cumulative data sample observations are as follows: 2006 (32,577), 2007 (29,370), 2008 (31,262), 2009 (34,920), 2010 (31,228), 2011 (33,622), 2012 (37,182), 2013 (35,068), 2014 (33,162), 2015 (33,893), and 2016 (33,259).

An observational study design was used to examine the alignment between Medicare's preventive coverage of screenings with USPSTF clinically recommended interval screenings for grade A and B preventive care services. The sample was limited to Medicare beneficiaries 65 years and older with continuous enrollment in Medicare part A and B services from 2006 to 2016 with different insurance type characteristics (Medicare-only, Medicare Advantage, Medicare + Private, and Medicare + Medicaid), using pooled survey data (years 2006-2016). Two multiyear cycles were used for the

study's analysis and reporting to examine differences in alignment with the USPSTF guidelines before and after the ACA provision was implemented. The impact of multiyear dummy variables on preventive screening intervals measured the differences in adherence to eleven USPSTF recommended and non-recommended preventive care practices within the pre-ACA (2006-2009) and post-ACA (2012-2016) years. The analysis was adjusted for person-level weight to reflect the mean annual subpopulation size, healthcare utilization, and expenditures within each cycle.

Quantitative methods using ordered logistic regression with marginal effects measured differences in categorical receipt of recommended interval screenings per USPSTF recommendations for metabolic preventive care, cancer screenings, and the influenza vaccine. They included: Blood pressure, Cholesterol, Aspirin use, Pap smears, Mammograms, Breast exam, Prostate (PSA), Colon cancer screenings (colonoscopy and sigmoidoscopy), and the Influenza (flu) vaccine. The study measured differences in the receipt of preventive services for the alignment to USPSTF recommended screening intervals specific to adults 65 years and older before and after the ACA's provisions. Controls included sociodemographic characteristics, type of insurance coverage, total out-patient office visits, total health expenditures, and source of payment, including out-of-pocket costs. Other controls included general health status, usual source of care provider, and whether they had chronic conditions.

Human Subjects, Animal Subjects, or Safety Considerations

This study is conducted with secondary analysis using public MEPS household panel data. Secondary analysis of existing data was approved under IRB exemption

because it does not fall within the regulatory definition of research involving human subjects. No animal subjects or safety considerations will be used in this study.

Outcome Variables:

This study measured differences in the pre-ACA and post-ACA year screening interval outcomes of USPSTF recommended and non-recommended preventive care services (Table 6), specific to adults 65 years and older. The ACA increased access to clinically recommended USPSTF grade A and B preventive care services by removing financial barriers. This study examined whether the ACA provision impacted the alignment of USPSTF clinically recommended services with Medicare's prevention policy. Adherence to appropriately timed preventive care services is predicted to improve among those previously susceptible to higher cost-sharing. The data includes dependent variables and panel responses that coincide with the USPSTF clinical recommendations. Blood pressure (Grade A - 2015), Cholesterol – lipid panel test (Grade A - 2015), and BMI (Grade B - 2018) annual screenings for risk of heart disease, stroke, and diabetes. Aspirin use (Grade B/C -2016 recently updated to D - 2022) is also recommended annually. Mammogram screenings (Grade B-2016) are recommended for women ages 50-74 every two years (biennially), and colorectal cancer screenings (Grade A-2016) are recommended for adults 50-75 years old every ten years and sigmoidoscopy screenings are recommended every five years. For the influenza vaccine, the ACIP recommends routine annual influenza vaccines for adults 65 years and older. Adherence to clinically recommended practice interval screening guidelines to manage the prevalence of chronic conditions among older adults at high risk is essential.

Table 6 - USPSTF recommended preventive screenings for adults 65+

| | USPSTF A and B Recommended Screenings for Adults > 65 | | | |
|---|---|---|---|---|
| Type of Screening | Grade (Year of Recommendation) | Age Range | Screening Frequency | MEPS survey definition for adherence of preventive screenings |
| Colonoscopy | A (2016) | 50-75 years | Every ten years | within past ten years or less |
| Sigmoidoscopy | A (2016) | | Every five years | within past five years or less |
| Abdominal Aortic Aneurysm: Screening | A (2019); C (2019); D | 65–75-year-old men who smoked, 65-75 who never smoked; not recommended for women never smoked | 1-time screening | Not collected in MEPS data |
| Abnormal Blood Glucose and Type 2 Diabetes Mellitus: | B (2015) | 40 to 70 years who are overweight or obese | Every three years | Blood glucose was collected only in ACA post-era.<br><br>BMI screening - within the past year or less<br><br>Blood Pressure screening within the past year or less.<br><br>Cholesterol screening within the past year or less |
| High Blood Pressure in Adults: Screening | A (2015) | >18 years | Annual screening >40 years old | within the past year or less |
| Hepatitis C Virus Infection in Adolescents and Adults: Screening | B (2020) | 18-79 years old | 1-time screening | Not collected in MEPS data |
| Screening for Hepatitis B Virus Infection in Adolescents and Adults | B (2020) | adults at increased risk for infection | The USPSTF found no evidence to determine optimal screening intervals. Periodic screening-high risk | Not collected in MEPS data |
| Human Immunodeficiency Virus (HIV) Infection: Screening | A (2019) | 15-65 years old | 3, 6, or Annual screenings (depends on risk) | Not collected in MEPS data |
| Lung Cancer: Screening Low-dose computed tomography | A (2013) | 55-80 with a history of smoking | Annually- | Not collected in MEPS data |
| Osteoporosis to Prevent Fractures: Screening | B (2018) | Women 65 years and older | Annually | Not collected in MEPS data |
| Unhealthy Drug Use: Screening | B (2020) | >18 | Annually | Not collected in MEPS data |
| Unhealthy Alcohol Use in Adolescents and Adults: Screening and Behavioral Counseling Interventions | B (2018) | >18 | Annually | brief screening instrument (e.g., SASQ or AUDIT-C), c |

| | | | | |
|---|---|---|---|---|
| Latent Tuberculosis Infection: Screening | B (2016) | >18 - populations at increased risk (e.g., living in Nursing Homes and ADL) | 1-time screening | Not collected in MEPS data |
| Depression in Adults: Screening | B (2016) | All Adult General population | Annually | Patient Health Questionnaire PHQ 2 – test for depression, mood and anhedonia |
| Chlamydia and Gonorrhea: Screening | B (2014) | Older women at risk | Annually | Not collected in MEPS data |
| Syphilis Infection in Nonpregnant Adults and Adolescents: Screening | A (2016) | persons who are at increased risk for infection | Annually | Not collected in MEPS data |
| Cervical Cancer Screening (Pap Test) | A, C (2016) | 25-65 years, < 65 years | Within the past three years or less. Not recommended for women over 65 | PAPSMR53 - HOW LNG LST PAP SMEAR TST (>17) - RD 5/3 |
| Breast Cancer Screening and Exam-Mammogram[3] | B (2016) | 50–74 years | Every two years | Within the past two years or less |
| Physical | n/a | | Annually | Within the past year or less |
| Cardiovascular: Metabolic screening for Diabetes and Heart Disease: | B (2015) | 40-70 years old | Annually | Within past year or less |
| Blood Pressure | A (2015) | 18 years and older | Annually | Within the past year or less |
| Weight Loss to Prevent Obesity-Related Morbidity and Mortality in Adults: Behavioral Interventions BMI | B (2018) | 18 years and older | Annually | Within the past year or less |
| Healthy Diet and Physical Activity for Cardiovascular Disease Prevention in Adults with Cardiovascular Risk Factors - Behavioral Interventions. Cholesterol | B (2020) | 18 years and older | Annually | Within the past year or less |
| Influenza vaccine -ACIP/CDC | A (2020) | 65 and older – high risk | Annually | Within the past year or less |

Main predictors:

The years 2010 and 2011 were the main predictor variables. Although the ACA implemented mandated coverage in 2010, Medicare began covering cost-free preventive care services on January 1, 2011. The comparison group design included differences in insurance type characteristics for beneficiaries with Medicare-only, Medicare with Private supplemental insurance, Medicare Advantage Care beneficiaries (HMO),

Medicare beneficiaries with supplemental public insurance (Medicaid HMOs), and those Uninsured. Those with Medicare-only are expected to benefit the most from the Part B enhancements. For this study the USPSTF-recommended preventive clinical screenings for adults 65 years and older are categorized by: 1) Medical conditions screenings (includes risk of heart, stroke and diabetes); 2) Aspirin use; 3) Vaccinations (flu/influenza); and 4) Cancer screenings. Survey subpopulation analysis was used for the statistical analysis of the panel survey. It ensures accurate estimation accounts for cluster and stratification of MEPS data. The effects of the ACA cost waiving provision on improving alignment between Medicare preventive coverage and USPSTF recommended preventive guidelines are examined among older Medicare beneficiaries by insurance type coverage. Self-reported panel responses to preventive care screening intervals during 2006-2016 were compared to USPSTF grade A and B preventive care guidelines. Differences in adherence to guidelines compared to non-adherence to guidelines were assessed using ordered logistic regression models (unadjusted and adjusted) during the pre-ACA (2006-2009) and the post-ACA periods (2012-2016).

Covariates:

All outcome variables (Table 6) are controlled for socio-demographics that included sex, race/ethnicity, education level, marital status, poverty status and geographical location (Northeast, Midwest, South, West). Controls also included self-reported responses to types of insurance coverage, total healthcare expenditures, source of payment, perceived health status, whether they have a usual source of care provider for preventive services and if they have chronic conditions.

Stata SE 15 includes a module to create a CCI helpful in determining if adults 65 years and older, with medical comorbidities, are receiving USPSTF clinically recommended preventive care screenings. The Charlson Comorbidity Index (CCI) is included in the analysis to account for at least one chronic disease or long-term condition common in adults 65 years and older. The Charlson scoring Index is included in the analysis to account for at least one chronic disease or long-term condition common in adults 65 years and older. The CCI categorizes patients' comorbidities based on the International Classification of Diseases (ICD) diagnosis codes under 17 categories. Each comorbidity category has an associated weight (from 1 to 6) based on the adjusted risk of mortality or resource use. The sum of all the weights results in a single comorbidity score for a patient. For example, a score of zero indicates that no comorbidities were found, and the higher the score, the more likely the predicted outcome will result in mortality or higher resource use. In this study, the CCI index is used as a predictor covariate within the analysis to understand better the association of chronic disease diagnosis with utilization rates of clinically recommended preventive healthcare before and after the ACA policy. The CCI was developed (Appendix) for the present using the diagnosis of chronic disease responses provided by the MEPS-HC component, which asks for a response of YES/NO to being diagnosed with a chronic condition. Only those conditions listed under the 17 commodities according to the CCI were used, which determined the categories for the dummy variable (gcci2) recorded as (1): no comorbidity, (2) at least one long-term condition, and (3) ≥2 long-term conditions present (Figure 4).

Relevant studies have used a modified CCI predictor variable when assessing the relationship between preventive services and existing chronic conditions. In 1992 Deyo adopted a clinical comorbidity index designed for using medical records data from the International Classification of Diseases (ICD-9-CM) diagnosis and procedure codes. The association of CCI with health outcomes and resource use was examined among Medicare beneficiaries who underwent lumbar spine surgery in 1985. The CCI index was associated with predicted postoperative complications, mortality, blood transfusion, discharge to a nursing home, length of hospital stays, and hospital charges (Deyo et al., 1992). Similarly, Wallner used a modified CCI to compare the rates of preventive services among Prostate cancer survivors five years before and after diagnosis to men without Prostate cancer. They found the rates of preventive services were lower among men diagnosed with Prostate cancer vs. men not diagnosed (Wallner et al., 2017). Schonberg used a modified CCI as a predictor variable when examining the use of preventive health services among older women to assess how age and illness burden influence care patterns. Illness burden was measured using the CCI. They found cancer screenings improved among older women in poor health, but lacked screenings for depression or counseling about exercise, falls, or incontinence (Schonberg et al., 2008). Chung used a modified CCI when investigating the utilization of preventive visits before and after the introduction of ACA's Annual Wellness Visit (AWV). They found older adults with multiple chronic conditions were less likely to make a separate preventive visit and preferred receiving preventive care during their problem-oriented visits (Chung et al., 2018).

Statistical Analysis:

A complex survey design estimation was used for this analysis using a previously appended Medical Expenditure Survey (MEPS-HC) pooled data set from 2006 to 2016. Estimated survey analysis provided preliminary descriptive statistics for the data sample characteristics, and OLS regression was used to determine the "goodness of fit" before using Ordinal logistic regression. Dummy variables were created for all preventive care services with binary outcomes variables for self-reported event screenings with 0 = nonadherence to recommended screening intervals and 1 = recommended screening intervals as per USPSTF age and gender-specific recommended guidelines for adults 65 years and older. The ordered logistic model reflects adherence to age-sex USPSTF grade A, B, C, D and I recommended screenings among adults 65 years and older. This study controlled for socio-demographic characteristics, total out-patient physician/provider visits, total healthcare expenditures, payment source, insurance type coverage, and perceived health status. Also included in this study is whether they have a usual source of care provider and if they currently have at least one chronic condition. The analysis included dummy variables for the predictor years 2006-2009 (preaca11) and 2012-2016 (postaca1). Ordinal logistic regression is used to estimate the differential impact of the outcome binary variables after controlling for relevant predictor variables, which measures whether the receipt of clinically recommended preventive care services aligns with USPSTF practice guidelines among adults 65 years and older. The fully adjusted statistical model for preventive care screenings among adults 65 years and older for each binary outcome is reflected in the Appendix. Differences in Metabolic screenings within

the Past Year and annual Influenza Vaccinations were assessed before and after ACA implementation. The cancer variables in the USPSTF have different guidelines regarding age-sex screenings. The study examined self-responses to whether Mammograms were received biennially, pap smears every three years, PSA every 1-2 years, colonoscopies every ten years, and sigmoidoscopy every five years.

Descriptive Characteristics

Survey estimation analysis provided the descriptive characteristics for the subpopulation and is summarized in Tables 7 and 8 (Appendix) by Insurance type (Medicare-only, Medicare Advantage, Medicare + Private insurance, and Medicare + Medicaid) and preventive services for adults 65 years and older. There are significant differences within insurance groups by socioeconomic status for receipt of preventive care services (95% CI). The screenings reflect the pooled proportion of beneficiaries that received preventive services within the Past Year, Within Two years, Three Years or more, or Never.

For Medicare-only enrollees over 98% of adults 65-74 and 87% of adults 75 years and older have Medicare coverage, 55% are female and 43.3% are male. For Race, the majority are White and Asian. Over 75% have less than a college degree, and more than half are married (54%) and live in the South (37%). The majority are either in the middle or high-income category (84%), and 92% have a usual source of care provider (USC). Over 60% have a perceived health status of very good or good, but 76.3% have at least one chronic condition, with almost 40% having between 11-14 outpatient physician visits

annually. In this category 95.4% have total healthcare expenditures, with 56.8% in out-of-pocket costs. For the screenings, 94% had Blood Pressure screenings during the Past Year, 34% were obese as per BMI check, 88% had Cholesterol screening during the Past Year, half of the beneficiaries were recommended Aspirin use, and 89% had their Blood Cholesterol checked. Over 70% reportedly had the flu vaccine, and 56% had a mammogram and breast exam during the past year. Eleven percent of males had a prostate-specific antigen test (PSA) within the last two years, and 19% of adults 65 years and older had a colonoscopy within five years and 13% within 10 years. Twenty percent never had a colonoscopy or sigmoidoscopy (83%).

For those with Medicare Advantage, 29% enrolled are between 65-74, and 28% are 75 years and older. Of these with Medicare Advantage 17.2% are female and 13% are male. Most of the enrollees are White or Asian (23%), and most participants have less than a college education. Over 50% are married, live in the South, and have middle and higher incomes. Over 29% reportedly have a USC, and 20% reported they are in very good or good health, but over 24% have at least one chronic condition. The annual outpatient physician office visits range from 4-6 and spend around 30% on total healthcare expenditures, with 20% being for out-of-pocket. About 30% had Blood Pressure screenings in the Past Year, most are overweight according to a BMI, and 28% reported having Cholesterol screenings. Half of the participants were recommended Aspirin use, 22% had the Flu vaccine, 18% of women had a mammogram and breast exam in the Past Year, 19% of men had a PSA in the Past Year, and 6% of the enrollees

had a colonoscopy Within Five Years and 4.5 Within Ten Years. More than 6% reported never having a colonoscopy, and 27% reported never receiving a sigmoidoscopy.

For those with Private Supplemental Insurance, 49.4% enrolled are between 65-74 and 35.8% are 75 years and older. Of this group 23.9% are female~~,~~ and 21.7% are male. Most of the enrollees are White or Asian (41%), and most participants have a high school (13.2%) or a college education (13.4%). Most are married (30%), live in the South, and have middle and higher incomes. Over 43.5% reportedly have a USC, and 15.6% reported they are in very good health, but over 34% have at least one chronic condition. The annual outpatient physician office visits range from 4-6 visits and spend around 45% on total healthcare expenditures with 28% of that amount being out-of-pocket. For screenings, around 44% had Blood Pressure screenings in the Past Year, 16.3% are overweight according to a BMI, and 41.5% reported having Cholesterol screenings. Half of the participants were recommended Aspirin use, 34% had the Flu vaccine, 28% of women had a mammogram and breast exam in the Past Year, 35% of men had a PSA in the Past Year, and 9% of the enrollees had a colonoscopy Within Five Years and 7% Within the last Ten Years. One percent reported having a sigmoidoscopy Within Five Years and 1.6% Within Ten Years. More than 8% reported never having a colonoscopy, and 38% reported never receiving a sigmoidoscopy.

For Dual eligible enrollees (Medicaid supplement), 7% are between ages 65 -74 years old, and 6.9% are 75 years and older. More than half are female, and most are Hispanic, with the majority having less than a high school education. Most are reportedly widowed and live in the South, and the majority reported they are under the poverty line

(poor). Most have a USC with a perceived health status ranging from fair to poor and have at least one chronic condition (6.3%). Outpatient physician office visits range from 2-3 to 4-6 annually, and 7.3% have total health expenditures with less than a third with out-of-pocket costs (2%). For screenings the majority, 7%, had Blood Pressure screenings during the Past Year, most are either overweight or obese as per BMI check, 6.8% had Cholesterol screenings. Half of the enrollees are recommended Aspirin use. Most had the flu vaccine during the past, and only 1% had a colonoscopy, with more than 3% having never received one, and most enrollees never received a sigmoidoscopy (6.5%).

Around 1% of adults 65 years and older are uninsured. Most are either middle or higher income and 0.28% have less than high school education. The majority are White or Asian, married, and live in the West. More than half have a USC, and 0.75% reported they are in excellent health. Less than one percent (0.29%) have at least one chronic condition, and most have no outpatient physician office visits (0.4%). Less than one percent (0.37%) have healthcare expenditures with 0.19% in out-of-pocket costs. For the screenings, 0.4% had Blood Pressure screenings during the Past Year, BMI for most enrollees is normal and 0.31% had Cholesterol screenings in the Past Year. Most were not recommended Aspirin use (0.14% vs. 0.39%), and 0.18% had the flu vaccine. Less than one percent (0.12%) had a mammogram and breast exam in the last Five Years or More, with 0.16% never receiving a mammogram and 0.08% not receiving a breast exam. Less than one percent (0.12%) of men received a PSA during the Past Year, and 0.3% reported never receiving it. Only 0.04% reported having a colonoscopy Within the

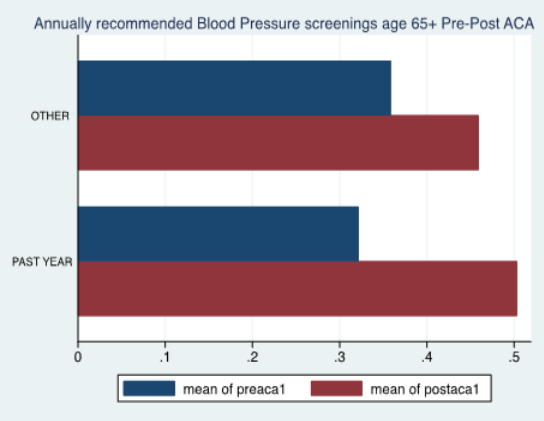
last Five Years and 0.03% Within Ten Years. Less than one percent (0.3%) never had a colonoscopy, and 0.49% never received a sigmoidoscopy. Descriptive statistics for comparison of adherence vs. nonadherence to USPSTF recommended grade A, B, C, D and I preventive services (Table 10) reflects the proportional difference pre- and post-ACA and Figure 6 reflects the pre- and post- ACA mean for each preventive care service.

Preliminary Results:

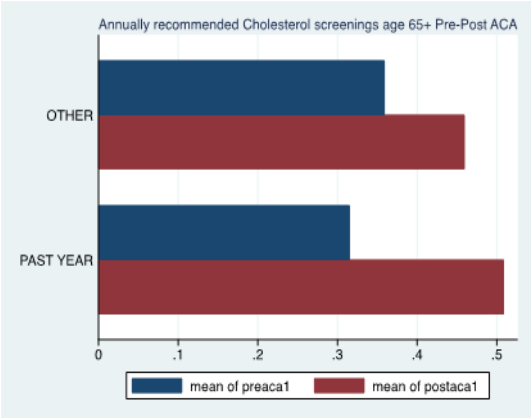
Figure 6: UPSTF recommended preventive screenings – Pre- & Post- ACA

1) Medical condition recommended screenings annually as per USPSTF grade A and B guidelines for adults 65 years and older. USPSTF recommended Preventive service screenings alignment with Medicare's coverage of preventive services vs. nonadherence to guidelines

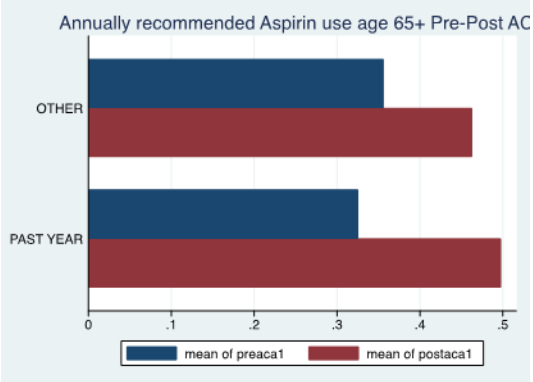
Blood Pressure Screenings




Cholesterol Screenings

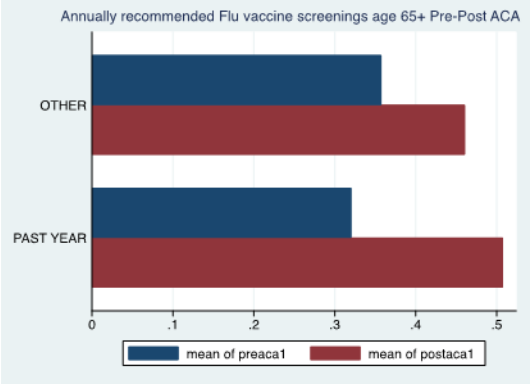


2)Aspirin Use



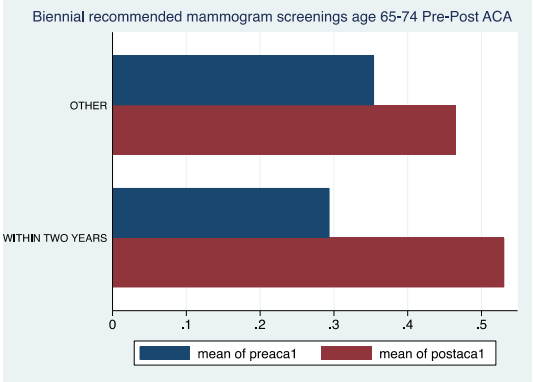

3) USPSTF and ACIP annual influenza vaccination recommendation for adults 65 years and older

Flu Vaccine

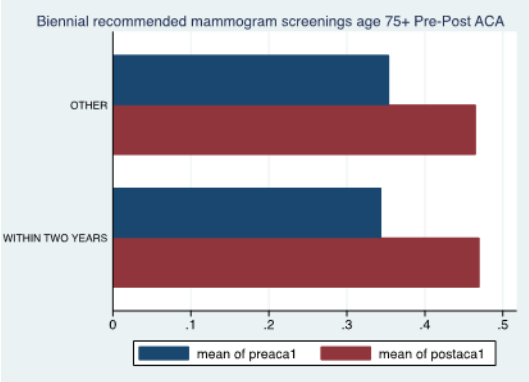



4) Cancer Screenings for Age-Specific USPSTF recommendations

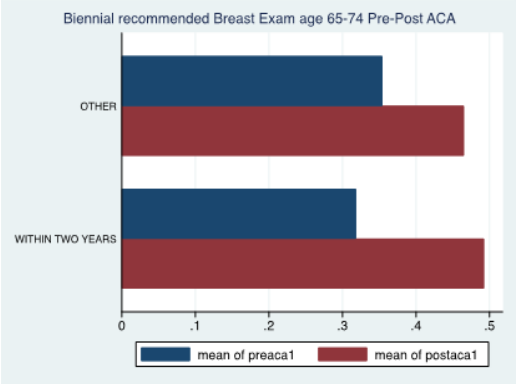
Mammogram recommendations for 65-74



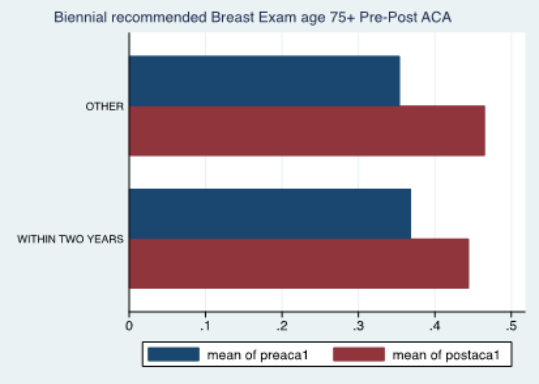

Mammogram recommendation for ages 75+



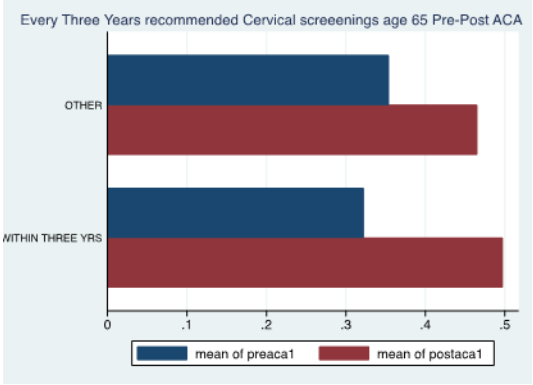
Breast exam recommendation 65-74



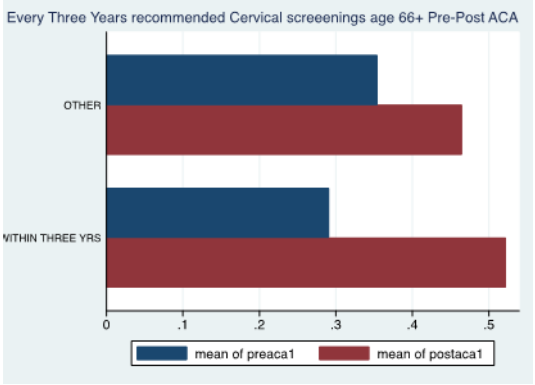

Breast Exam recommendation 75+



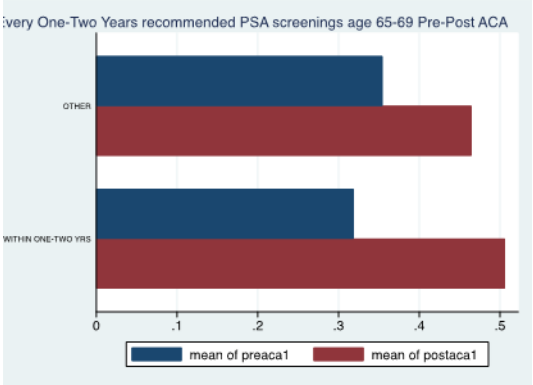

Pap Smear screenings for age 65



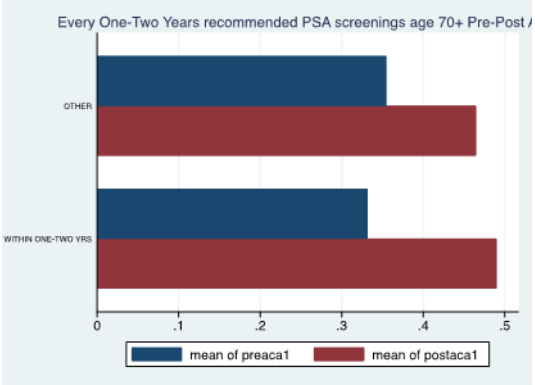

Pap Smear screenings for ages 66+



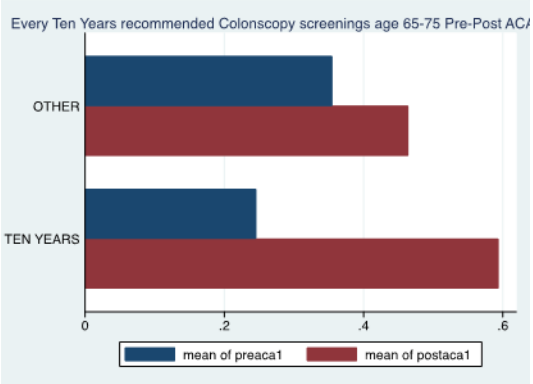

Prostate screenings for Men 65-69



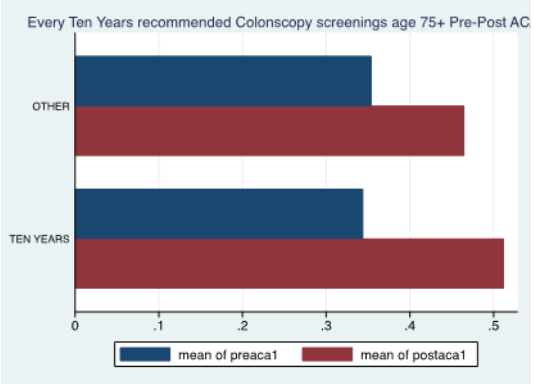

Prostate screenings for Men 70+



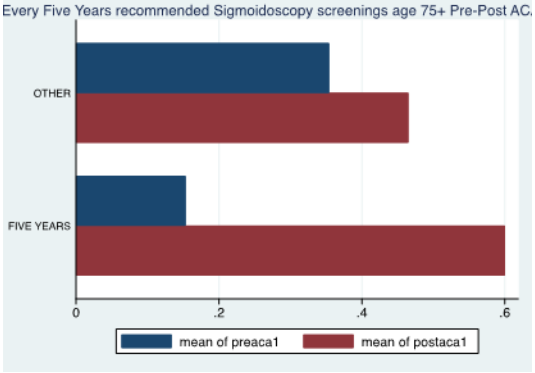
Colonoscopy screenings for Adults 65-75




Colonoscopy screenings for Adults 75+




Sigmoidoscopy screenings - Adults 65-75




Sigmoidoscopy screenings - Adults 76+

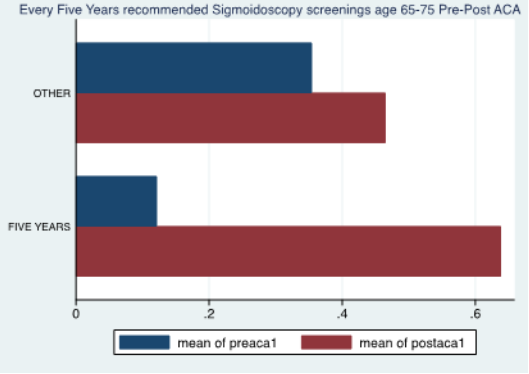
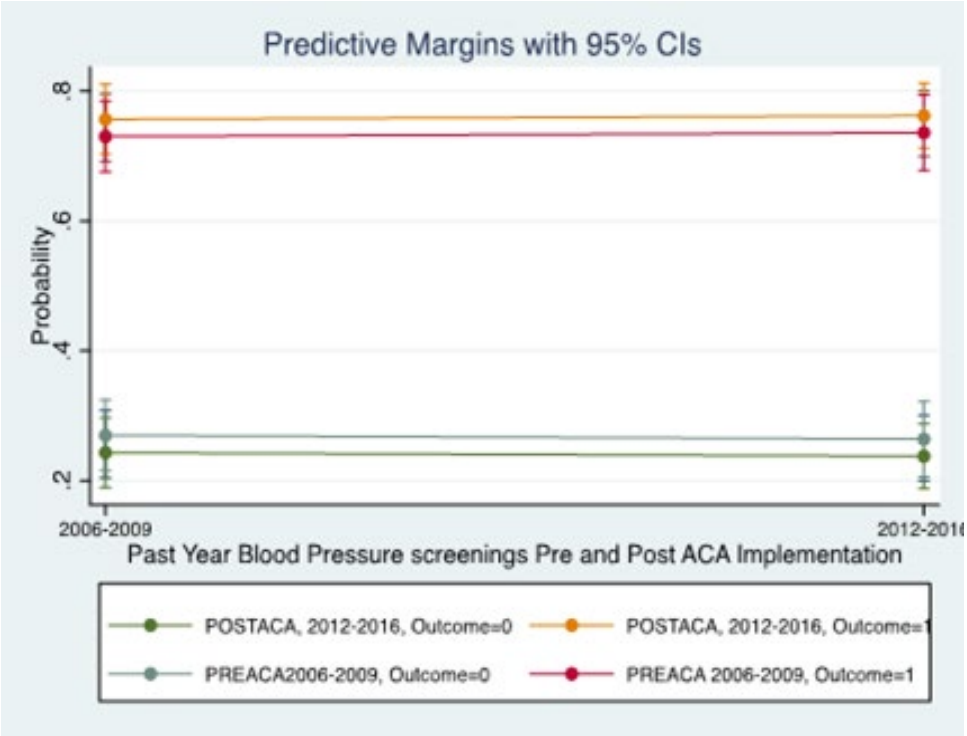


Table 10: Comparison of adherence vs. nonadherence to USPSTF guidelines.

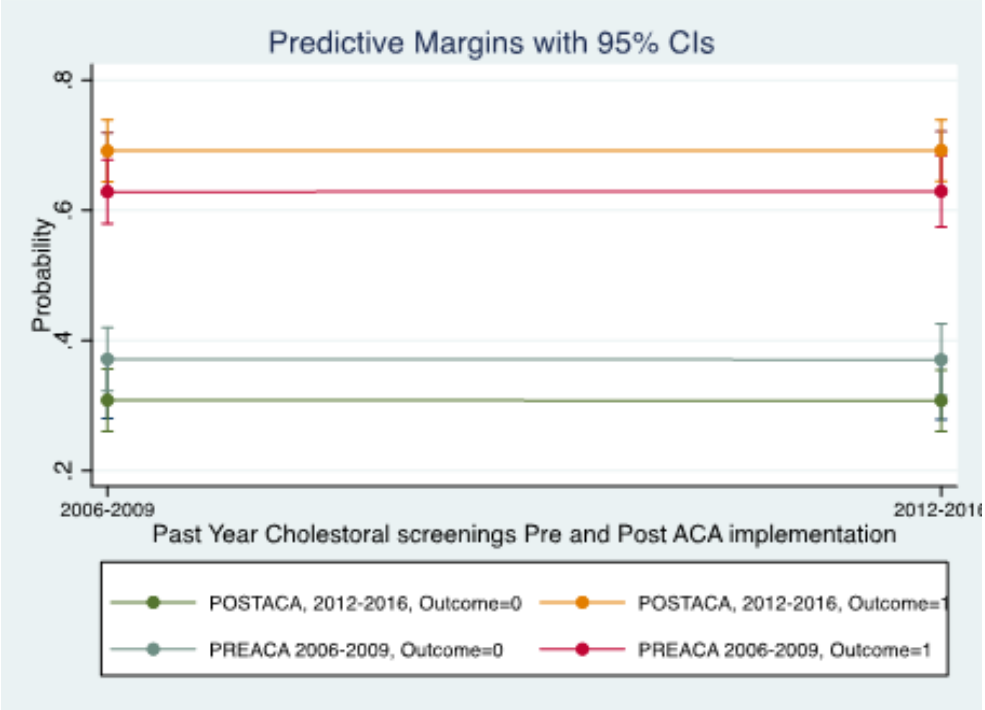
| USPSTF PREVENTIVE SERVICES | Obs./Subpopulation | Age-Sex screening alignment with USPSTF recommended Preventive Care Services before and after Affordable Care Act (ACA) for adults 65 years and older | | | | |
|---|---|---|---|---|---|---|
| | | Year | Proportion | Std.Err. | [95%Conf. | Interval] |
| *BLOOD PRESSURE (65+) SCREENINGS (gui_bp1)* | obs = 39,558<br>n = 39,780,150 | preaca1<br>postaca1 | 0.322<br>0.503 | 0.005<br>0.006 | 0.311<br>0.492 | 0.332<br>0.515 |
| *CHOLESTEROL (65+) SCREENINGS (gui_chol1)* | obs = 36,207<br>n = 36,348,968.6 | preaca1<br>postaca1 | 0.315<br>0.509 | 0.005<br>0.006 | 0.305<br>0.498 | 0.326<br>0.520 |
| *ASPIRIN USE (65+) (gui_asprin1)* | obs = 44,595<br>n = 44,318,861.9 | preaca1<br>postaca1 | 0.352<br>0.464 | 0.005<br>0.005 | 0.343<br>0.454 | 0.362<br>0.474 |
| *INFLUENZA (65+) VACCINATION (gui_flush1)* | obs = 28,402<br>n = 29,485,392.8 | preaca1<br>postaca1 | 0.320<br>0.508 | 0.006<br>0.006 | 0.309<br>0.496 | 0.332<br>0.520 |
| *MAMMOGRAM (65-74) SCREENINGS (gui_mamm1)* | obs = 1,829<br>n = 1,710,544.28 | preaca1<br>postaca1 | 0.294<br>0.531 | 0.014<br>0.016 | 0.267<br>0.499 | 0.322<br>0.562 |
| *MAMMOGRAM ( 75+) SCREENINGS (gui_mamm2)* | obs = 1,361<br>n = 1,390,830.74 | preaca1<br>postaca1 | 0.344<br>0.470 | 0.017<br>0.017 | 0.311<br>0.436 | 0.378<br>0.503 |
| *BREAST EXAM ( 65-74) (gui_brst1)* | obs = 1,739<br>n = 1,620,634.83 | preaca1<br>postaca1 | 0.318<br>0.492 | 0.014<br>0.016 | 0.292<br>0.461 | 0.345<br>0.523 |
| *BREAST EXAM 75+) (gui_brst2)* | obs = 1,210<br>n = 1,204,082.91 | preaca1<br>postaca1 | 0.369<br>0.444 | 0.017<br>0.019 | 0.335<br>0.408 | 0.403<br>0.481 |
| *PAP SMEAR (age 65) SCREENINGS (gui_pap1)* | obs = 147<br>n = 124,521.3296 | preaca1<br>postaca1 | 0.322<br>0.497 | 0.043<br>0.050 | 0.243<br>0.399 | 0.413<br>0.595 |
| *PAP SMEAR (age 66 +) SCREENINGS (gui_pap1)* | obs = 147<br>n = 124,521.3296 | preaca1<br>postaca1 | 0.291<br>0.522 | 0.015<br>0.016 | 0.263<br>0.490 | 0.321<br>0.554 |
| *PROSTATE CANCER (65-69)SCREENINGS (gui_psa2)* | obs = 7,251<br>n = 7,766,545.02 | preaca1<br>postaca1 | 0.332<br>0.490 | 0.008<br>0.010 | 0.315<br>0.471 | 0.348<br>0.509 |
| *PROSTATE CANCER (70+)SCREENINGS (gui_psa2)* | obs = 7,251<br>n = 7,766,545.02 | preaca1<br>postaca1 | 0.332<br>0.490 | 0.008<br>0.010 | 0.315<br>0.471 | 0.348<br>0.509 |
| *COLONOSCOPY (65-75) SCREENINGS (gui_clnt1)* | obs = 2,302<br>n = 2,627,936.66 | preaca1<br>postaca1 | 0.246<br>0.593 | 0.013<br>0.014 | 0.221<br>0.565 | 0.271<br>0.621 |
| *COLONOSCOPY (75+) SCREENINGS (gui_clnt2)* | obs = 1,735<br>n = 1,932,333.59 | preaca1<br>postaca1 | 0.344<br>0.512 | 0.016<br>0.017 | 0.312<br>0.478 | 0.377<br>0.546 |
| *SIGMOIDOLOGY (65-75) SCREENINGS (gui_sgmt1)* | obs = 374<br>n = 353,994.3721 | preaca1<br>postaca1 | 0.121<br>0.638 | 0.021<br>0.032 | 0.086<br>0.572 | 0.168<br>0.699 |
| *SIGMOIDOLOGY (76+) SCREENINGS (gui_sgmt2)* | obs = 213<br>n= 200,748.7814 | preaca1<br>postaca1 | 0.153<br>0.600 | 0.029<br>0.045 | 0.104<br>0.508 | 0.221<br>0.685 |

Results: Change in the estimated differential impact of the new coverage for adherence to preventive care utilization rates pre- and post- ACA.

Blood Pressure



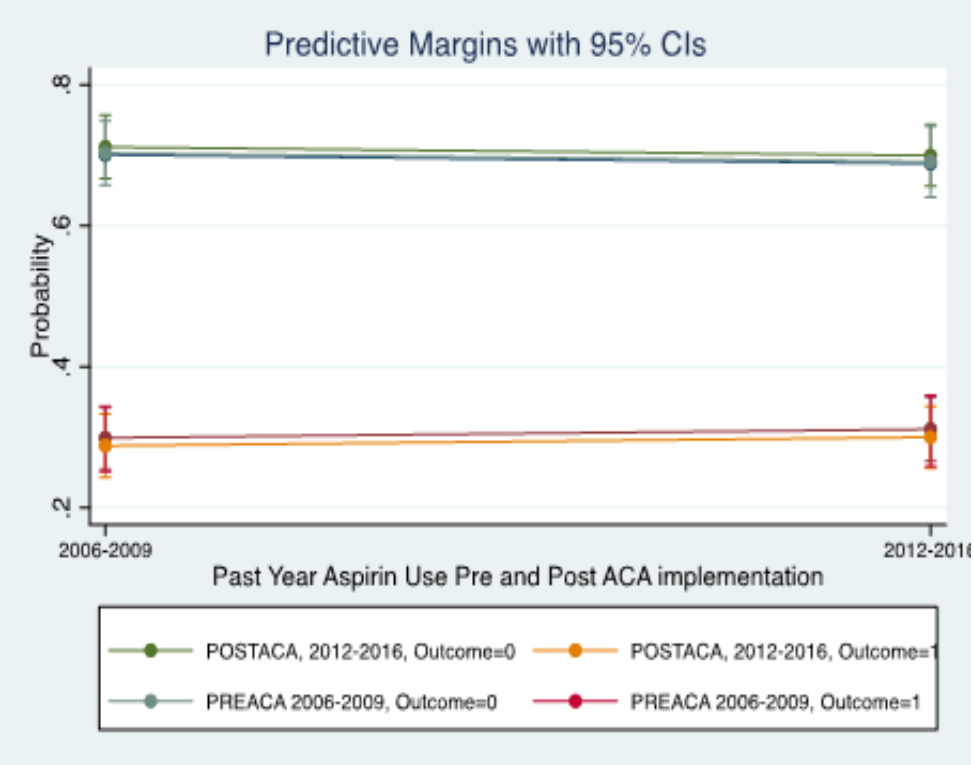
Cholesterol




- For Medicare beneficiaries 65 years and older 73.6% (P<0.000) reported receiving Blood Pressure screenings in the Past Year for the pre-ACA period and increased to 76.2% in the post-ACA period (a difference of 2.6% points). Annual Blood Pressure screenings have been found to be an effective preventive service and rated grade A. Hypertension is a prevalent condition, affects approximately 45% of the adult U.S. population, and is the most diagnosed condition at outpatient office visits. Hypertension is a major contributing risk factor for heart failure, myocardial infarction, stroke, and chronic kidney disease. USPSTF suggests annual screening for hypertension in adults 40 years or older and for adults at increased risk for hypertension (such as Black persons, persons with high-normal blood pressure, or persons who are overweight or obese).

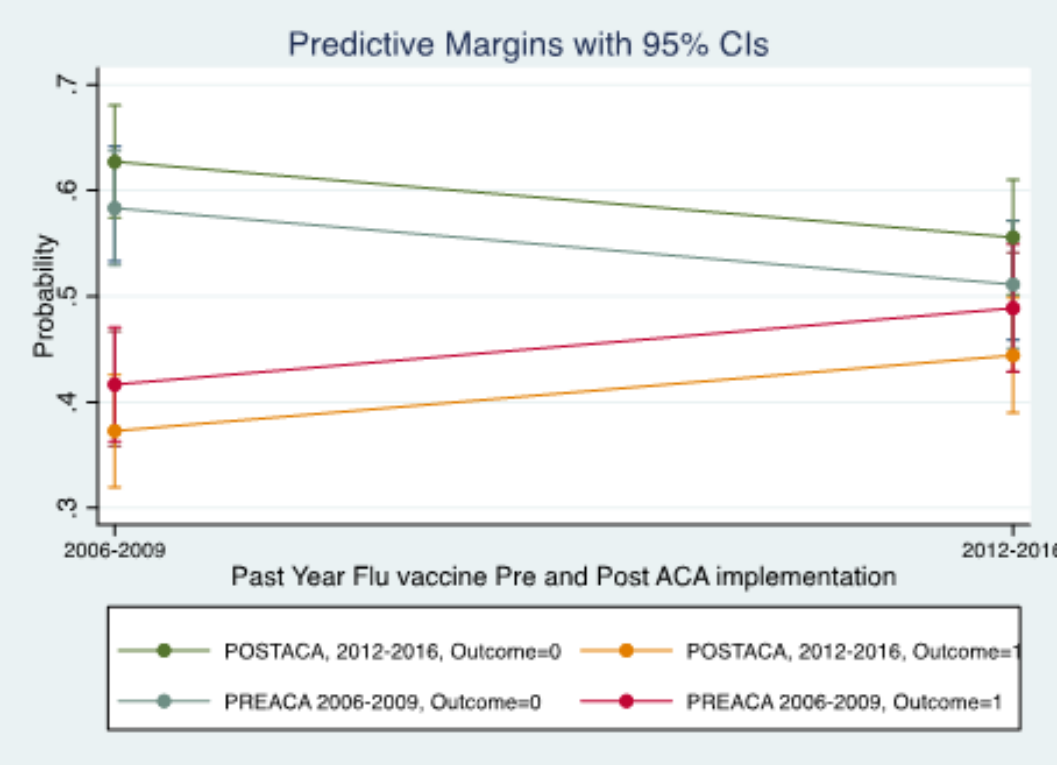
- This study found adherence of annual Cholesterol – lipid panel test screening in pre-ACA for Past Year screenings was 62.9% and increased to 69.2% (P<0.000) in the post-ACA period (a difference of 6.3%). These tests measure levels of Cholesterol (Low-High density lipoproteins) and other fats (Triglycerides) in the blood. They are used to measure risk of heart disease, stroke, and atherosclerosis (a clogging or hardening of the arteries). Adults 65 years and older are recommended lipid disorder screenings with a grade A recommendation, updated to Stalin use in 2016 with grade B recommendation for those with high CVD factors, and grade C for those without risk. Screenings are not recommended for adults 76 years and older (grade I).

Aspirin



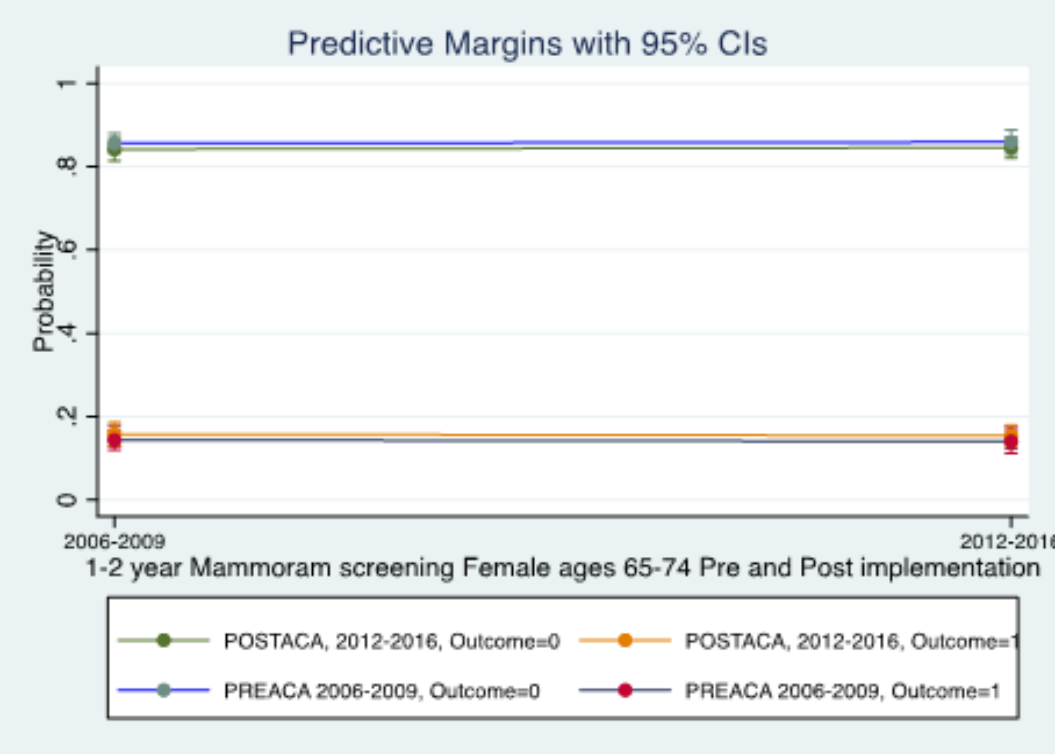
- The study found that 30.9% (P<0.000) of adults 65 years and older were recommended Aspirin use in the Past Year pre-ACA and reduced to 30% post-ACA period (a difference of 0.90%). The change in the recommendation in 2016 may have contributed to the decline in receipt. Aspirin use, although no longer recommended by the USPSTF as of 2022, has been used to prevent cardiovascular disease. It was a grade A in 2009, updated to grade C in 2016, and in 2022 grade D and not recommended for adults 60 years and older for primary CVD prevention.

Flu Vaccine

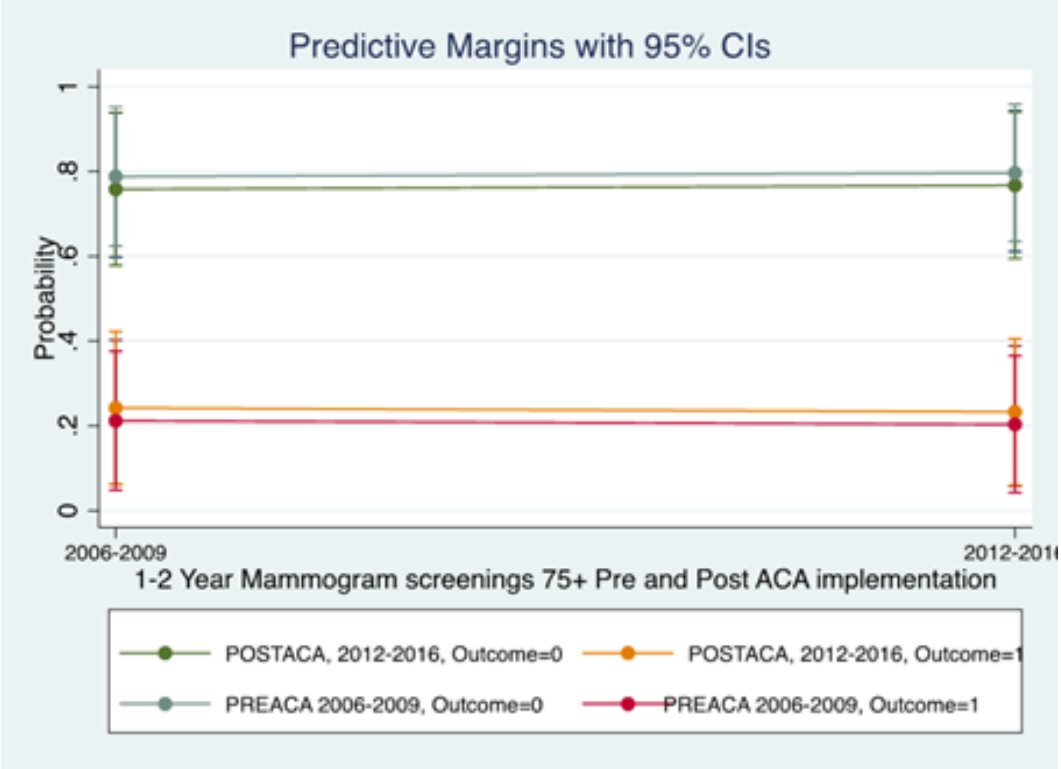


- For the flu vaccine the study found that 48.9% (P<0.00)) pre-ACA and 44.4% post-ACA reported having a flu vaccine within the Past Year (a difference of -4.5%). The USPSTF and ACIP recommend annual influenza vaccines for adults 65 years and older susceptible to certain chronic conditions without appropriate vaccinations.

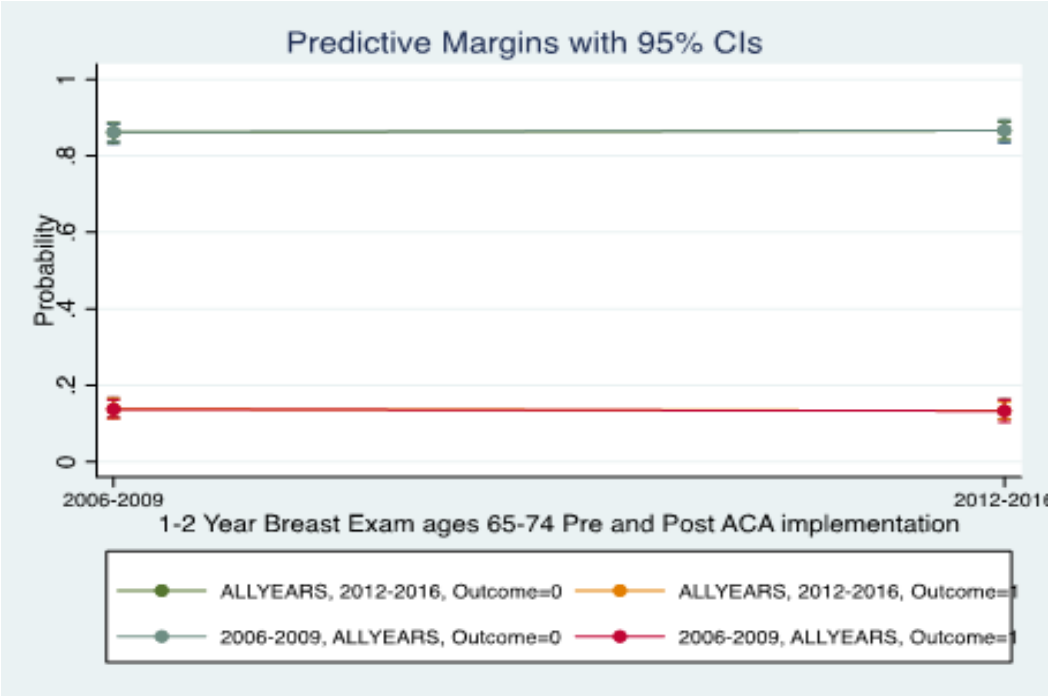
Mammograms 65-74 years old



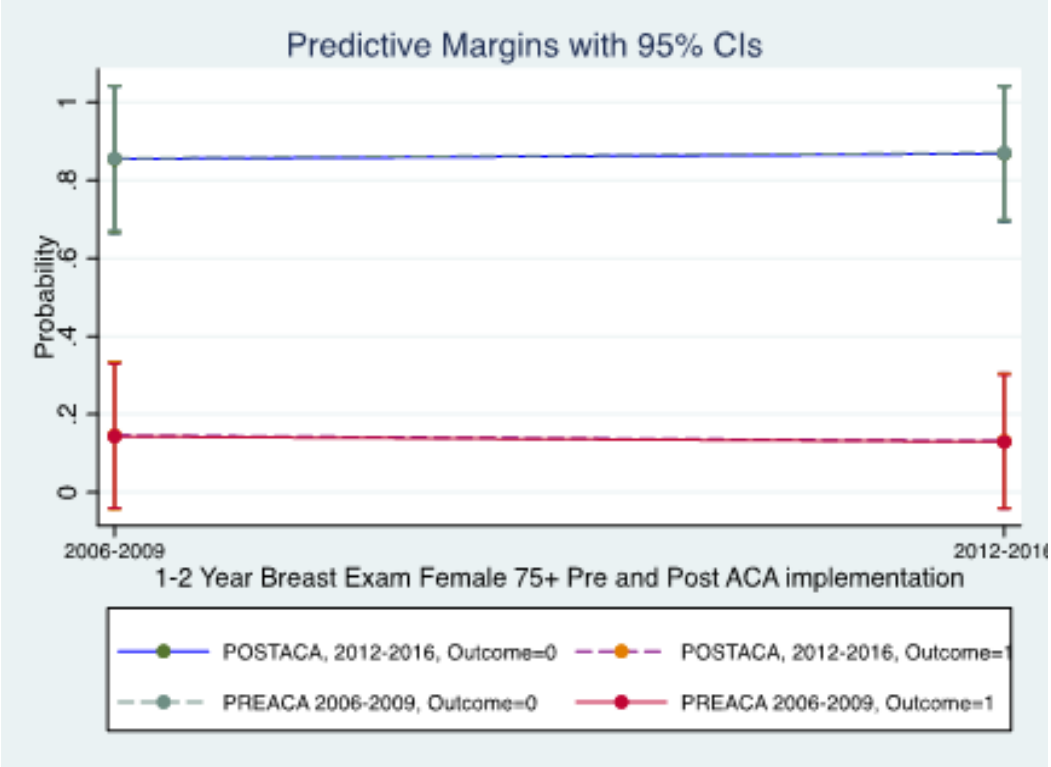
Mammogram 75+




Breast Exam 65-74



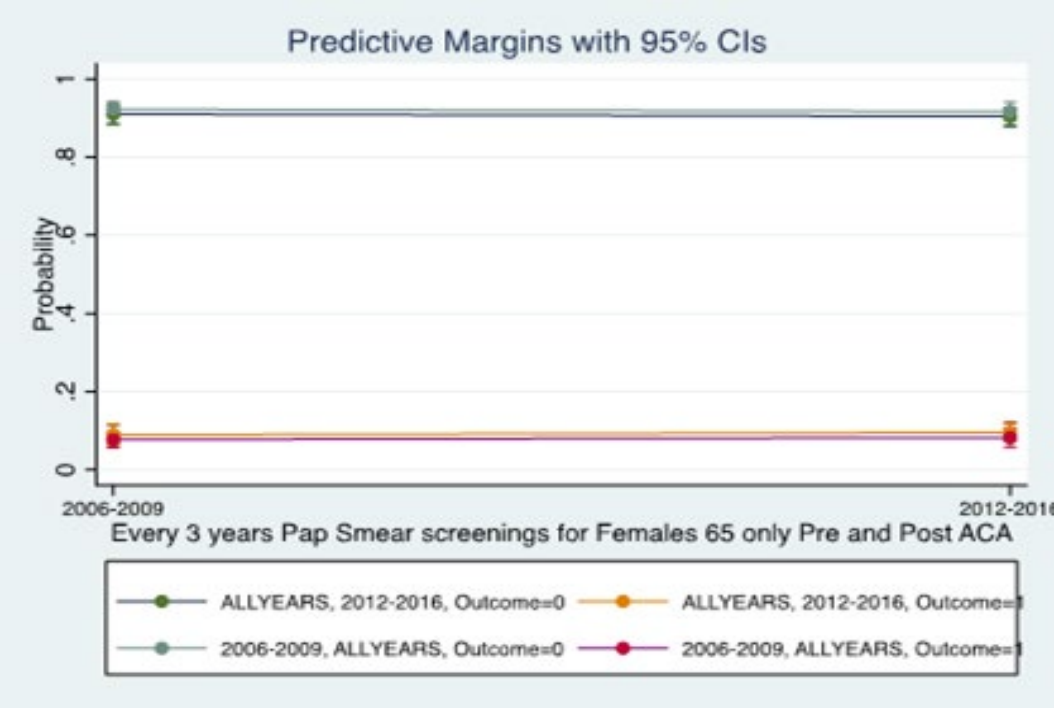
Breast Exam 75+



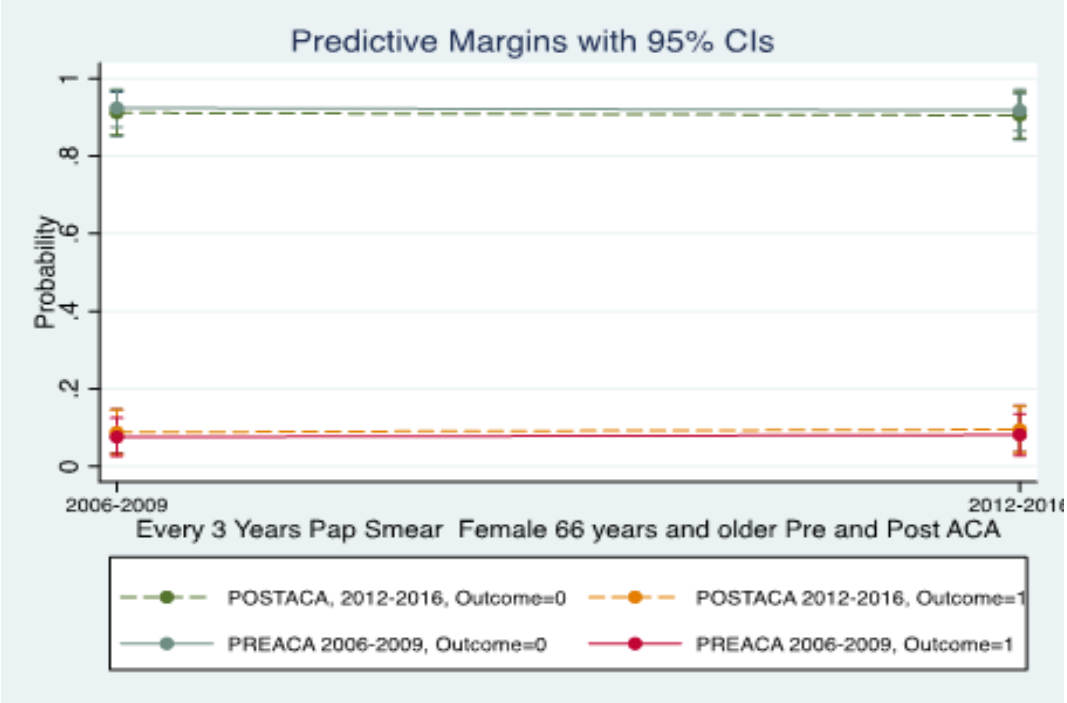

- During the pre-ACA period, for women 65-74, the study found that 14.1% (P<0.000) reported receiving biennial mammogram screenings vs. 15.4% during the post-ACA period (a difference of 1.3% points). For women 75 years and older, it was found that 20.4% (P<0.000) reported biennial screenings pre-ACA vs. 23.3% in the post-ACA period (a difference of 2.9%). The USPSTF recommends biennial mammogram screenings for women up to 74 years old. They were updated from the previous 2009 recommendation that all women 40 and over should have annual screenings.

- For breast exams among women ages 65-74, the study found that 13.3% (P<0.000) had been checked Within Two Years pre-ACA and 13.4% in the post-ACA period (a difference of 0.10%). For women 75 years and older, it was found that 13.0% (P<0.000) pre-ACA vs. 13.2% post-ACA reported being screened Within Two Years (a difference of 0.20% points). Breast exams are essential for older women to check for any abnormalities.

Pap Smears – 65 years old only

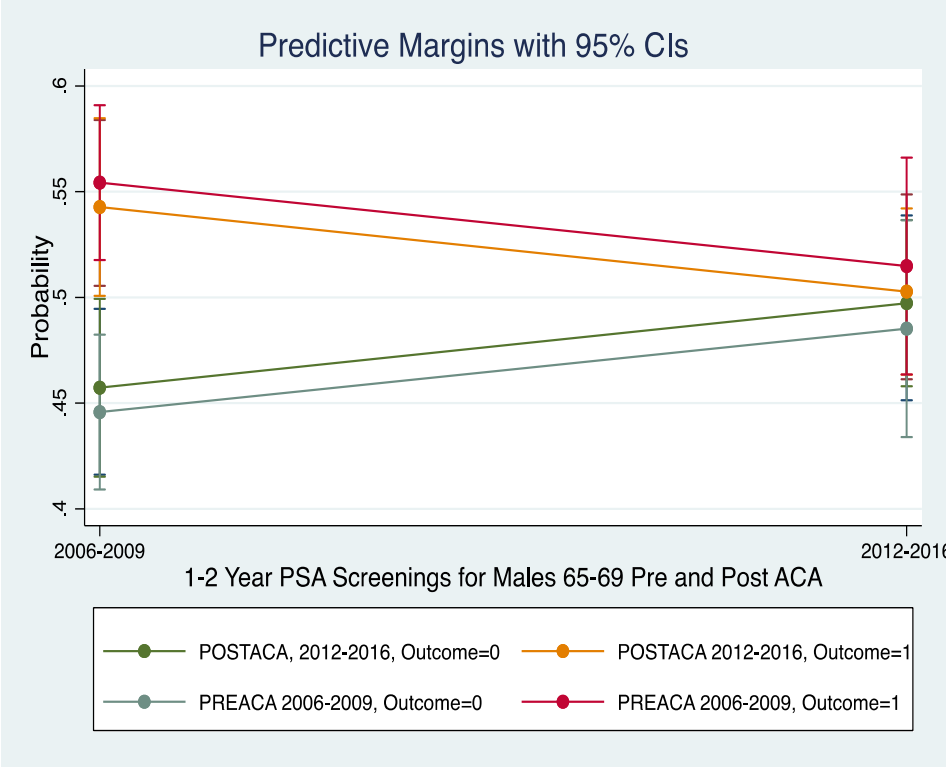


Pap Smears 66+

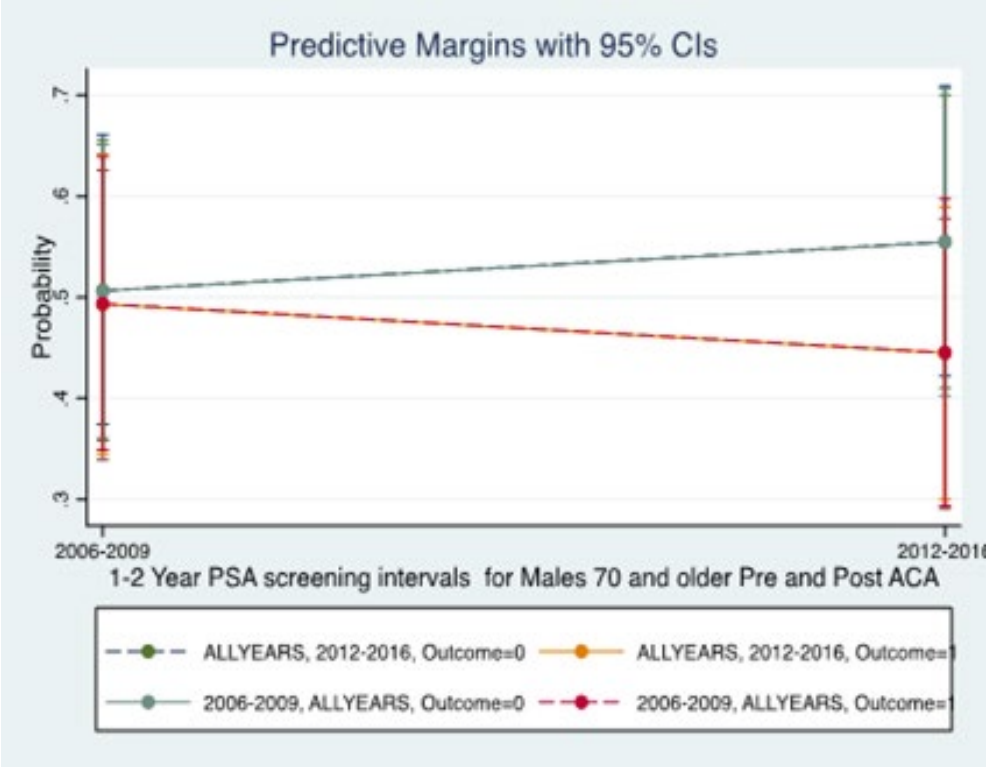



- Pap smears are not recommended for women older than 65 and are used to detect cervical cancer. The present study found that 42% of women in the sample had a hysterectomy (i.e., Depending on the surgery done a pap smear may no longer be needed). Among women 65 years old, 8.3% (P<0.000) reported having a pap smear Within Three Years pre-ACA and 9.6% post-ACA. (a difference of 1.3%). For women 66 years and older, 8.2% (P<0.000) reported having a pap smear Within Three Years pre-ACA, and 9.5% reported screenings within three years post-ACA (a difference of 1.3%).

Prostate screenings 65-69

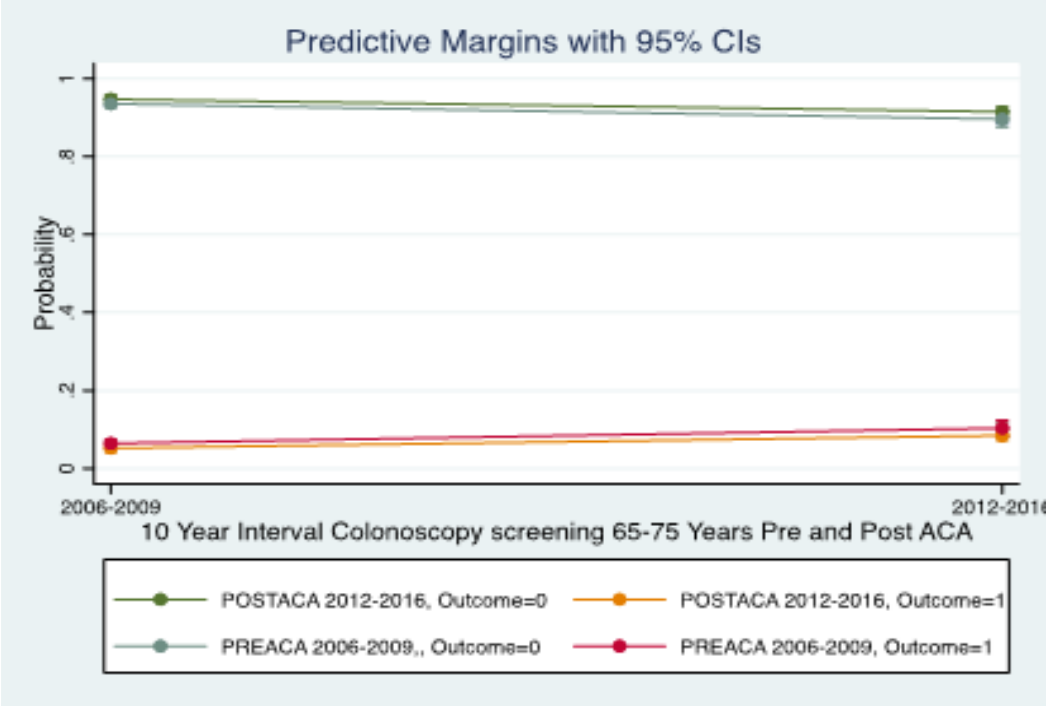


Prostate screenings 70+

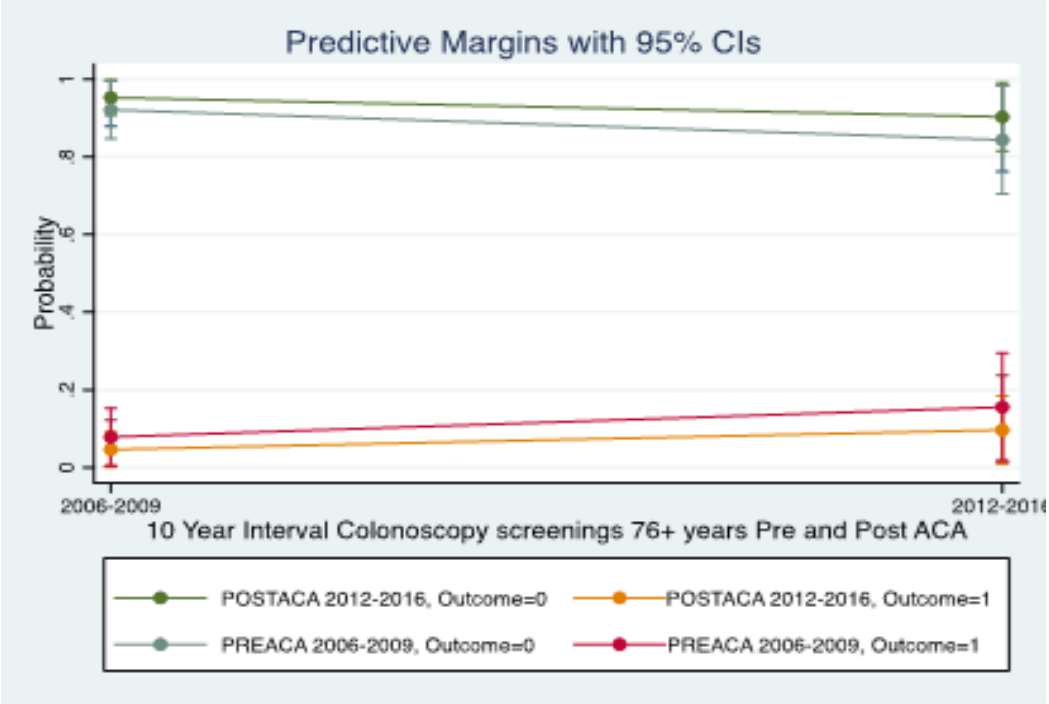



- For PSA screenings, this present study found that for men up to age 69 (65-69), 51.5% (P<0.000) reported having screenings every one to two years pre-ACA, and 50.3% post-ACA (a difference of -1.2%). For men 70 and older, PSAs are not USPSTF recommended, but 44.5% (P<0.000) were screened during pre-ACA and 44.5% during post-ACA (no difference).

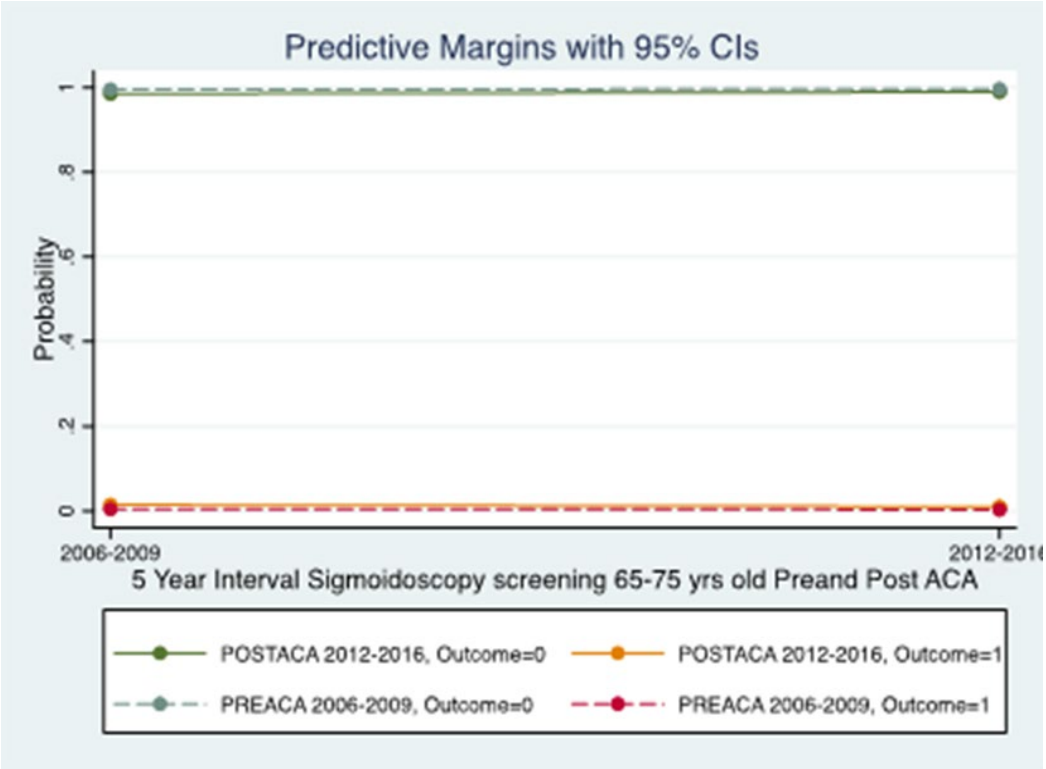
Colonoscopy 65-74




Colonoscopy 75+



Sigmoidoscopy 65-75




- Colonoscopy screenings every Ten Years for adults 65-75 were 10.3% (P<0.000) pre-ACA and 8.5% post-ACA (a difference of -1.8% points). Colonoscopies for adults 76 years and older are not USPSTF recommended, but 15.6% (P<0.000) reported being screened every Ten Years pre-ACA and 9.6% post-ACA (a difference of -6% points).
- Sigmoidoscopy screenings are recommended every Five Years. This study found less than 1% (P<0.000) of adults ages 65-75 reported receiving the pre-ACA and post-ACA periods (a difference of 0.20% points). For adults 75 years and older the sample size was small, and the results were insignificant.

Discussion:

This study aimed to examine Medicare's alignment with USPSTF recommended grade A and B preventive care service guidelines. Following the ACA provisions, four of the ten preventive care screenings for Medicare beneficiaries 65 years and older were not aligned with USPSTF clinically recommended guidelines. Cancer screenings (mammograms, colonoscopies, PSA, and cervical) in older adults significantly differed from USPSTF recommended age requirements. Inconsistencies in clinical preventive practice guidelines can lead to non-alignment with health systems and confuse the beneficiaries and insurers. Although the ACA states the cost-waiving provision covers USPSTF grades A and B guidelines, it has allowances for Medicare's continued coverage of grades C, D, and I, which can counteract evidence-based research guidelines and clinical practice patterns.

The USPSTF recommendations are guided by evidence-based research provided by the Agency for Health Care Research and Quality (AHRQ). AHRQ is the leading Federal agency responsible for improving the safety and quality of healthcare on a national level. They review and compile evidence-based research data needed to improve the healthcare system to guide consumers, healthcare professionals, and policymakers to make informed health decisions (AHRQ 2022). However, these guidelines can conflict with other national agencies, such as the ACS and AGOC, which have different guidelines for best clinical practice. Furthermore, since older adults are unrepresented in clinical trials, USPSTF evidence-based screening interval uncertainty persists for multiple screening measures (Desai et al., 2017; Lewis et al., 2003). Although the

USPSTF has age restrictions for most cancer-related screening deemed ineffective and perceived adverse effects, research finds that the risk of developing cancer increases with advancing age. It may have policy implications for whether most USPSTF cancer screening recommended age restrictions are outdated and nonconforming to older adults living longer, healthier lives. The National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program provide information on cancer statistics to reduce the cancer burden among the U.S. population. One study reported that between 2013-2017, the incidence rates for cancer increased, from fewer than 25 cases per 100,000 people in age groups under age 20 to about 350 per 100,000 people among those aged 45–49, to more than 1,000 per 100,000 people in age groups 60 years and older. They also report that the median age at diagnosis is 62 years for breast cancer, 67 years for colorectal cancer, 71 years for lung cancer, and 66 years for prostate cancer (NCI, 2021). The CDC has reported that more than two-thirds of all new cancers are diagnosed among adults aged 60 years and older, and new cases are predicted to increase due to prolonged life spans. They report that in 2018, more than 1.7 million people were diagnosed with cancer, and expected to reach more than 2.2 million by 2050, with the most significant percentage increase among adults 75 years or older (CDC, 2021). According to a recent ACS Facts & Figures report, the probability of developing invasive cancer among adults 70 years and older during 2014-2016 was 1 in 12 for prostate cancer, 1 in 30 for colon cancer, and 1 in 4 for breast cancer. They also find that older age and being female are the most substantial risk factors for breast cancer, but early detection with mammograms can reduce the incidence of breast cancer-related deaths in older women (ACS, 2022). Most recently, the NCI reported new evidence that suggests

benefits to increasing the age ceiling for USPSTF recommended colonoscopy screenings to include adults 76 years and older. Screening for colorectal cancer has been shown to reduce deaths from the disease. Although the USPSTF recently updated its guidance to recommend screening for all adults aged 45 to 75, it concluded that the "net benefit" of screening after age 75 was insignificant and, therefore, not recommended. However, recent evidence indicates it may benefit people over age 75. One study used two large prospective cohorts with a sample of 56,374 adults aged 75 years and older, regardless of screening history, and found that screening beyond the recommended guidelines was associated with a reduced risk of CRC incidence and related mortality. These findings provided empirical evidence for supporting continued colon screening for adults 75 years and older to prevent CRC incidence and death (Ma et al., 2021). A conflicting observational study found colonoscopy screenings among adults, 70-74, provided only modest benefits in preventing CRC and even fewer benefits to older beneficiaries. Although the risk for adverse events was low, it was significant among older adults (García-Albéniz et al., 2016). ACS reports that prostate cancer is the second leading cause of cancer death in American men and that one in forty-one men die of this disease. They also find prostate cancer is most likely to develop in older men and non-Hispanic Black men, and six cases out of ten are diagnosed in men 65 or older with an average age of 66 at diagnosis. However, the USPSTF recommends it should be an individual's choice (grade C) for men 55-69, but does not recommend screenings for men, including African Americans (grade D) over 70. One study examined the lack of consensus on screening recommendations for prostate cancer with minimal guidance on screening cessation in men 70 and older. They found that considerations consistent with aggressive

disease progression become more prevalent as men age. They concluded that these findings have policy implications for current screening and treatment guideline recommendations (Brassell et al., 2011).

The underrepresentation of older adults in evidence-based clinical research undercuts the legitimacy guidelines that purport to be "evidence-based". Prior research has found that barriers to inconsistencies in guidelines are attributed to the underrepresentation of adults 65 years and older in clinical research studies. One study found that although 61% of new cancer treatments occur among the elderly, only 23% participate in clinical trials. They concluded that the underrepresentation of older adults in research studies is relevant to their disease burden (Lewis et al., 2003). A similar study found that the prevalence of breast cancer among women 65 years and older was significant, also attributing to uncertainty for screenings and treatment due to their non-participation in research studies (Desai et al., 2017). Other barriers to enrollment of elderly patients in clinical trials were associated with prior age exclusions and strict enrollment criteria that excluded patients with mild abnormalities in renal, hepatic, or cardiovascular functions impacting participation for older patients with comorbidities. This study observed similar findings with a reduction in certain cancer screening services with age restrictions, such as prostate cancer screenings and colonoscopy screenings, among adults 65 years and older. While cervical cancer screenings are not recommended for women over 65, this study found screening increased following the ACA (1.3%). The USPSTF also does not recommend mammograms over 75 years, but this study observed a 2.3% increase in this population following the ACA implementation.

Although the Medicare prevention policy adopted the ACA provisions on January 1, 2011, coverage decisions can instigate health policy implications when there are conflicting clinical practice guidelines. While most of the medical condition screenings and the flu vaccination adhered to USPSTF guidelines, significant inconsistencies in unrecommended age restricted USPSTF cancer screenings following the ACA implementation were found. While not USPSTF clinically recommended, this study found breast cancer screenings for women over 75 years were 20.4% pre-ACA and increased to 23.3% post-ACA, and pap smear screenings for women 66 years and older were 8.2% pre-ACA and increased to 9.5% post-ACA. However, no differences were found in the utilization rates of Prostate cancer screenings for men 70 years and older, which were 44.5% pre-ACA and post-ACA. However, for Colon cancer screenings among adults 76 years and older, the study found that 15.6% reported being screened during the pre-ACA period which decreased to 9.6% post-ACA. This decrease could be attributed to increased consistency with guidelines. Conflicting guidelines could impact adequate screening recommendations for those at higher risk and result in barriers to access. Lower-income vulnerable Medicare beneficiaries without a usual source of provider may not be aware of the new Medicare benefits, which include the cost-free Annual Wellness Visit that would focus on the individual's health risk factors and medical history to develop a personalized prevention plan. Additionally, confusion over when cancer-related screenings should cease due to USPSTF recommended age limitations could result in missed diagnosis and an increase in cancer-related deaths among adults 65 years and older. Unfortunately, research finds minorities are not receiving preventive services consistent with guidelines instigating disparities in receipt

of preventive healthcare due to barriers in access and other socio-demographic factors contributing to lower utilization rates (Adepoju et al., 2015; Buchmeller et al., 2016; Chen J et al., 2017; Chung et al., 2015; Lissenden et al., 2017; NCI-AA., 2021; Wan et al., 2015). Uncertainty in recommending appropriate preventive care screenings can impact the well-being of older adults prone to a higher-risk incidence of chronic diseases, which counteract good clinical practice guidelines.

The limitations of this study may include self-reported response bias, but MEPS-HC data collection addresses this issue by surveying each household five times over two years. The survey is also from the perspective of the patient and not the provider. Furthermore, having access to Annual Wellness Visits data would provide a more accurate assessment of appropriate screening intervals, as per recommended USPSTF guidelines. In addition, as previously mentioned, another limitation of the current research is that older adults are unrepresented in research, especially minorities.

## Conclusion

Although the ACA has attempted to improve the alignment of USPSTF clinically recommended grade A and B preventive screenings with Medicare's coverage policy, there are conflicting nationally recommended guidelines for cancer screenings for adults 65 years and older. These inconsistencies can cause disruptions of preventive healthcare services within multiple levels of the healthcare system. Based on shared decision-making between the provider and the patient, there should be a conversation based on current evidence-based research. This study's approach provids information for future research that should consider multiple factors influencing the implementation of these

recommendations. Future research should focus on whether the USPSTF-recommended evidence-based guidelines are being implemented fully for seniors to accurately represent this population.

Key Findings:

- There are inconsistences between the guidelines and actual utilization.
- USPSTF guidelines conflict with other national agencies, such as the ACS and AGOC and CMS, which have different guidelines for best clinical practice.
- This current study agrees with previous research (Desai et al., 2017; Lewis et al., 2003) that policy implications are apparent since older adults are unrepresented in clinical trials used to determine USPSTF evidence-based screening intervals which can result in uncertainty for optimal screening intervals and treatment decisions.

Chapter IV- Paper Three

# The Affordable Care Act's impact on reducing gaps in health disparities for Medicare beneficiaries 65 years and older by race/ethnicity and income.

## Introduction:

Adults 65 years and older from minority and lower income groups have been found to have lower utilization of healthcare services, including preventive care (Adini et al., 2019; Anderson et al., 2014; Doty et al., 2022). Improving equity in access to recommended healthcare services at reasonable costs for lower-income vulnerable Medicare beneficiaries in the United States has been a social and economic concern. Insufficient insurance coverage, high healthcare costs, and a widening disparity in receipt of needed preventive care services have adversely affected the elderly population (Fulmer et al., 2021; Hayes et al., 2017; Yamada et al., 2015). A growing number of adults 65 years and older have delayed or forgone clinically recommended screenings due to the financial burden associated with required out-of-pocket expenses in the form of deductibles and copays, which can result in beneficiaries deferring needed treatment. Gaps in health disparities can exacerbate the receipt of preventive care services, leading to late diagnosis and causing early mortality among older vulnerable Medicare beneficiaries. Beyond income, a variety of factors can lead to lower utilization rates among older vulnerable Medicare beneficiaries.

Health disparities are a major threat to overall well-being and polices have been instituted aiming to address them and increase equity. The National Institute of Aging defines Health Disparities as differences in any health-related factor, disease burden, diagnosis, response to treatment, quality of life, health behaviors, and access to care

among population groups (NIA Strategic Directions, 2020). Health disparities are associated with an extensive, complex, and interconnected range of factors. These include age, race/ethnicity, insurance coverage, socioeconomic status, geographic location, education, healthcare access and quality, preexisting chronic conditions, or can be biological (e.g., sex).

The convergence of policy priorities, stimulated by the Affordable Care Act and the Centers for Medicare and Medicaid Services (CMS) Quality Strategy, has focused on promoting effective prevention and treatment of chronic disease by increasing access to preventive care services with the elimination of financial barriers previously impacting vulnerable Medicare beneficiaries 65 years and older. Prior research has associated the lack of access to preventive care with disparities in healthcare insurance coverage, race/ethnicity, and poverty-income levels (Chen et al., 2007; Peek et al., 2007; Yamada et al., 2015). Inequities in the utilization rates of preventive care services among minorities and lower income adults 65 years and older is a public health concern. For example, older Black Americans continue to have disproportionate, lower rates of preventive care services that include cancer, diabetes, cardiovascular screenings, and flu vaccinations, compared to older White Americans. This is attributed to socioeconomic status (Doubeni et al., 2009; Shavers et al., 2007; Zhangn et al., 2013).

The Affordable Care provisions (Title IV Section 4103, 4104) have incentivized healthcare interventions that target patients, providers, payors, and health organizations which aim to reduce racial disparities and improve health outcomes. Research shows gaps in racial disparities have been reduced since the ACA (Card et al., 2008; Chung et al., 2018; Hamman et al., 2015; Lissenden et al., 2017; Wan et al., 2015). Others,

however, have argued that there remains an unexplainable gap in the utilization rates of cancer screening services among minorities compared to non-minorities since the ACA eliminated financial barriers (Adepoju et al., 2015; Cunningham et al., 2017; Li et al., 2017; Ward et al., 2017). Although current strategies target efforts to reduce gaps in health disparities, the 2020 National Center of Health Statistics reported multiple chronic conditions among seniors. Diabetes increases with age, reaching 26.8% among those aged 65 years or older, with non-Hispanic Blacks (8.2 per 1,000 persons) and Hispanics (9.7 per 1,000 persons) having a higher incidence compared to non-Hispanic Whites (5.0 per 1,000 persons). Deaths associated with heart disease, stroke, and cancer also remain higher for African Americans than Whites (Cunningham et al., 2017; Elo et al., 1997; Feldman et al., 1999).

The Centers for Medicare and Medicaid (CMS) play a crucial role in supporting increased access to Preventive care services for the underserved, including older subpopulations, minorities, disabled, and for those that require public assistance. Medicare has placed an increased emphasis on preventive care services for older adults. Although coverage of preventive services under the Social Security Act Title XVIII (7), the Affordable Care Act aims to increase utilization of preventive services with policy enhancements by reducing out-of-pocket costs for older adults and by promoting equity in care. As the largest U.S. healthcare purchaser and regulator, Medicare has leverage to reduce disparities. As a purchaser, Medicare provides coverage to forty-one million older and disabled adults, one in five of which are members of racial and ethnic minority groups (Eichner et al., 2005). Nevertheless, barriers to accessing preventive care services continued to exist among older minority groups. The ACA has addressed this issue by

not only removing financial constraints, but by mandating cost-free coverage of USPSTF grade A and B services. The implementation of interventions for personalized health plan and subsequent screenings during the Welcome-to-Medicare and Annual Wellness Visits has also increased access.

This paper extends previous efforts examining gaps in literature about health disparities among older adults seeking Preventive care. It will, however, focus on the impact of ACA's Medicare benefit on reducing gaps in disparities for receipt of preventive services among lower income and minority Medicare beneficiaries, controlling for education, type of insurance coverage, and prevalence of a preexisting condition.

Literature Review:

Evidence has shown that even after differences in socioeconomic conditions are considered, race and ethnicity remain significant predictors of whether people will receive clinically recommended preventive healthcare services. (Baicker et al., 2004; Fiscella et al., 2007; Hood et al., 2007; Nelson et al. 2000).

The higher incidence of chronic diseases among minorities than non-minorities prompted Congress to request the Institute of Medicine (IOM) to examine racial and ethnic differences in healthcare use not associated with financial constraints or insurance coverage. The aim was to evaluate racial and ethnic disparities in healthcare that included bias, discrimination, and stereotyping throughout health system levels. IOM was also required to provide recommendations for interventions to eliminate healthcare disparities. After reviewing a wide array of evidence-based publications, they concluded

that significant differences exist in the quality and quantity of healthcare services utilized by older minority Medicare beneficiaries (Nelson et al., 2003).

Delayed diagnosis is increased without routine screenings and can lead to increased morbidity and mortality for Medicare beneficiaries. Prior research has found significant differences between minorities vs. Whites for the leading causes of death, the prevalence of chronic diseases, related health behaviors, health-related quality of life indicators, and healthcare utilization practices. Overall, minorities were less likely to receive preventive services than Whites. One study used Medicare Current Beneficiary Survey data to examine preventive care services from 1998 to 2002 among minority (Black and Hispanic) Medicare beneficiaries 65 and older, controlling for primary care visits. These included colonoscopy screenings, the influenza vaccine, lipid screening, mammography, and pap smear screenings. They found minorities were significantly less likely to have 2-3 primary care visits annually, with an even higher likelihood of not receiving any preventive care. Although they identified the lack of frequency in primary care visits among minority beneficiaries as a significant predictor for gaps in disparities, education and income also attributed to access to preventive services (Fiscella et al., 2007). A similar study using Medicare claims from 1998–2001 found significant variability of racial disparities in healthcare received by Medicare beneficiaries across geographical regions and for different Preventive care services. They concluded that Black enrollees have higher end-of-life healthcare expenditures with higher rates of ICU admissions in their last six months of life. But minorities were also less likely to receive highly effective preventive care interventions such as mammograms and diabetes screenings (Baicker et al., 2004). An American Cancer Society (ACS) study compared

racial health disparities between years 2000 and 2015 and found colorectal cancer screening among adults ages 50 and older increased from 32% to 62% in non-Hispanic Blacks compared to an increase of 40% to 65% in non-Hispanic Whites, among men ages 50 and older. For PSA and mammogram screenings 31% of Blacks reported having had a PSA test in the past year compared to 37% for Whites. They also found 69% of Black women ages 40 and older reported receiving a mammogram within the Past Two Years compared to 65% of White women. (ACS- 2019-2021). A study conducted among adults aged 50-75 examined the widening disparity between minorities and Whites for influenza vaccination rates. They found Whites and African Americans concerned about getting the flu were significantly more likely to be vaccinated (96% and 91%, respectively) than those not concerned (45% and 33%). But vaccination rates among Hispanics concerned with getting the flu (54%) or not concerned (34%) were lower than for Whites and African Americans. They also found other dissimilar factors attributed to barriers to receiving the influenza vaccination that existed among racial/ethnic groups. Hispanics were likelier to report a lack of access to services due to financial barriers. At the same time, African Americans had issues with mistrust of adverse effects of the vaccine, causing influenza, which were significant. (Chen et al., 2007). Ya-Chen et al. examined the effect of Medicare reimbursement on the rate and disparity of colorectal cancer screening among the elderly in the United States during the BBA reform. The health reform alleviated the screening disparity between non-Hispanic Whites and Blacks by expanding preventive services coverage to include annual mammograms and pap smears with no deductibles. It also expanded Medicare's coverage of prostate exams, diabetes self-management services, and colorectal cancer screenings. They found no significant

disparities in screening rates between non-Hispanic Whites and non-Hispanic Blacks after Medicare began covering colonoscopy. However, they found significant disparities between non-Hispanic Whites and Hispanics, who were 50% less likely to be screened for colonoscopies. The study concluded that factors other than cost-waiving were uniquely associated with the lower screening rate among older Hispanic Medicare beneficiaries, even after removing economic barriers (Ya-Chen et al., 2006). Another study identified gaps in disparities when observing screening vs. diagnostic testing among minority Medicare beneficiaries. They examined the receipt of preventive services for Fecal Occult Blood Test (FOBT), sigmoidoscopy, colonoscopy, and barium enema among Medicare beneficiaries over 65, for differences among racial subgroups for preventive services (e.g., diagnostic vs. screening). FOBT and sigmoidoscopy screenings were significantly higher for Whites (18.24% and 3.07%) than African Americans (11.86% and 2.17%). Colonoscopy screenings were higher among Whites than African Americans (7.36% vs. 6.88%). However, barium enema screening was significantly ($P<0.001$) higher for African Americans compared to Whites (2.26% vs. 1.88%). They concluded that racial disparity in receipt of colonoscopy screenings was higher for African Americans (7%) than Whites (8%). However, diagnostic colonoscopies were higher among African American men than White men (3.28% vs. 2.64%). The differences in receipt of preventive care screening contributed to the higher colorectal carcinoma incidence (SEER) observed in African American patients, which suggests disparities exist not only in the use of colorectal procedures, but also as indications of late-stage testing in this vulnerable population (Cooper et al., 2004).

Before the ACA provisions, prior evidence-based research and the IOM identified substantial barriers to access in the receipt of preventive care services predicated on differences in race and ethnicity. Most recently a 2017 CDC study examined age-specific mortality rates for selected leading causes of death among African Americans 65 years and older and found they declined between 1999 and 2015. This included heart disease reducing from 43% to 32%, cancer from 29% to 27%, and cerebrovascular disease from 41% to 34%. But as of 2015, African Americans continue to have a 40% higher death rate than Caucasians for all-cause mortality in all age groups. Overall, the study found that during 1999–2015, age-adjusted death rates decreased significantly, with rates declining the most among African Americans for major leading causes of death. They concluded the disparity gap in all-cause mortality rates narrowed from 33% in 1999 to 16% in 2015 (Cunningham et al., 2017).

The focal purpose of the ACA provisions was to reduce gaps in access to healthcare disparities among older Medicare beneficiaries. The following literature examines the impact of the ACA on eliminating racial disparities in the receipt of preventive care among Medicare beneficiaries 65 years and older with different conditions and insurance coverage. One study used MEPS (2009-2013) to assess whether the ACA's free preventive care benefit reduced racial and ethnic disparity gaps in the utilization rates of preventive services (cholesterol screenings, colonoscopies, mammograms, and pap smears). The control group was non-Hispanic Whites who were covered by Medicare without cost-sharing compared to non-Hispanic Blacks and Hispanics with Private insurance and were susceptible to cost-sharing. They found that cost-free preventive care screenings were associated with significant increases in the

likelihood of preventive care services. The utilization rates of preventive care cancer screenings for colonoscopies and mammograms among minorities increased in post-ACA years. Privately insured Hispanics' likelihood of receiving a colonoscopy was 3.6% and a mammogram 3.1% higher than non-Hispanic White adults with Medicaid coverage. Similarly, privately insured African Americans' probability of receiving these colonoscopies and mammograms increased by 2.3% and 2.4% compared to a non-Hispanic White person on Medicaid. They concluded racial and ethnic disparities have decreased amongst all private health insurers (Agirdas et al., 2018).

Buchmueller (2016) used data from the American Community Survey (ACS) from 2008 to 2014 to examine how health insurance coverage changed for Black and Hispanic adults compared with White adults in the first year after the implementation of ACA healthcare reform. They found Income was a significant factor for reducing the health disparity coverage gap between Blacks and Whites which decreased from 9% to 3.2% in 2014. The study concluded that the ACA's increased coverage of preventive care in the United States has led to a slight reduction in disparities related to race and ethnicity (Buchmueller et al., 2016). A recent study observed that disparities for colon cancer among racial Medicare beneficiaries were attributed to new reforms expanding access to care, adherence to clinically recommended cancer screening, and other socioeconomic conditions, but found disparities remained after adjusting for these factors. They concluded different dynamics that may include the understanding of ethnicity-specific factors, genetic and environmental factors, the biology of CRC progression, and the changes in screening age eligibility are all vital when evaluating the impact of reforms targeting eliminating disparities (Augustus et al., 2018). Another study

examined the variability of racial disparities among Medicare beneficiaries for cardiovascular preventive screenings. They found significant variation across regions and types of preventive care in both general use and racial disparities. They observed White beneficiaries get almost three times as many carotid endarterectomies as Blacks, but only 30% more angiograms. Blacks were also found to have higher admission rates to the ICU in their last six months of life and spent more out-of-pocket costs near the end of life but received fewer of these highly effective screening interventions. The study provided evidence that racial disparities exist, for the receipt of cardiovascular screenings, but found no significant association between disparities and the use of highly effective diabetic screening and mammography's (Baicker et al., 2004). Moy et al. examined whether the use of selected cancer screening and diabetes services, available under traditional Medicare to White and Asian Americans, differ by socioeconomic status (SES). They found Asian beneficiaries were less likely than Whites to receive cancer screening services across all age, sex, and socioeconomic groups with differences among metropolitan areas. They concluded that Asian Medicare beneficiaries were less likely than Whites to receive mammograms, colorectal cancer screening services, or diabetic services. The policy implications demonstrate the prevalence of Asian-White disparities at the national level (Moy et al., 2008). A similar John Hopkins University study examined African Americans' three leading causes of death regarding barriers to access. Despite ongoing research efforts, they found that many barriers to reducing the disparity in heart disease attributed to significant health problems of African Americans. They concluded that an approach was needed to address barriers, and stimulate health providers, researchers, and health policies to support interventions designed to reduce the

excessive death rates of high-risk population groups (Feldman et al., 1999). Similar findings are found when examining the receipt of clinically recommended vaccines for adults over 65. One study examined the national utilization of routinely recommended vaccines for Medicare beneficiaries based on patient-level characteristics. They found that Medicare beneficiaries within lower-income demographics with comorbid conditions, were less likely to receive routine vaccinations. Black and Hispanic utilization rates were between 27-42% compared to Whites 40%-61%. Dual-eligible beneficiaries also have a lower probability of receiving influenza and pneumococcal disease vaccine, but had a higher vaccination rate for herpes zoster (Shen et al., 2017). Another study used Electronic Health Records (EHR) data within a large California Healthcare organization to assess differences in preventive care utilization for Medicare beneficiaries 65 years and older before and after the ACA. They found these services were underutilized mainly by older adults with multiple chronic conditions, minorities (Hispanic and Black), and Medicare FFS beneficiaries. However, the utilization of advanced-aged beneficiaries increased post-ACA, thus reducing previous gaps in disparities. Also, HMO beneficiaries not impacted by the ACA cost-sharing provision still had the highest utilization of preventive services (Chung et al., 2015). Prior research has found differences in racial and ethnic backgrounds have been significant factors associated with access to preventive care services. Limited studies have found the ACA to be an essential contributing factor in reducing gaps in racial/ethnic disparities attributed to provisions enhancing access to care.

Poverty income levels can be a significant barrier to care for minorities at the lower end of the spectrum and are expected to be most likely impacted by the ACA

Medicare benefit with less out-of-pocket costs. Prior literature has shown that lower socioeconomic status can affect access to preventive care. One study compared changes in the utilization of mammogram and colonoscopy screenings among Medicare FFS beneficiaries 70 years and older. Using county-level socioeconomic status (SES), they found those beneficiaries in the lower-income quantile were associated with a lower rate of mammogram screenings compared to those in upper SES income quantiles, even after the implementation of the ACA. However, there was still a significant improvement in reducing the disparities gap. They also found no significant increases for colonoscopy screenings. Nevertheless, the association between education and income in receipt of this preventive service was significant during both periods. The study supports the finding that removing cost barriers reduces health disparities with increased access to preventive care for lower-income Medicare FFS beneficiaries (Cooper et al., 2017).

Others have found racial and ethnic disparities in access to preventive care services have decreased since the implementation of the ACA. The AARP Public Policy institute conducted a study to assess national trends in the utilization of Annual Wellness Visits among Medicare Advantage (M.A.) beneficiaries. It also explored the relationship between preventive care visits and receipt of individual screenings and vaccines (pneumonia, influenza, shingles, PSA, colonoscopy, mammogram, and pap smears) by socioeconomic status. They found that AWV utilization among Medicare Advantage enrollees went from 6.2% in 2001 to 25.25% in 2015. The rate was the highest among Whites and lowest among Hispanics, 26.3% compared to 18.3% in 2015. The utilization rates were higher for ages 65-74 (26.1%) than for those 75 or older (24.2%). Additionally, Southern states have the highest receipt for these services (Carter et al.,

2019). Ganguli et al. examined whether health disparities related to the type of healthcare organization, provider specialty, and location impact the receipt of Annual Wellness Visits (AWV). They found that Medicare beneficiaries living in rural areas were less likely to utilize AWV (8.1%) than those living in metropolitan areas (24.4%). They also found higher utilization in independent health organizations (e.g., primary care physicians) than hospitals. There was a higher rate in receipt of services for health organizations with a higher percentage of primary care physicians, practices with higher adoption of Electronic Health Records (EHR) and provider specialty mix. Medicare's EHR incentive program's participation had almost double the utilization rates of AWV compared to non-adopters. The study had policy implications since the lower adoption of AWV was significantly associated with historically underserved populations (non-Hispanic Blacks), Dual-Medicare enrollees (Medicare/Medicaid), and those living in rural areas. They found the type of healthcare organization was associated with the receipt of preventive services and was most effective with high-quality, coordinated care, such as in Accountable Care Organizations (Ganguli et al., 2018). A similar study found that the ACA cost-sharing waiver (ACA Section 4104) was associated with a 20% uptake in increased adherence to colonoscopy screenings among socioeconomically disadvantaged males (lower-income, less educated) Medicare beneficiaries. However, the ACA's policy implications include loopholes that could increase out-of-pocket costs for Medicare beneficiaries enrolled in Grandfather plans since they would still be liable for follow-up screenings, which continue to be billable to the patient under therapeutic services (Hamman et al., 2015). Others have examined the role of cost-effectiveness analysis in Medicare coverage of recommended preventive services compared to the lack

of coverage of treatments. They found the reforms current distinction between screening and diagnostic for specific preventive procedures, such as colonoscopies, could expose beneficiaries to unexpected cost-sharing. They could create cost barriers, increase gaps in health disparities and perpetuate the arbitrary distinction, in payment policy, between the private sector and Medicare coverage (Chambers et al., 2015; Flowers et al., 2013). A similar study found further progress is needed for reducing and eliminating health disparities needed in the post-ACA era. They concluded that to improve health reform, the focus should be on eliminating differential access to care and underlying social elements, which would provide knowledge gaps in preventive health services utilization, and concluded that providers should advocate providing patient-centered care and integrated care health systems (Adepoju et al., 2015). Another study used nationally representative data for 2011– 2015 from the Behavioral Risk Factor Surveillance System (BRFSS) to assess changes in health insurance coverage and access associated with the ACA for people in different socioeconomic levels to compare differences between Medicaid expanded vs. non-expansion states. The study examined how the ACA reduced disparities in healthcare access across socioeconomic groups and assessed the contribution of Medicaid expansion to these trends. They found differences in access narrowed significantly under the ACA, with the gap in coverage between higher and lower-income households falling by 46% in Medicaid expansion states and 23% in non-expansion states (Griffith et al., 2017). According to the 2011 Government Accountability Office, the overage of vaccines in Medicare remains problematic post-ACA, with only some vaccines (e.g., influenza, pneumococcal, and hepatitis B) being routinely covered without cost-sharing under Part B. However, vulnerable beneficiaries

without Medicare's Part D drug benefit could still have considerable cost-sharing, such as the shingles vaccine, which averaged $57 in 2009 (GAO, 2014).

The type of Medicare insurance characteristics may impact gaps in health disparities among beneficiaries. Before the ACA, an NBER study examined the impact of expanded Medicare healthcare coverage at age 65 to evaluate health insurance coverage effects on health-related behaviors and outcomes. They found that Medicare eligibility sharply reduces disparities in access to medical care and those with significant increases in insurance coverage at age 65 experienced systematic reductions in the probability of delaying or not receiving medical care. They also found that Medicare increased the probability of visiting a doctor at least once per year, the frequency of routine medical checkups and hospital stays by10%. However, the rise in hospitalizations was mostly significant for Whites compared to Blacks and Hispanics. Although having Medicare insurance was found to reduce medical healthcare gaps in racial disparities, they concluded that there was not enough significant evidence that associated Medicare eligibility with mortality rates at age 65. There was also not enough evidence to determine whether Medicare eligibility leads to increases in specific preventative care procedures, such as Blood Cholesterol testing, mammography, or prostate cancer testing among vulnerable beneficiaries (Card et al., 2008). One study compared trends in preventive visits and recommended preventive services for patients between the ages of 65 and 75 among Medicare fee-for-service, and Medicare HMO patients, as well as those with private fee-for-service, and private HMO plans. They found Medicare patients with fee-for-service insurance, use of annual use of preventive visits had the most significant increase from 1.4% before the ACA implementation to

27.5% post-ACA. Nevertheless, the rates of annual preventive care visit use among Medicare fee-for-service patients remained 10–20% lower than those with private coverage or those in a Medicare HMO. They concluded that the ACA expansions led to increased preventive service use by Medicare fee-for-service beneficiaries, which suggests that the ACA Medicare coverage expansion effectively increased the use of preventive services for adults over 65 (Chung et al., 2015).

Access to preventive care services for elderly Medicare beneficiaries is also impacted by location and transportation issues. One study examined trends and patterns of colorectal cancer screening (CCS) of Medicare beneficiaries in rural areas by state and year (before and after ACA) controlling for contextual, organizational, and aggregated patient characteristics influencing variations in care received by patients of rural health clinics (RHCs). They found robust evidence that higher utilization rates of CCS by Medicare beneficiaries, in rural areas, were found in the post-ACA period compared to the pre-ACA period. However, they concluded that only nine procedures had significant increases in CCS screening rates after enacting ACA, which were attributed to spillover effects of both Medicaid expanded States and preventive care coverage under the ACA (Wan et al, 2015).

Higher out-of-pocket costs for lower income beneficiaries with multiple chronic conditions can impact the receipt of necessary screenings. A recent Commonwealth Fund study compared out-of-pocket spending among older Medicare beneficiaries by type of service, income, insurance coverage, and health status. They used MCBS 2012 data, with projections up to 2016, and they found that more than a quarter of Medicare beneficiaries spent 20% or more of their income on healthcare (premiums, out-of-

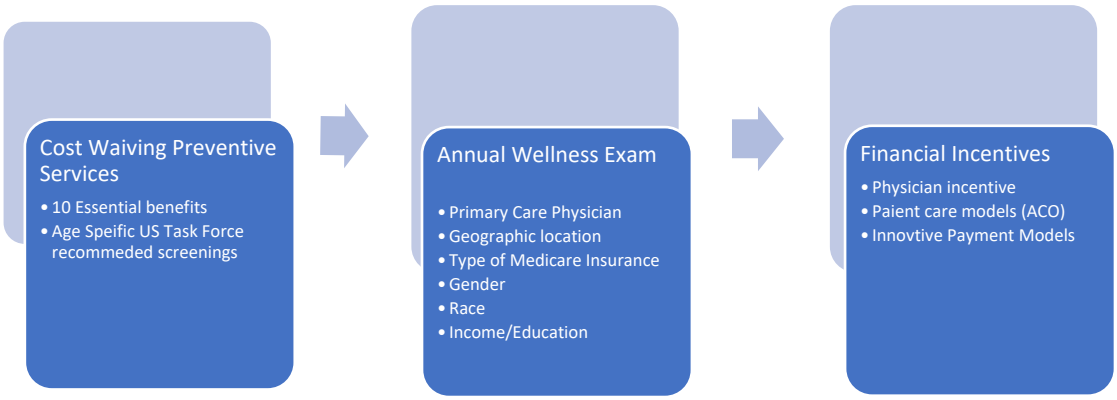
pocket). Medicare FFS spent almost double out-of-pocket expenditures (40%), and those with Medigap also had higher annual out-of-pocket expenses than Medicare Advantage and Medicaid beneficiaries (Dual-eligible). The study implies a higher financial cost burden for those beneficiaries with multiple chronic conditions and lower incomes. Beneficiaries without supplemental, private insurance coverage or Medicare Part D will pay higher out-of-pocket costs (without an out-of-pocket annual limit cap) for dental, vision, hearing, long-term services, or prescriptions (Schoen et al., 2017). A related study investigated whether the reduction in expected out-of-pocket expenses for a colonoscopy resulting from ACA's implementation (Section 4104) was associated with changes in screening behavior in the population ages 66– 75. Using data from the Behavioral Risk Factor Surveillance System (BRFSS), they estimated changes in annual colonoscopy rates before and after January 2011 and within certain socioeconomic groups to determine whether the policy might have helped the economically vulnerable elderly more than other groups. The study found that increases were the largest among socioeconomically disadvantaged groups. Following the ACA implementation, men increased the probability of having had a colonoscopy within the Past Year by 20%, but there was no significant change in women's screening rates. They found that screening rates increased by 9.2 % among men who reported not having seen a physician due to cost barriers within the Past Year. They also found screening significantly increased among household incomes of $25,000– $34,999, but did not find significant screening changes among men with household incomes less than $19,999. They found that among people with less than high school education, screening rates increased by 7.5% among men and 2.2% among women. They concluded that income was associated with larger

gains in preventive care services among socioeconomically older disadvantaged groups (Hamman et al., 2015). In contrast one study found provisions mandated by the ACA improved cancer screening affordability and increased accessibility for vulnerable beneficiaries for routine mammography and initial colorectal cancer screenings. They found the ACA provisions for preventive services in Medicare led to significant increases in the number of colorectal cancers diagnosed at an early stage, but not for the early diagnosis of breast cancer. Results provided evidence that ACA expansions in Medicare were associated with the decreased number of late-stage colorectal cancer diagnoses for men by 10.3% ($p < 0:05$). They concluded the ACA had a larger impact on the number of early-stage colorectal cancer diagnoses for women than men. The increase for men was not significant (3.8%), but was for women at 12.8% ( ($p < 0:01$ ) ( Lissenden et al., 2017) .

To summarize, empirical analyses for the effect of health insurance, race/ethnicity, gender, income/education, and location, on preventive care service use, all account for systematic barriers within the U.S. healthcare system. Disparities due to age, gender, income, education, and type of Medicare coverage could impact preventive screening utilization rates. Traditional Medicare beneficiaries (FFS) were hypothesized to experience the most impact, compared to other Medicare beneficiaries (supplemental MA or Dual-eligible), due to eliminating cost-sharing. However, prior research (before and after the ACA) has indicated health disparities continue to exist, providing evidence that cost is only one factor impacting health service delivery (Hamman et al., 2015; Xu et al., 2020)

Although the ACA is well-known for reform expansions of health insurance, improving access to preventive healthcare services and whether these provisions have reduced health disparities for access to preventive care screenings will be the focus of this study. This analysis will separate these effects in the context of elderly persons by race/ethnicity and income.

**Figure 7: The ACA policy provisions – gaps in disparity**




Methods:

This research will use a repeated cross-sectional study design using aggregated household component files from the Medical Expenditure Panel Survey for Household (MEPS – HC) from 2006 – 2016. For each year, MEPS gathers from across the nation comprehensive information on respondents' health services utilization, healthcare expenditures (including out-of-pocket/self-pay), socioeconomic characteristics, health insurance coverage, health status, and health behaviors. This analysis will account for the

MEPS complex survey design. The dataset represents a national population of 323,141,687 with 34,655 observations that include the utilization of preventive care services, healthcare expenditures, and self-reported health status, and is a good representative sample of race/ethnicity. A natural experiment design was used to examine the differences in race/ethnicity and income in receipt of Medicare's preventive coverage of screenings with USPSTF clinically recommended interval screenings for grade A and B preventive care services. The sample was limited to Medicare beneficiaries 65 years and older with continuous enrollment in Medicare part A and B services from 2006 to 2016 with different insurance type characteristics (Medicare-only, Medicare Advantage, Medicare + Private, and Medicare + Medicaid), using pooled survey data (years 2006-2016). Two multiyear cycles were used for the study's analysis and reporting to examine differences in alignment with the USPSTF guidelines before and after the ACA provision was implemented. The impact of multiyear dummy variables on preventive screening intervals measured the differences in the utilization rates for ten USPSTF recommended and non-recommended preventive care practices within the pre-ACA (2006-2009) and post-ACA (2012-2016) years. The analysis was adjusted for person-level weight to reflect the mean annual subpopulation size, healthcare utilization, and expenditures within each cycle.

Quantitative methods using ordered logistic regression with marginal effects measured differences in categorical receipt of recommended interval screenings per USPSTF recommendations for metabolic preventive care, cancer screenings, and the influenza vaccine. They included: Blood pressure, Cholesterol, Aspirin use, Pap smears,

Mammograms, Breast exam, Prostate (PSA), Colon cancer screenings (colonoscopy and sigmoidoscopy), and the Influenza (flu) vaccine. The study measured differences in the receipt of preventive services for the alignment to USPSTF recommended screening intervals specific to adults 65 years and older before and after the ACA's provisions. Controls included sociodemographic characteristics, type of insurance coverage, total out-patient office visits, total health expenditures, and source of payment, including out-of-pocket costs. Other controls included general health status, usual source of care provider, and whether they had one or more chronic conditions.

Human Subjects, Animal Subjects, or Safety Considerations

This study is conducted with secondary analysis using public MEPS household panel data. Secondary analysis of existing data was approved under IRB exemption because it does not fall within the regulatory definition of research involving human subjects. No animal subjects or safety considerations will be used in this study.

Outcome Variables:

This study measured differences in the pre-ACA and post-ACA year screening interval outcomes of USPSTF recommended and non-recommended preventive care services (Table 6), specific to adults 65 years and older by race/ethnicity and income. The ACA increased access to clinically recommended USPSTF grade A and B preventive care services by removing financial barriers. This study examined whether the ACA provision impacted the alignment of USPSTF clinically recommended services with Medicare's prevention policy. Adherence to appropriately timed preventive care services

is predicted to improve among those previously susceptible to higher cost-sharing. The data includes dependent variables and panel responses that coincide with the USPSTF clinical recommendations for Blood pressure (Grade A - 2015), Cholesterol – lipid panel test (Grade A - 2015), and BMI (Grade B - 2018) annual screenings for risk of heart disease, stroke, and diabetes. Aspirin use (Grade B/C -2016 recently updated to D - 2022), is also recommended annually. Mammogram screenings (Grade B-2016) are recommended for women ages 50-74 every Two Years (biennially), and colorectal cancer screenings (Grade A-2016) are recommended for adults 50-75 years old every Ten Years and sigmoidoscopy screenings are recommended every Five Years. For the Influenza vaccine, the ACIP recommends routine annual influenza vaccines for adults 65 years and older. Adherence to clinically recommended practice interval screening guidelines to manage the prevalence of chronic conditions among older adults at high risk is essential.

Table 6 - USPSTF recommended preventive screenings for adults 65+

| | USPSTF A and B Recommended Screenings for Adults > 65 | | | |
|---|---|---|---|---|
| Type of Screening | Grade (Year of Recommendation) | Age Range | Screening Frequency | MEPS survey definition for adherence of preventive screenings |
| Colonoscopy | A (2016) | 50-75 years | Every ten years | within past ten years or less |
| Sigmoidoscopy | A (2016) | | Every five years | within past five years or less |
| Abdominal Aortic Aneurysm: Screening | A (2019); C (2019); D | 65–75-year-old men who smoked, 65-75 who never smoked; not recommended for women never smoked | 1-time screening | Not collected in MEPS data |
| Abnormal Blood Glucose and Type 2 Diabetes Mellitus: | B (2015) | 40 to 70 years who are overweight or obese | Every three years | Blood glucose was collected only in ACA post-era.<br><br>BMI screening - within the past year or less<br><br>Blood Pressure screening within the past year or less. |

| | | | | |
|---|---|---|---|---|
| | | | | Cholesterol screening within the past year or less |
| High Blood Pressure in Adults: Screening | A (2015) | >18 years | Annual screening >40 years old | within the past year or less |
| Hepatitis C Virus Infection in Adolescents and Adults: Screening | B (2020) | 18-79 years old | 1-time screening | Not collected in MEPS data |
| Screening for Hepatitis B Virus Infection in Adolescents and Adults | B (2020) | adults at increased risk for infection | The USPSTF found no evidence to determine optimal screening intervals. Periodic screening-high risk | Not collected in MEPS data |
| Human Immunodeficiency Virus (HIV) Infection: Screening | A (2019) | 15-65 years old | 3, 6, or Annual screenings (depends on risk) | Not collected in MEPS data |
| Lung Cancer: Screening Low-dose computed tomography | A (2013) | 55-80 with a history of smoking | Annually- | Not collected in MEPS data |
| Osteoporosis to Prevent Fractures: Screening | B (2018) | Women 65 years and older | Annually | Not collected in MEPS data |
| Unhealthy Drug Use: Screening | B (2020) | >18 | Annually | Not collected in MEPS data |
| Unhealthy Alcohol Use in Adolescents and Adults: Screening and Behavioral Counseling Interventions | B (2018) | >18 | Annually | brief screening instrument (e.g., SASQ or AUDIT-C), c |
| Latent Tuberculosis Infection: Screening | B (2016) | >18 - populations at increased risk (e.g., living in Nursing Homes and ADL) | 1-time screening | Not collected in MEPS data |
| Depression in Adults: Screening | B (2016) | All Adult General population | Annually | Patient Health Questionnaire PHQ 2 – test for depression, mood and anhedonia |
| Chlamydia and Gonorrhea: Screening | B (2014) | Older women at risk | Annually | Not collected in MEPS data |
| Syphilis Infection in Nonpregnant Adults and Adolescents: Screening | A (2016) | persons who are at increased risk for infection | Annually | Not collected in MEPS data |
| Cervical Cancer Screening (Pap Test) | A, C (2016) | 25-65 years, < 65 years | Within the past three years or less. Not recommended for women over 65 | PAPSMR53 - HOW LNG LST PAP SMEAR TST (>17) - RD 5/3 |
| Breast Cancer Screening and Exam-Mammogram[3] | B (2016) | 50–74 years | Every two years | Within the past two years or less |
| Physical | n/a | | Annually | Within the past year or less |
| Cardiovascular: Metabolic screening for Diabetes and Heart Disease: | B (2015) | 40-70 years old | Annually | Within past year or less |

| | | | | |
|---|---|---|---|---|
| Blood Pressure | A (2015) | 18 years and older | Annually | Within the past year or less |
| Weight Loss to Prevent Obesity-Related Morbidity and Mortality in Adults: Behavioral Interventions BMI | B (2018) | 18 years and older | Annually | Within the past year or less |
| Healthy Diet and Physical Activity for Cardiovascular Disease Prevention in Adults with Cardiovascular Risk Factors - Behavioral Interventions. Cholesterol | B (2020) | 18 years and older | Annually | Within the past year or less |
| Influenza vaccine -ACIP/CDC | A (2020) | 65 and older – high risk | Annually | Within the past year or less |

Main predictors:

The years 2010 and 2011 were the main predictor variables. Although the ACA implemented mandated coverage in 2010, Medicare began covering cost-free preventive care services on January 1, 2011. The comparison group design included differences in race/ethnicity and income by insurance type characteristics for beneficiaries with Medicare-only, Medicare with Private supplemental insurance, Medicare Advantage Care beneficiaries (HMO), Medicare beneficiaries with supplemental public insurance (Medicaid HMOs), and those Uninsured. Those with Medicare-only are expected to benefit the most from the Part B enhancements. For this study, the USPSTF recommended preventive clinical screenings for adults 65 years and older are categorized by: 1) Medical condition screenings, 2) Aspirin use, 3) Vaccinations (flu/influenza), and 4) Cancer screenings. Survey subpopulation analysis was used for the statistical analysis of the panel survey. It ensures accurate estimation accounts for cluster and stratification of MEPS data. The effects of the ACA cost-waiving provision on improving alignment between Medicare preventive coverage and USPSTF recommended preventive guidelines are examined among older Medicare beneficiaries by insurance type coverage. Self-

reported panel responses to preventive care screening intervals during 2006-2016 were compared to USPSTF grade A and B preventive care guidelines. Differences in adherence to guidelines compared to nonadherence to guidelines were assessed using ordered logistic regression models (unadjusted and adjusted) during the pre-ACA (2006-2009) and the post-ACA periods (2012-2016).

Covariates:

All outcome variables (Table 6) are controlled for socio-demographics that includes sex, race/ethnicity, education level, marital status, poverty status and geographical location (Northeast, Midwest, South, West). Controls also included self-reported responses to types of insurance coverage, total healthcare expenditures, source of payment, perceived health status, whether they have a usual source of care provider for preventive services, and if they have at least one or two or more chronic conditions.

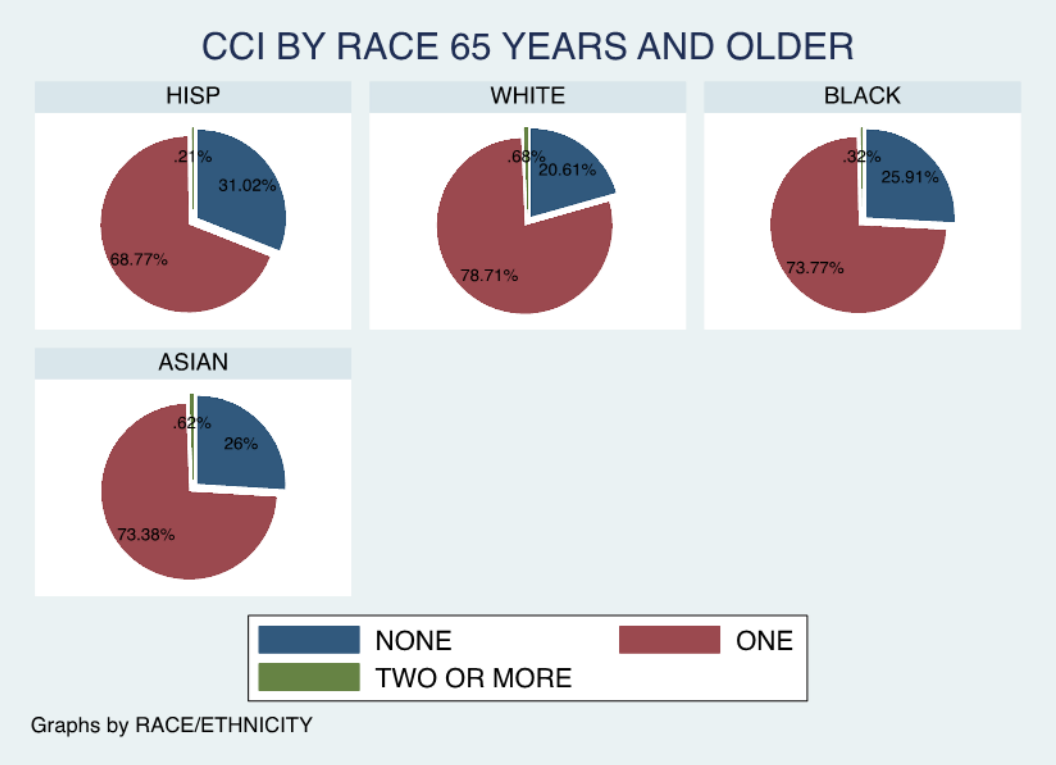
Stata SE 15 includes a module to create a Charlson Comorbidity Index (CCI) helpful in determining if adults 65 years and older, with medical comorbidities, are receiving USPSTF clinically recommended preventive care screenings. The CCI is included in the analysis to account for at least one chronic disease or long-term condition common in adults 65 years and older. The Charlson scoring Index is included in the analysis to account for at least one chronic disease or long-term condition common in adults 65 years and older. The CCI categorizes patients' comorbidities based on the International Classification of Diseases (ICD) diagnosis codes under 17 categories. Each comorbidity category has an associated weight (from 1 to 6) based on the adjusted risk of mortality or resource use. The sum of all the weights results in a single comorbidity

score for a patient. For example, a score of zero indicates that no comorbidities were found, and the higher the score, the more likely the predicted outcome will result in mortality or higher resource use. In this study, the CCI index is used as a predictor covariate within the analysis to understand better the association of chronic disease diagnosis with the utilization rates of clinically recommended preventive healthcare before and after the ACA policy. The CCI was developed (Appendix) for the present using the diagnosis of chronic disease responses provided by the MEPS-HC component, which asks for a response of YES/NO to being diagnosed with a chronic condition. Only those conditions listed under the 17 commodities according to the CCI were used, which determined the categories for the dummy variable (gcci2) recorded as (1): no comorbidity, (2) at least one long-term condition, and (3) ≥2 long-term conditions present (Figure 4).

Relevant studies have used a modified CCI predictor variable when assessing the relationship between preventive services and existing chronic conditions. In 1992 Deyo adopted a clinical comorbidity index designed for using medical records data from the International Classification of Diseases (ICD-9-CM) diagnosis and procedure codes. The association of CCI with health outcomes and resource use was examined among Medicare beneficiaries who underwent lumbar spine surgery in 1985. The CCI index was associated with predicted postoperative complications, mortality, blood transfusion, discharge to a nursing home, length of hospital stays, and hospital charges (Deyo et al., 1992). Similarly, Wallner used a modified CCI to compare the rates of preventive services among Prostate Cancer survivors five years before and after diagnosis to men

without Prostate Cancer. They found the rates of preventive services were lower among men diagnosed with Prostate Cancer vs. men not diagnosed (Wallner et al., 2017). Schonberg used a modified CCI as a predictor variable when examining the use of preventive health services among older women to assess how age and illness burden influence care patterns. Illness burden was measured using the CCI. They found cancer screenings improved among older women in poor health, but lacked screenings for depression or counseling about exercise, falls, or incontinence (Schonberg et al., 2008). Chung used a modified CCI when investigating the utilization of preventive visits before and after the introduction of ACA's Annual Wellness Visit (AWV). They found older adults with multiple chronic conditions were less likely to make a separate preventive visit and preferred receiving preventive care during their problem-oriented visits (Chung et al., 2018).

Figure 8: CCI Index by Race




Statistical Analysis:

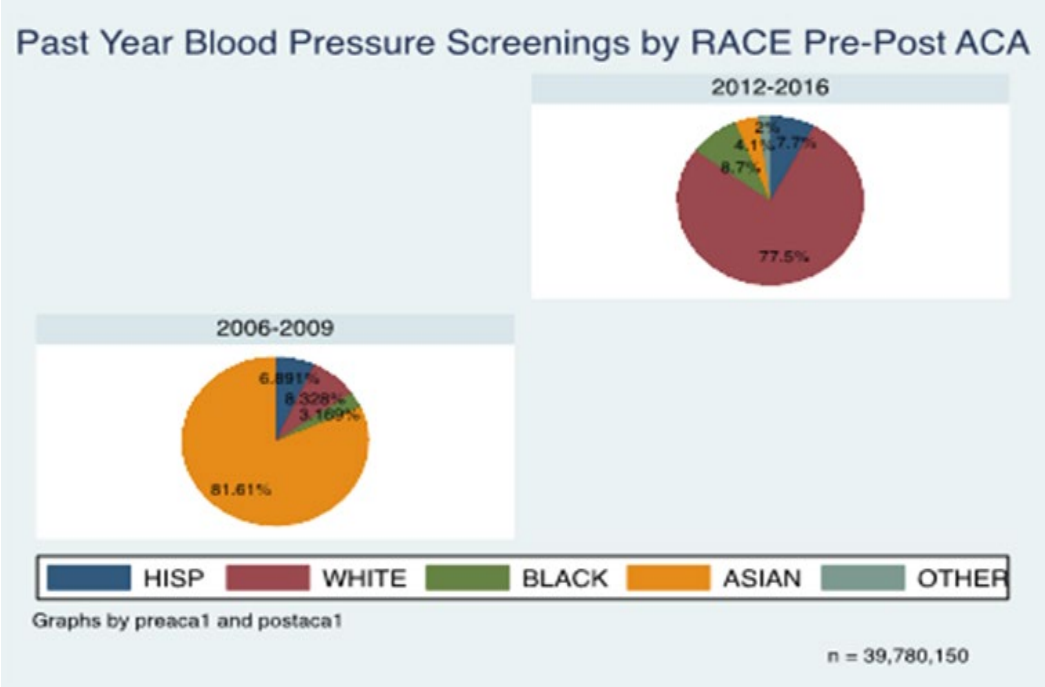
A complex survey design estimation was used for this analysis using a previously appended Medical Expenditure Survey (MEPS-HC) pooled data set from 2006 to 2016. Estimated survey analysis provided preliminary descriptive statistics for the data sample characteristics, and OLS regression was used to determine the "goodness of fit" before using ordinal logistic regression. Dummy variables were created for all preventive care services with binary outcomes variables for self-reported event screenings with 0 = nonadherence to recommended screening intervals and 1 = recommended screening

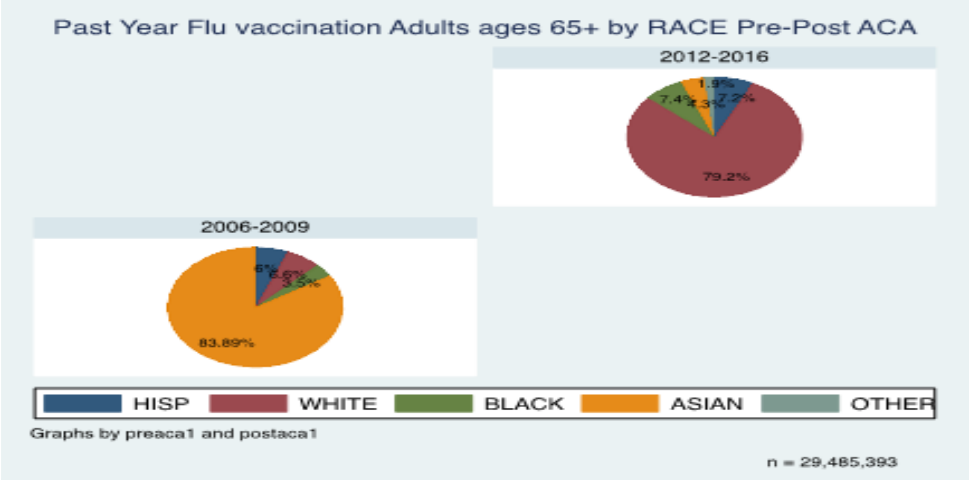
intervals as per USPSTF age and gender-specific recommended guidelines for adults 65 years and older.

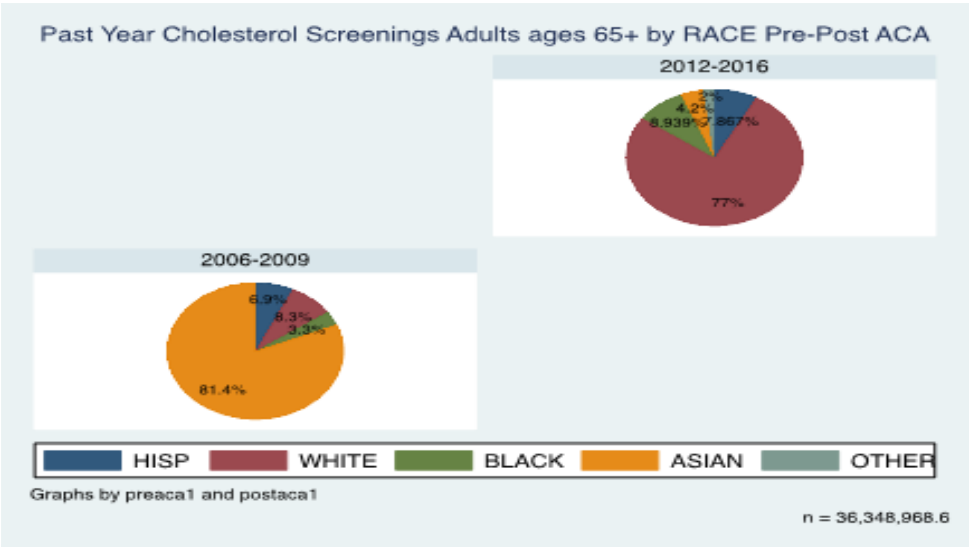
The ordered logistic model reflects the USPSTF grade A, B, C, D and I age-sex clinically recommended screenings intervals for adults 65 years and older. This study controlled for socio-demographic characteristics, total out-patient physician/provider visits, total healthcare expenditures, payment source, insurance type coverage, and perceived health status. Also included was whether they have a usual source of care provider and if they currently have at least one chronic condition. The analysis also included dummy variables for the predictor years 2006-2009(preaca11) and 2012-2016(postaca1). Ordinal logistic regression is used to estimate the differential impact of the outcome binary variables after controlling for relevant predictor variables, which measures whether the receipt of clinically recommended preventive care services aligns with USPSTF practice guidelines among adults 65 years and older. The fully adjusted statistical model for preventive care screenings among adults 65 years and older for each binary outcome is reflected in the Appendix. Differences in Medical condition screenings, Aspirin use and whether they received the Influenza vaccine within the Past Year were assessed before and after the ACA implementation. The cancer variables in the USPSTF have different guidelines regarding age-sex screenings. This current study examined self-responses to whether Mammograms were received biennially, pap smears every three years, PSA every 1-2 years, colonoscopies every Ten Years, and sigmoidoscopy every Five Years. A sample of around 12% of Medicare beneficiaries over 65 will be used in the analysis.

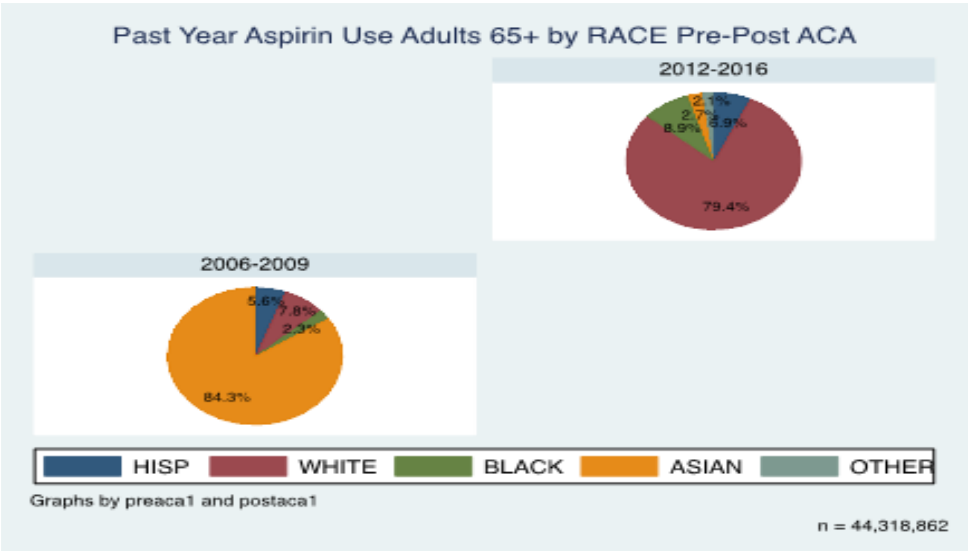
Statistical Analysis

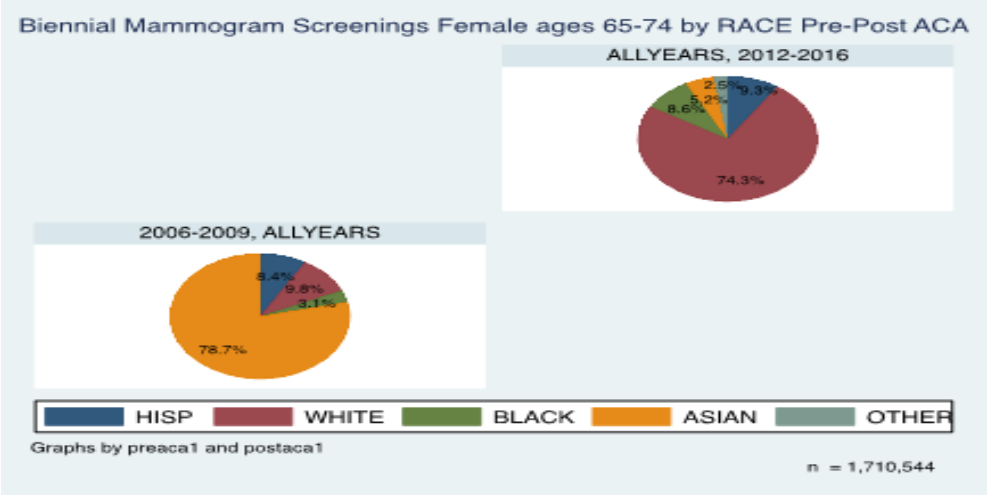
Preliminary results: Descriptive analysis for proportion of adults 65 years and older by age-sex specific USPSTF recommended preventive screening guidelines by Race before and after the ACA implementation.

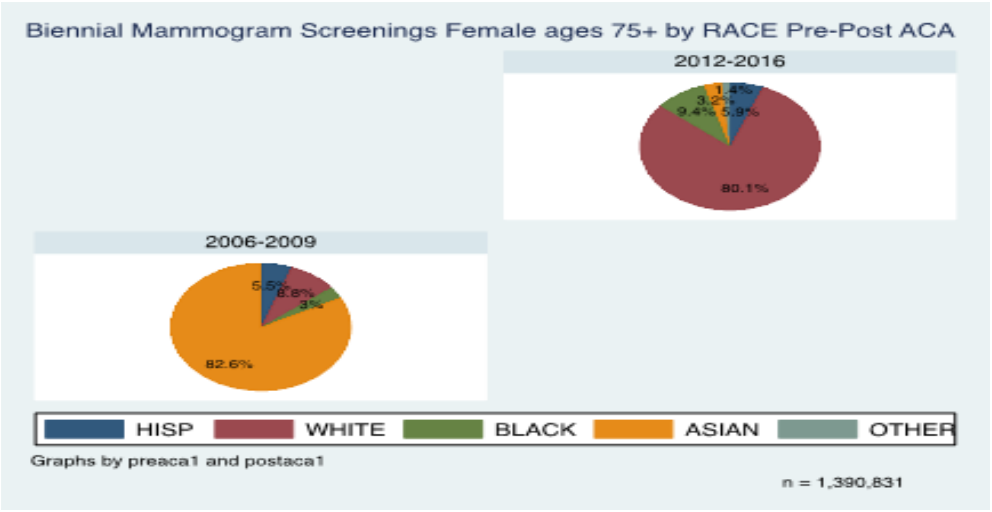


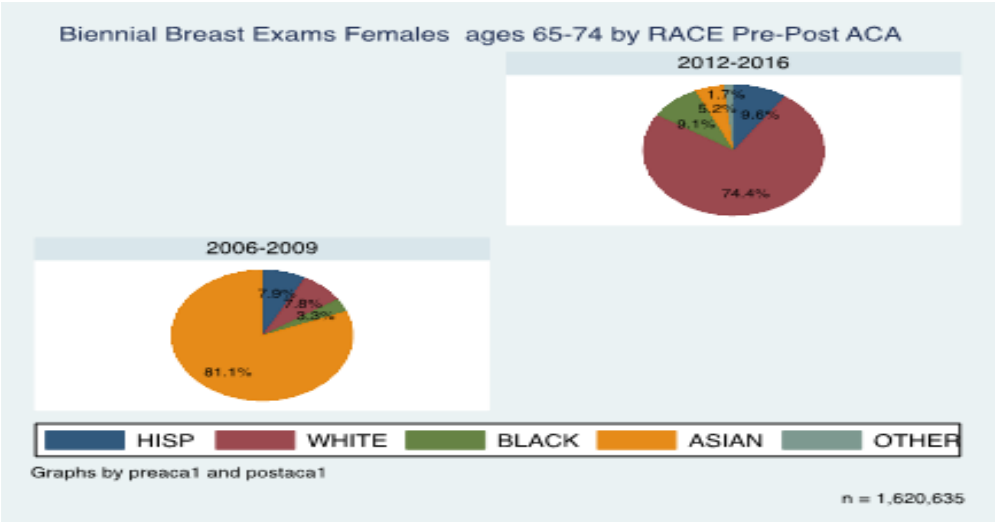

Past Year Flu vaccination Adults ages 65+ by RACE Pre-Post ACA
2012-2016
1.9%
7.4%
4.3%
7.2%
79.2%
2006-2009
6%
6.6%
3.5%
83.89%
HISP
WHITE
BLACK
ASIAN
OTHER
Graphs by preaca1 and postaca1
n = 29,485,393

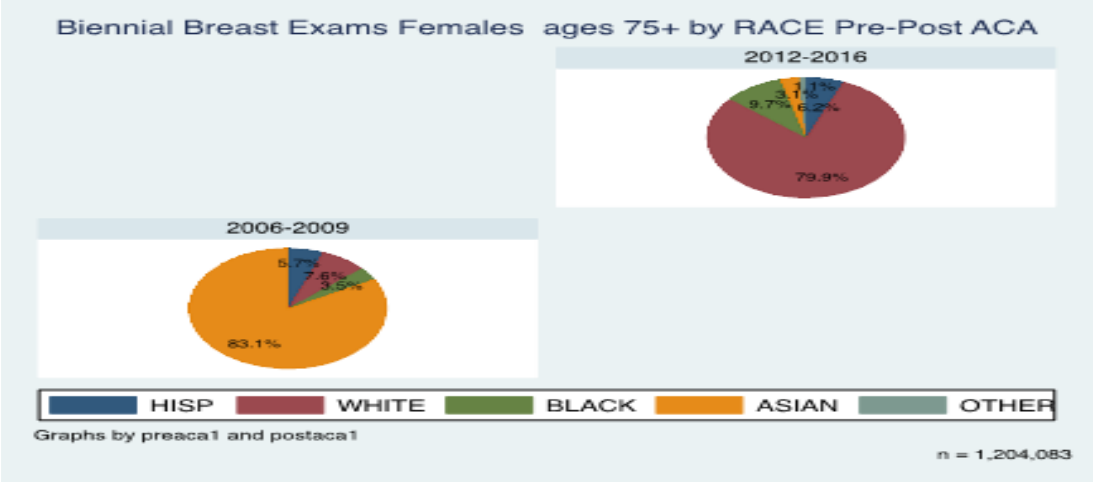

Past Year Cholesterol Screenings Adults ages 65+ by RACE Pre-Post ACA
2012-2016
4.2%
8.939%
7.867%
77%
2006-2009
6.9%
8.3%
3.3%
81.4%
HISP
WHITE
BLACK
ASIAN
OTHER
Graphs by preaca1 and postaca1
n = 36,348,968.6

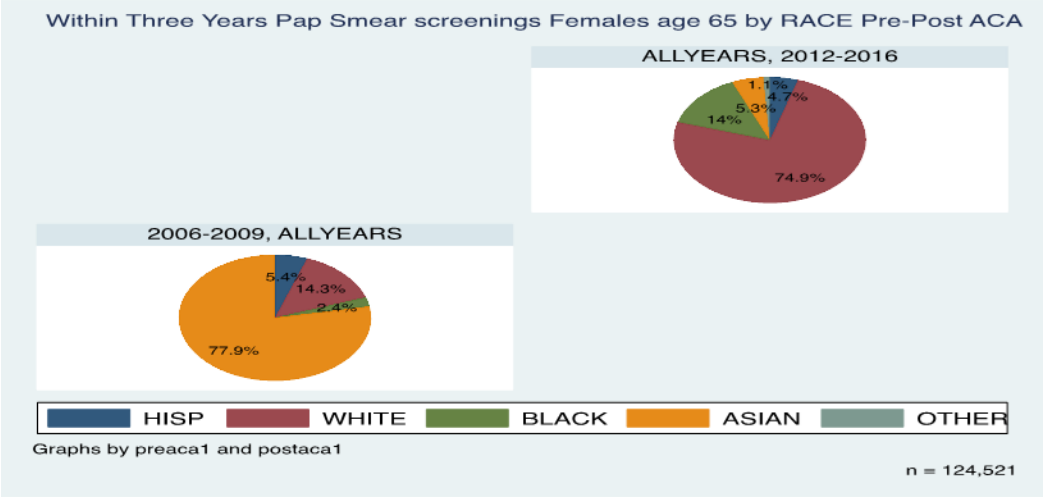

Past Year Aspirin Use Adults 65+ by RACE Pre-Post ACA
2012-2016
2.7%
8.9%
8.9%
79.4%
2006-2009
5.6%
7.8%
2.3%
84.3%
HISP
WHITE
BLACK
ASIAN
OTHER
Graphs by preaca1 and postaca1
n = 44,318,862

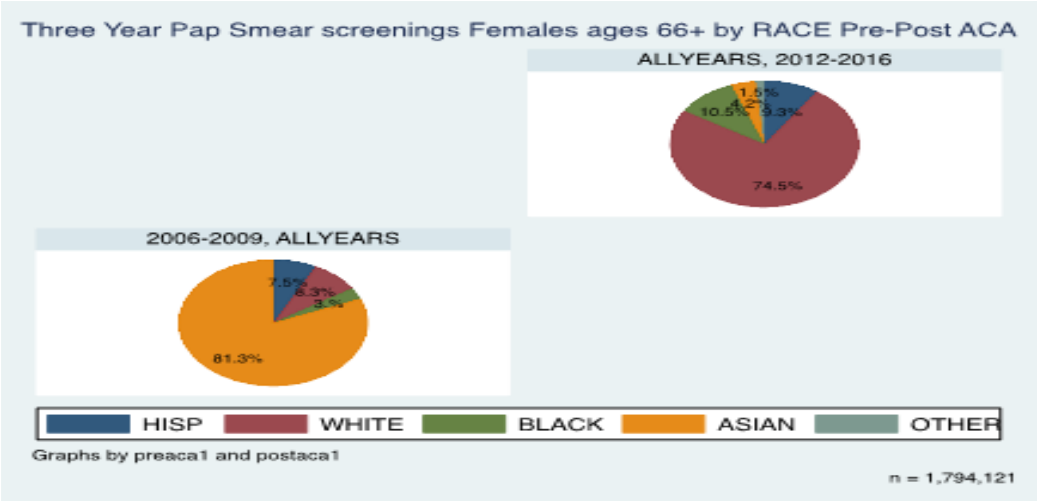

Biennial Mammogram Screenings Female ages 65-74 by RACE Pre-Post ACA
ALLYEARS, 2012-2016
2.6%
9.3%
5.2%
8.6%
74.3%
2006-2009, ALLYEARS
6.4%
9.8%
3.1%
78.7%
HISP
WHITE
BLACK
ASIAN
OTHER
Graphs by preaca1 and postaca1
n = 1,710,544

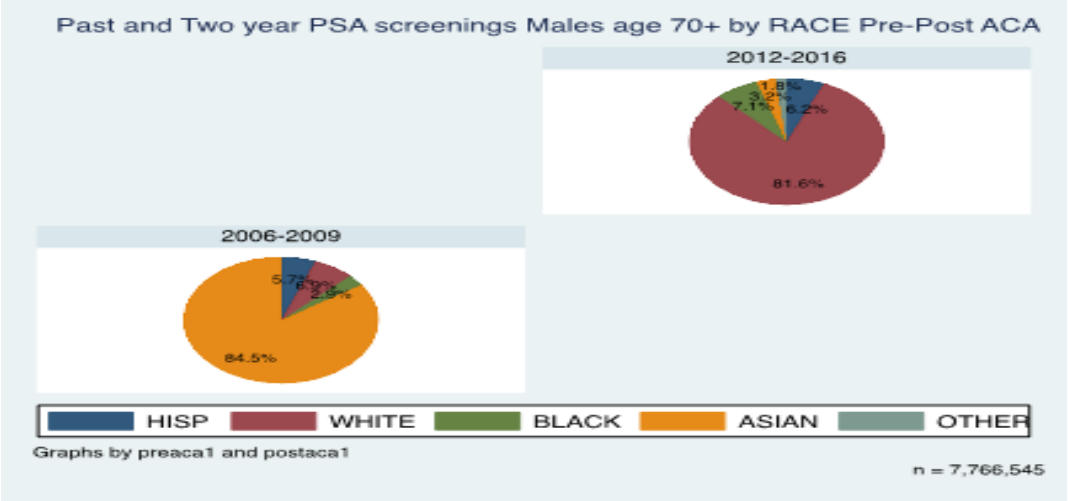

Biennial Mammogram Screenings Female ages 75+ by RACE Pre-Post ACA
2012-2016
1.4%
3.2%
9.4%
5.9%
80.1%
2006-2009
5.5%
8.8%
3%
82.6%
HISP
WHITE
BLACK
ASIAN
OTHER
Graphs by preaca1 and postaca1
n = 1,390,831

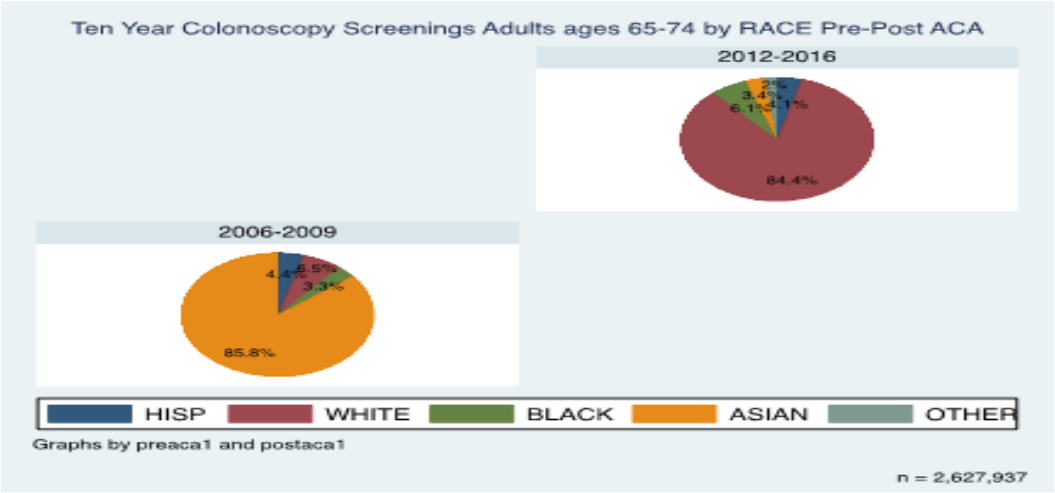

Biennial Breast Exams Females ages 65-74 by RACE Pre-Post ACA
2012-2016
1.7%
5.2%
9.6%
9.1%
74.4%
2006-2009
7.9%
7.8%
3.3%
81.1%
HISP
WHITE
BLACK
ASIAN
OTHER
Graphs by preaca1 and postaca1
n = 1,620,635

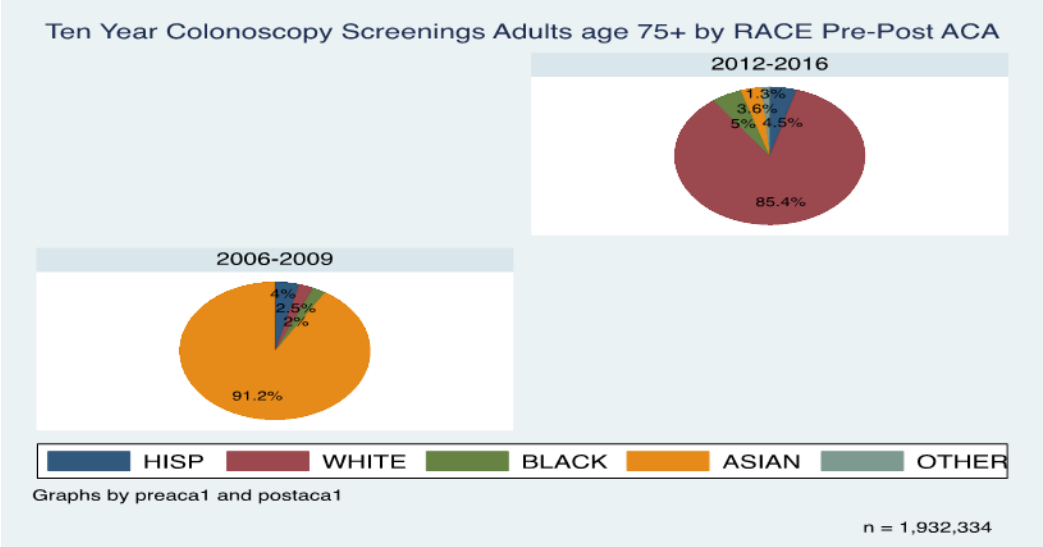

Biennial Breast Exams Females ages 75+ by RACE Pre-Post ACA
2012-2016
1.1%
3.1%
9.7%
6.2%
79.9%
2006-2009
5.7%
7.6%
3.5%
83.1%
HISP
WHITE
BLACK
ASIAN
OTHER
Graphs by preaca1 and postaca1
n = 1,204,083

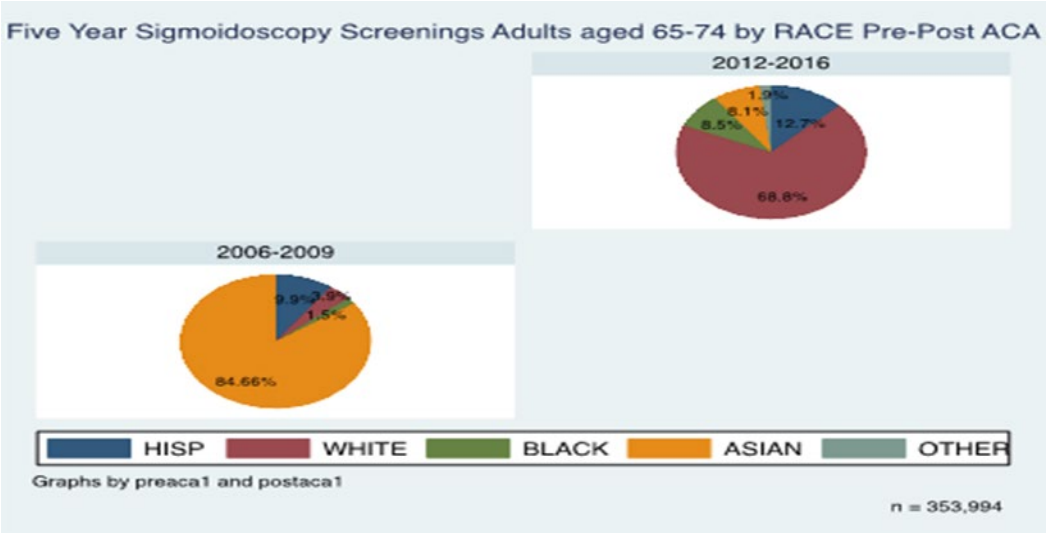

Within Three Years Pap Smear screenings Females age 65 by RACE Pre-Post ACA
ALLYEARS, 2012-2016
1.1%
4.7%
5.3%
14%
74.9%
2006-2009, ALLYEARS
5.4%
14.3%
2.4%
77.9%
HISP
WHITE
BLACK
ASIAN
OTHER
Graphs by preaca1 and postaca1
n = 124,521


Three Year Pap Smear screenings Females ages 66+ by RACE Pre-Post ACA
ALLYEARS, 2012-2016
1.5%
10.5%
3.3%
74.5%
2006-2009, ALLYEARS
7.5%
8.3%
3.5%
81.3%
HISP
WHITE
BLACK
ASIAN
OTHER
Graphs by preaca1 and postaca1
n = 1,794,121


Past and Two year PSA screenings Males age 70+ by RACE Pre-Post ACA
2012-2016
1.8%
3.2%
7.1%
6.2%
81.6%
2006-2009
84.5%
HISP
WHITE
BLACK
ASIAN
OTHER
Graphs by preaca1 and postaca1
n = 7,766,545


Ten Year Colonoscopy Screenings Adults ages 65-74 by RACE Pre-Post ACA
2012-2016
3.4%
6.1%
84.4%
2006-2009
6.5%
3.3%
85.8%
HISP
WHITE
BLACK
ASIAN
OTHER
Graphs by preaca1 and postaca1
n = 2,627,937




Results:

Race

For race/ethnicity, the utilization rates were compared for ten clinically recommended preventive care services for Blacks and Hispanics to White and Asian before (2006-2009) and after (2012-2016) the ACA was implemented. The results reflect

the marginal difference in receipt of medical condition screenings, Aspirin use, the influenza vaccine, and cancer screenings by race/ethnicity (Figure 9).

- For receipt of Blood Pressure screenings within the Past Year, pre-ACA, it was found Blacks were 4.7% lower than Whites and 4.2% lower than Asians, and Hispanics were 11.2% lower than Whites and 11% lower than Asians. But post-ACA, a substantial increase was seen; Blacks were 1.5% higher than Whites and 1.4% higher than Asians, and Hispanics were 2.9% higher than Whites and 2.8% higher than Asians.
- For Past Year's Cholesterol screenings during the pre-ACA period, Blacks were 2.1% higher than Whites and 2.4% higher than Asians, and Hispanics were 8.5% lower than Whites and 8.2% lower than Asians. For post-ACA, Blacks were 1.4% higher than Whites and 4.1% higher than Asians, and Hispanics were 9.7% lower than Whites and 7% lower than Asians.
- For the Past Year, Aspirin use pre-ACA, Blacks were found 6.5% lower than Whites and 8.4% lower than Asians, and Hispanics were 10.7% lower than Whites and 12.6% lower than Asians. Post-ACA, Blacks were 6.5% lower than Whites and 9.1% lower than Asians, and Hispanics were 10.5% lower than Whites and 13.1% lower than Asians.
- For the Past Year's receipt of the Flu vaccine, pre-ACA, it was found Blacks were 3.2% lower than Whites and 7% lower than Asians, and Hispanics were 10.7% lower than Whites and 14.5% lower than Asians. Post-ACA, Blacks were 2%

lower than Whites and 11% lower than Asians, and Hispanics were 8% lower than Whites and 17.3% lower than Asians.

Statistically significant differences were seen in equity for cancer screenings since the implementation of the ACA between minorities compared to Whites and Asians. For this research, the focus is on the comparison of utilization rates between minorities (Black and Hispanic) compared to Whites. For mammograms the utilization rates decreased for Blacks (0.4%) (P<0.00) and Hispanics (0.9%) (P<0.00), increasing gaps in disparity. For Pap smears the utilization rates increased among Blacks (1.8%) (P<0.00) and Hispanics (2.3%) (P<0.00), so therefore disparities decreased. For Breast Exams the study found an increase in utilization rates for both Blacks (0.7%) (P<0.00) and Hispanics (1.1%) (P<0.00) compared to Whites, therefore reducing disparities. For Prostate screenings the study found utilization rates decreased for Blacks (0.3%) (P<0.00) and Hispanics (0.5%) P(P<0.00) compared to Whites, widening the gap in disparities. It was also found the utilization rates for colonoscopies decreased among Blacks (2%) (P<0.00) and Hispanics (3.4%) (P<0.00) compared to Whites, increasing gaps in disparities. For sigmoidoscopy the utilization rates increased for Blacks (0.3%) (P<0.00) and Hispanics (0.1%) (P<0.00) compared to Whites, reducing disparities.

- For biennial mammogram screenings pre-ACA, Blacks were 1.6% lower than Whites and 6.2% lower than Asians, and Hispanics were 12.6% lower than Whites and 17.2% lower than Asians. Post-ACA, Blacks were 2% lower than

Whites and 4.7% lower than Asians, and Hispanics were 13.5% lower than Whites and 16.1% lower than Asians.

- For biennial Breast Exams pre-ACA, Blacks were 0.6% higher than Whites and 2.1% higher than Asians, and Hispanics were 6.7% higher than Whites and 8.2% higher than Asians. Post-ACA, Blacks were 1.3% higher than Whites and 0.5% lower than Asians, and Hispanics were 7.8% higher than Whites and 6% higher than Asians.
- For Pap smear screening Within Three Years or more, pre-ACA Blacks were 5% less than Whites and 1.3% less than Asians. Hispanics were 1.8% less than Whites and 1.9% more than Asians. Post-ACA Blacks were 3.2% less than Whites and 4.1% less than Asians. For Hispanics they were 0.5% more than Whites and 0.40% less than Asians.
- For Past Year's PSA screenings, pre-ACA, Black men were 8.5% lower than Whites and 13.4% lower than Asians, and Hispanic men were 15.3% lower than Whites and 20.2% lower than Asians. Post-ACA, Black men were 8.8% lower than Whites and 12% lower than Asians, and Hispanic men were 15.8% lower than Whites and 19.1% lower than Asians.
- For colonoscopy screenings received Within Three Years or more, pre-ACA, Blacks were 0.5% lower than Whites and 0.8% lower than Asians, and Hispanics were 2.5% lower than Whites and 2.8% lower than Asians. Post-ACA, Blacks were 2.5% lower than Whites and 2.9% lower than Asians, Hispanics were 5.9% lower than Whites and 6.3% lower than Asians.

- For receipt of sigmoidoscopy screenings Within Three Years or more, pre-ACA, Blacks were 2% lower than Whites and 3% lower than Asians, and Hispanics were 0.7% lower than Whites and 1.7% lower than Asians. Post-ACA, Blacks were 1.7% lower than Whites and 2.5% lower than Asians, and Hispanics were 0.6% lower than Whites and 1.4 % lower than Asians.

Income

For poverty income levels, this study observed differences in preventive care services for beneficiaries categorized as poor, near-poor, middle income, or high income (Figure 10).

- For Blood Pressure screenings pre-ACA, it was found those with a poverty level of poor were 2.6% lower than those with middle incomes and 7.4% lower than higher incomes. Near-poor was 1.2% lower than middle incomes and 6% lower than higher incomes. Post-ACA, the poor were 2.4% lower than middle incomes and 7% lower than higher income, and the near-poor were 1.2% lower than middle incomes and 5.8% lower than higher incomes. Post-ACA, the poor were 1.6% lower than middle incomes and 6.2% lower than higher incomes.
- For Cholesterol screenings pre-ACA, poor were 1.6% lower than middle incomes and 6.2% lower than higher incomes; no differences were found between near-poor and middle incomes, but were 4.6% lower than higher incomes. Post-ACA period, those with a poverty level of poor were 1.5% lower than those with middle incomes and 6% lower than higher incomes, near-poor was 0.10% lower than middle incomes and 4.6% lower than higher incomes.

- Aspirin use pre-ACA, poor were 3.4% lower than middle incomes and 7% lower than higher incomes; near-poor were 0.30% higher than middle incomes and 4.1% lower than higher incomes. Post-ACA, the poor were 3.5% lower than middle incomes and 7% lower than higher incomes; near-poor were 0.40% higher than middle incomes and 3.2% lower than higher incomes.
- For Flu vaccines pre-ACA, the poor were 4.7% lower than middle incomes and 11.5% lower than higher income; near-poor were 2.1% lower than middle incomes and 9% lower than higher incomes. Post-ACA, the poor were 5% lower than middle incomes and 11.8% lower than higher incomes; near-poor were 2.4% lower than middle incomes and 9.2% lower than higher incomes.

This study found statistically significant outcomes of disparities for cancer screenings when comparing the utilization rates of those reported in the poor and near-poor category compared to those with middle incomes. Post ACA for Mammograms the utilization rates decreased for the poor by 0.7% ($P<0.00$) and for near-poor decreased by 0.6% ($P<0.00$) compared to those with middle income, increasing disparities. Pap smears utilization rates among the poor decreased by 2.1 % ($P<0.00$) and near-poor decreased by 1.7% ($P<0.00$) compared to those with middle income, increasing disparities. For post-ACA Breast exams utilization rates, it was observed the poor decreased 0.6% ($P<0.00$) and near-poor decreased by 0.5% ($P<0.00$). For PSA utilization rates an increase was seen among the poor by 0.4% ($P<0.00$) and near-poor increased by 0.2% ($P<0.00$). For colonoscopy screenings the study observed a decrease of 2.1% ($P<0.00$) for the poor and a near-poor 1.8% ($P<0.00$) decrease, increasing disparities and for sigmoidoscopies it was

found the poor increased 0.1% (P<0.00) and near-poor increased by 0.2% (P<0.00), therefore reducing disparities.

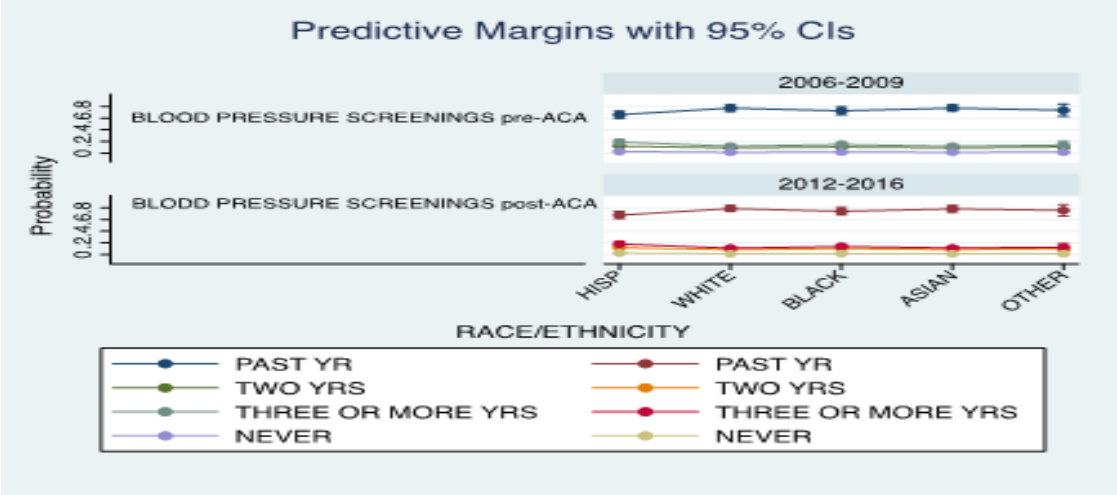
- Past Year mammogram screenings, pre-ACA, poor were 12.2% lower than middle incomes and 24.4% lower than higher incomes, and near-poor were 9.7% lower than middle incomes and 22% lower than higher incomes. Post-ACA, the poor were 11.5% lower than middle incomes and 23.6% lower than higher income, near-poor were 9.2% lower than middle incomes and 21.3% lower than higher incomes. For Biennial Mammogram screenings, pre-ACA, poor were 0.6% lower than middle incomes and 0.3% lower than higher income, near-poor were 0.4% lower than middle incomes and 0.10% lower than higher incomes. Post-ACA, the poor were 1.3% lower than middle incomes and 1.4% lower than higher incomes, near-poor were 1% lower than middle income and 1.1% lower than higher incomes.
- Past Year Breast exams, pre-ACA, poor were 9.7% lower than middle incomes and 23.4% lower than higher incomes, and near-poor were 6.5% lower than middle incomes and 20.2% lower than higher incomes. Post-ACA, the poor were 9.1% lower than middle incomes and 22.6% lower than higher incomes, near-poor were 6.1% lower than middle incomes and 19.6% lower than higher incomes.
- Biennial Breast exams, pre-ACA, poor were 0.4% lower than middle incomes but 0.4% higher than higher incomes, and near-poor were 0.20% lower middle incomes but 0.60% higher than high incomes. Post-ACA, the poor were 1%

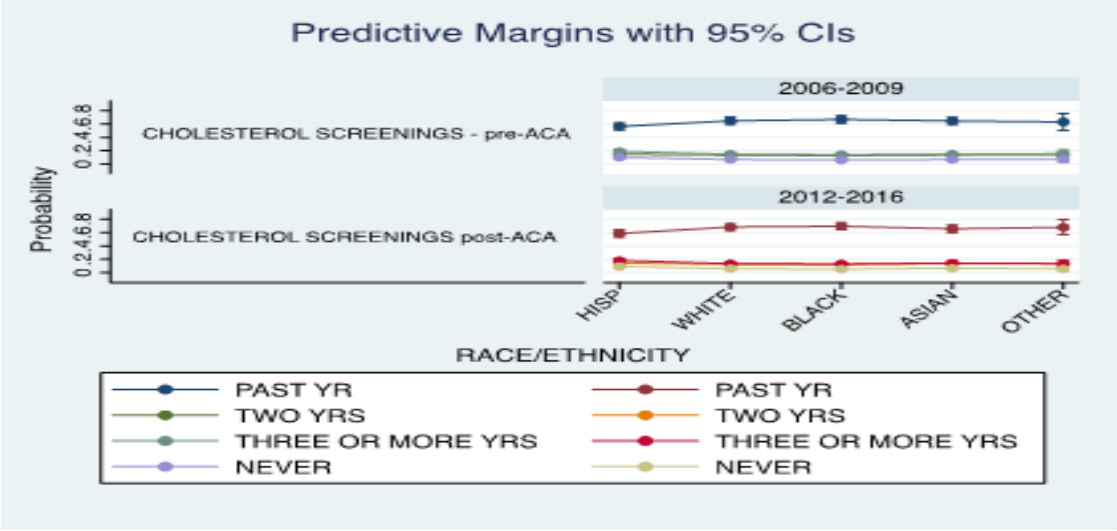
lower than middle incomes and 1% lower than higher incomes, and the near-poor were 0.70% lower than middle incomes and 0.70% lower than higher incomes.

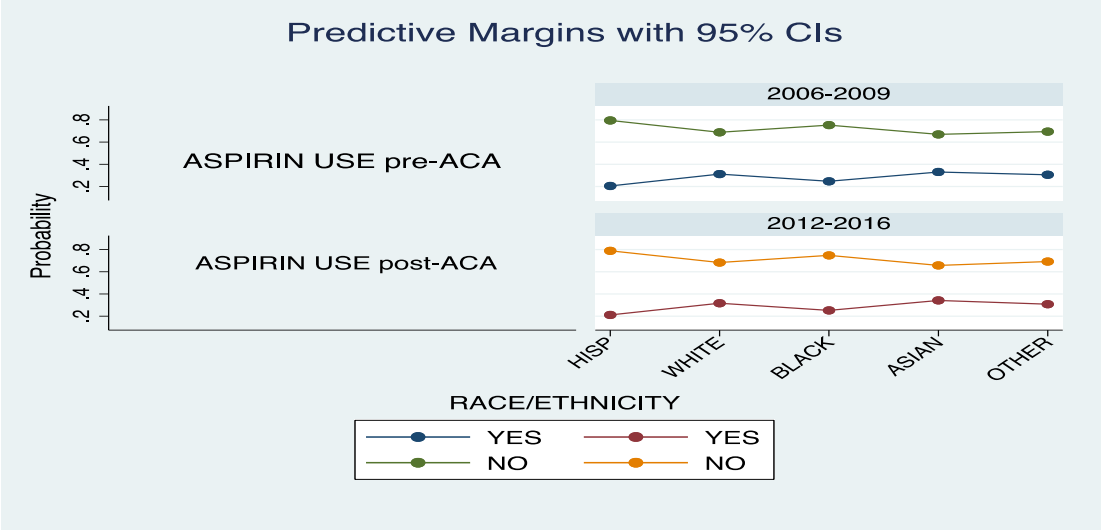
- For Pap smear screening Within Three Years or more, pre-ACA, poor were 6.2% higher than middle incomes and 15.8% higher than high incomes, near-poor was 5.2% higher than middle incomes and 4.8% higher than high incomes. Post-ACA, the poor were 4.1% higher than middle incomes and 11.8% higher than high incomes, near-poor was 3.5% higher than the middle incomes and 11.2% higher than the high incomes.
- For the Past Year PSA screenings, pre-ACA, the poor were 15% lower than middle income and 28.2% lower than high income and near-poor was 8% lower than middle income and 21.2% lower than high income. Post-ACA, poor was 14.6% lower than middle incomes and 27.8% lower than higher incomes, and near-poor was 7.8% lower than middle incomes and 21% lower than high incomes.
- For colonoscopy screening, pre-ACA, the poor was 1.5% lower than middle incomes and 1.7% lower than high incomes, and near-poor for Three Years or More was 1.6% lower than middle incomes and 1.8% lower than higher incomes. Post-ACA, the poor were 3.7% lower than middle incomes and 6.5% lower than higher incomes, near-poor was 3.4% lower than middle incomes and 6.2% lower than high incomes.
- For sigmoidoscopy screenings, pre-ACA, the poor was 1.3% lower than middle incomes and 4.9% lower than high incomes, and near-poor was 1.8% lower than middle incomes and 5.4% lower than high incomes. Post-ACA poor was 1.2%

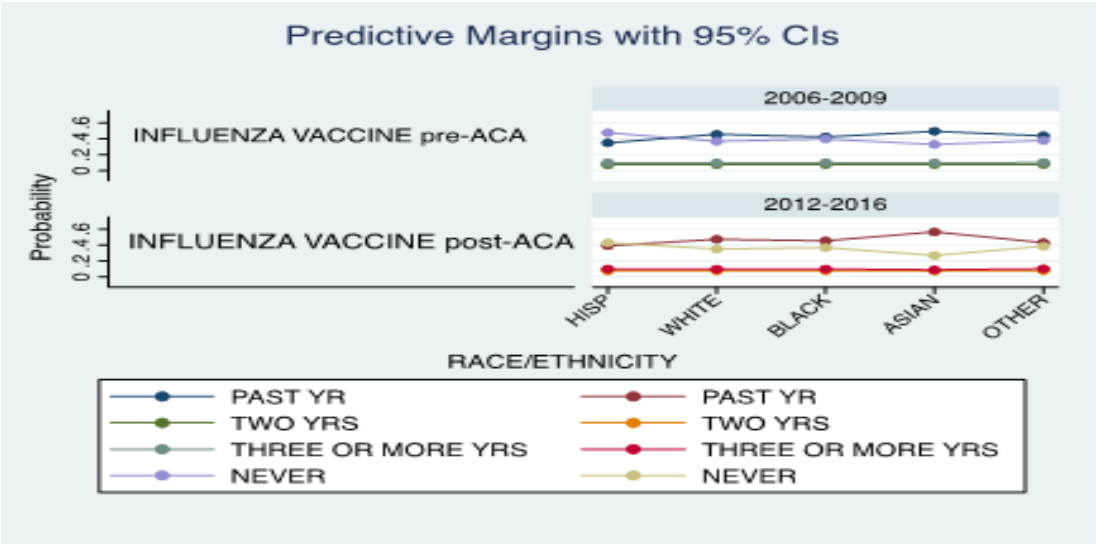
lower than middle incomes and 4.4% lower than high incomes, and near-poor was 1.6% lower than middle incomes and 4.8% lower than high incomes.

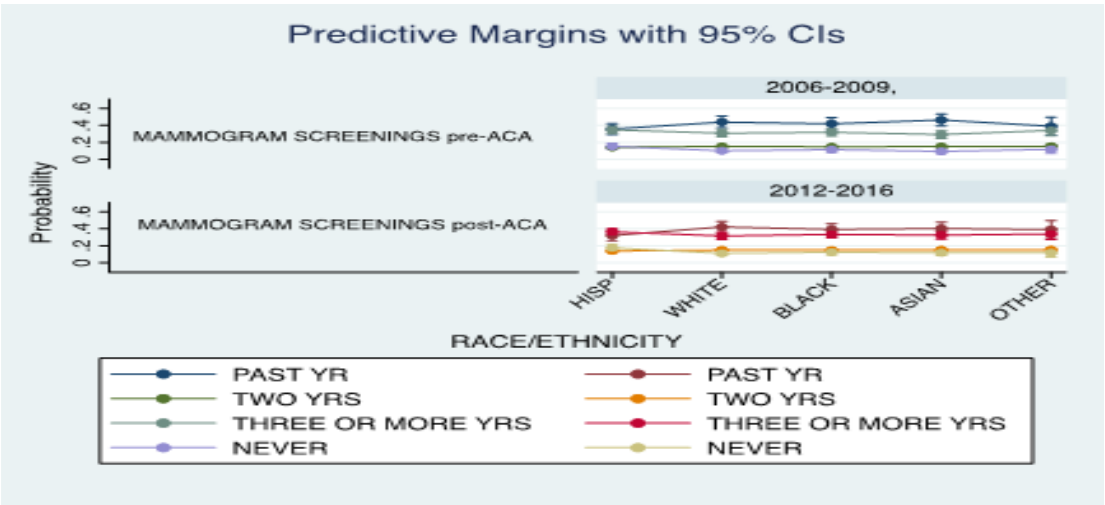
Figure 9: Differences in receipt of preventive care services by Race/Ethnicity.

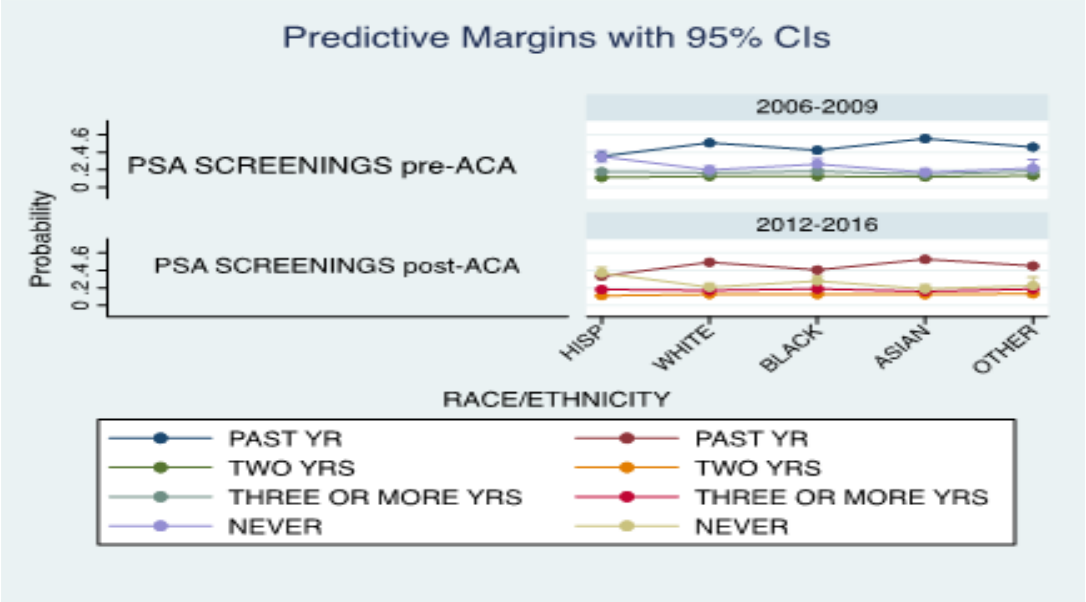


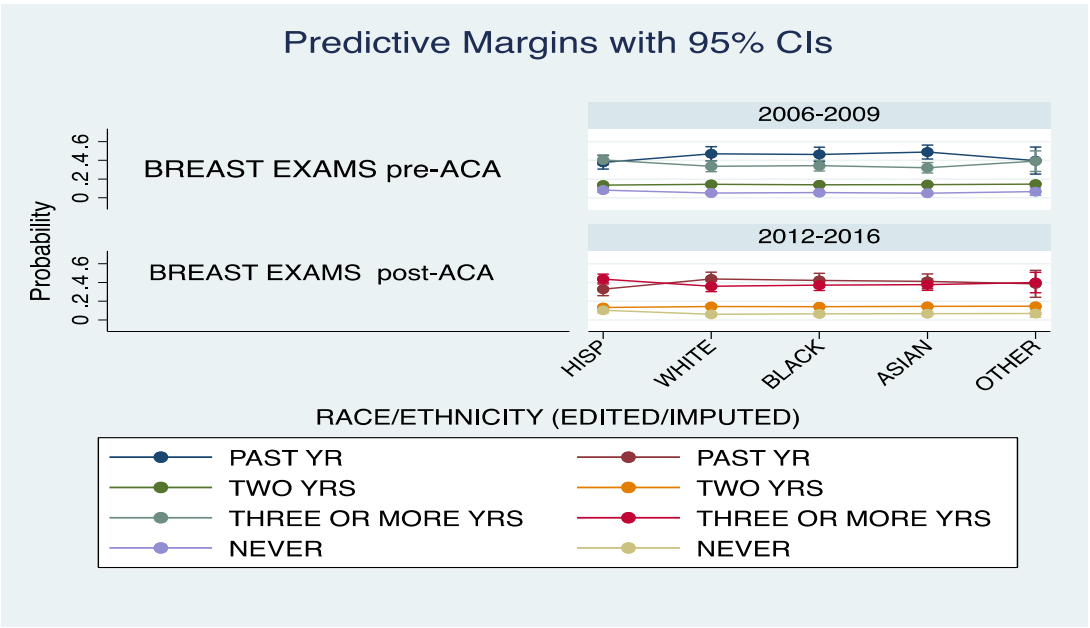



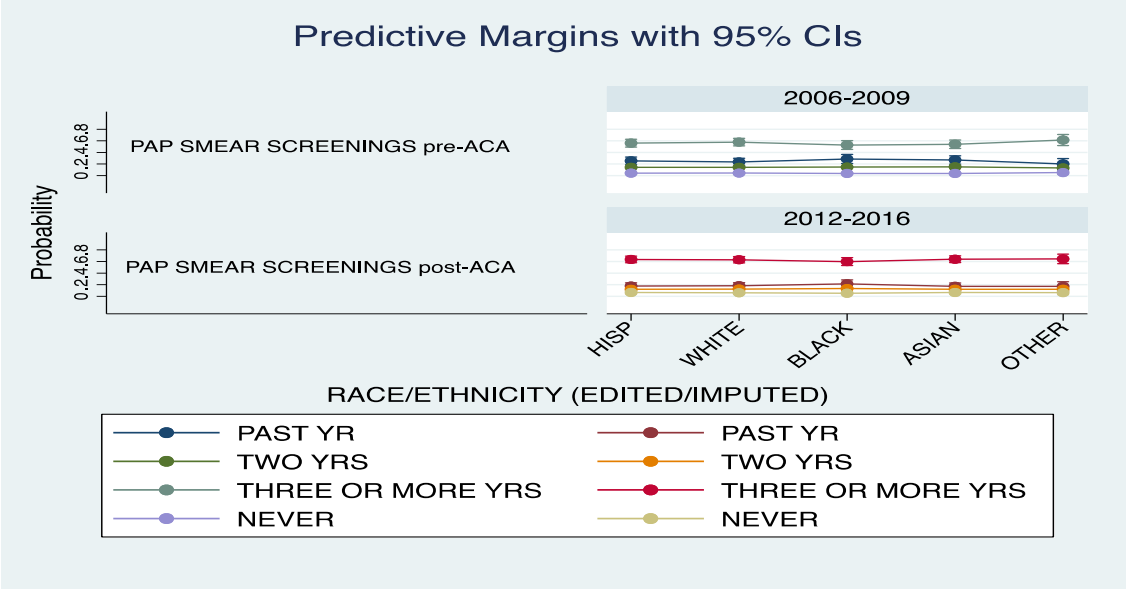

Predictive Margins with 95% CIs
2006-2009
2012-2016
ASPIRIN USE pre-ACA
ASPIRIN USE post-ACA
Probability
.2 .4 .6 .8
HISP
WHITE
BLACK
ASIAN
OTHER
RACE/ETHNICITY
YES
NO
YES
NO

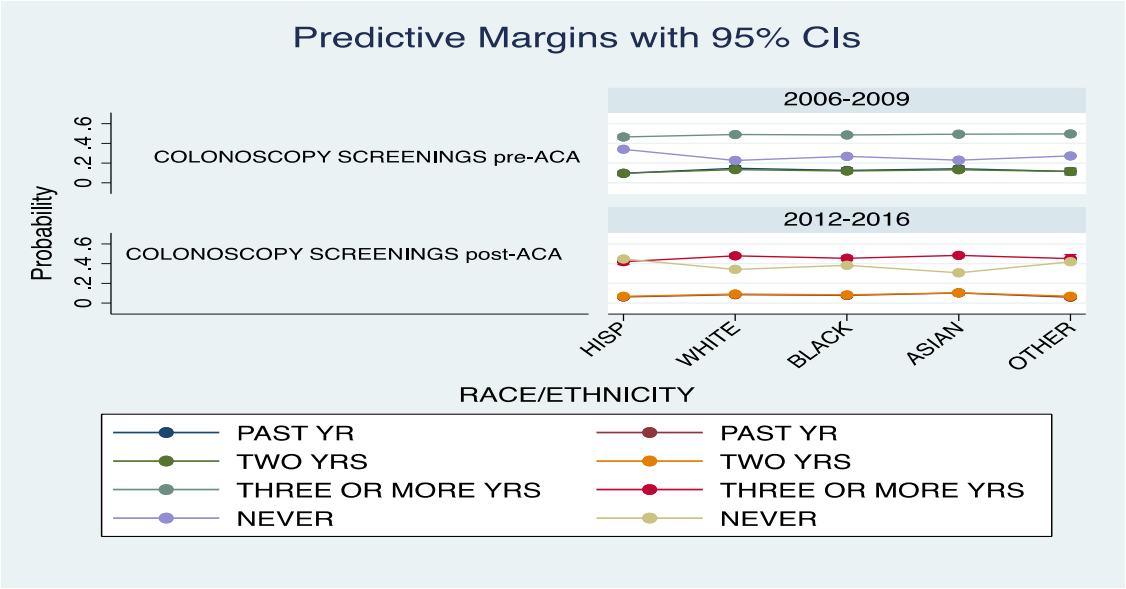

Predictive Margins with 95% CIs
2006-2009
2012-2016
INFLUENZA VACCINE pre-ACA
INFLUENZA VACCINE post-ACA
Probability
0 .2 .4 .6
HISP
WHITE
BLACK
ASIAN
OTHER
RACE/ETHNICITY
PAST YR
TWO YRS
THREE OR MORE YRS
NEVER
PAST YR
TWO YRS
THREE OR MORE YRS
NEVER


Predictive Margins with 95% CIs
2006-2009,
2012-2016
MAMMOGRAM SCREENINGS pre-ACA
MAMMOGRAM SCREENINGS post-ACA
Probability
0 .2 .4 .6
HISP
WHITE
BLACK
ASIAN
OTHER
RACE/ETHNICITY
PAST YR
TWO YRS
THREE OR MORE YRS
NEVER
PAST YR
TWO YRS
THREE OR MORE YRS
NEVER


Predictive Margins with 95% CIs
2006-2009
2012-2016
PSA SCREENINGS pre-ACA
PSA SCREENINGS post-ACA
Probability
0 .2 .4 .6
HISP
WHITE
BLACK
ASIAN
OTHER
RACE/ETHNICITY
PAST YR
TWO YRS
THREE OR MORE YRS
NEVER


Predictive Margins with 95% CIs
2006-2009
2012-2016
BREAST EXAMS pre-ACA
BREAST EXAMS post-ACA
Probability
0 .2 .4 .6
HISP
WHITE
BLACK
ASIAN
OTHER
RACE/ETHNICITY (EDITED/IMPUTED)
PAST YR
TWO YRS
THREE OR MORE YRS
NEVER


Predictive Margins with 95% CIs
2006-2009
2012-2016
PAP SMEAR SCREENINGS pre-ACA
PAP SMEAR SCREENINGS post-ACA
Probability
0.2.4.6.8
HISP
WHITE
BLACK
ASIAN
OTHER
RACE/ETHNICITY (EDITED/IMPUTED)
PAST YR
TWO YRS
THREE OR MORE YRS
NEVER


Predictive Margins with 95% CIs
2006-2009
2012-2016
COLONOSCOPY SCREENINGS pre-ACA
COLONOSCOPY SCREENINGS post-ACA
Probability
0 .2 .4 .6
HISP
WHITE
BLACK
ASIAN
OTHER
RACE/ETHNICITY
PAST YR
TWO YRS
THREE OR MORE YRS
NEVER

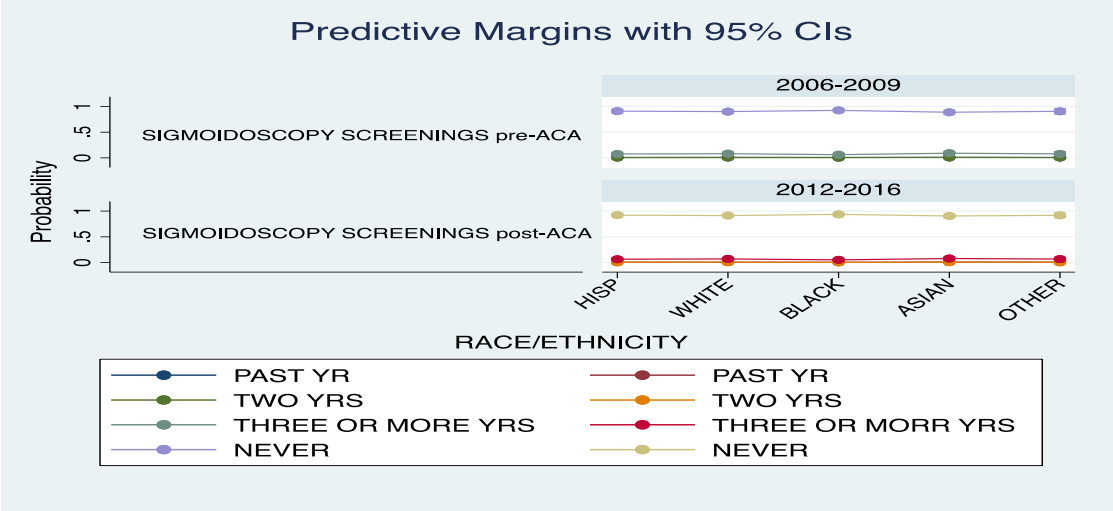
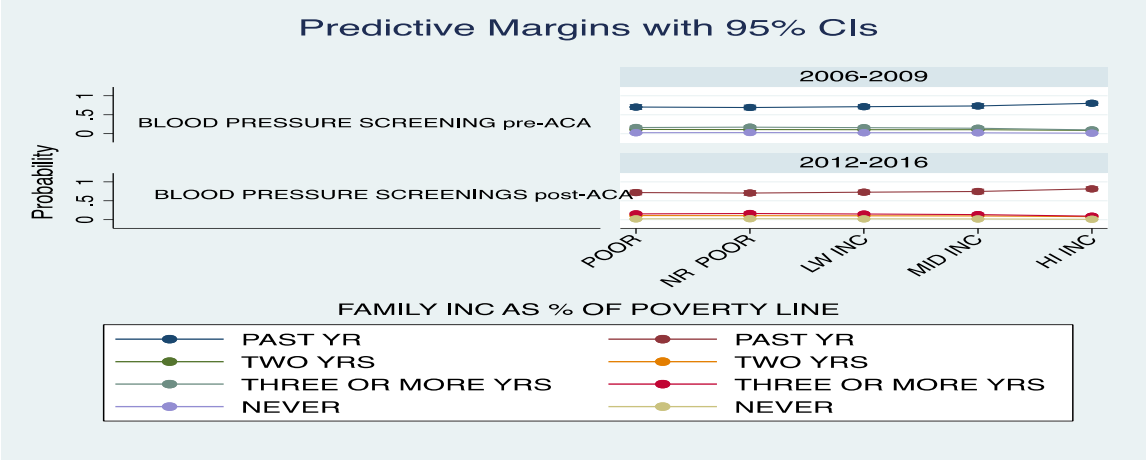
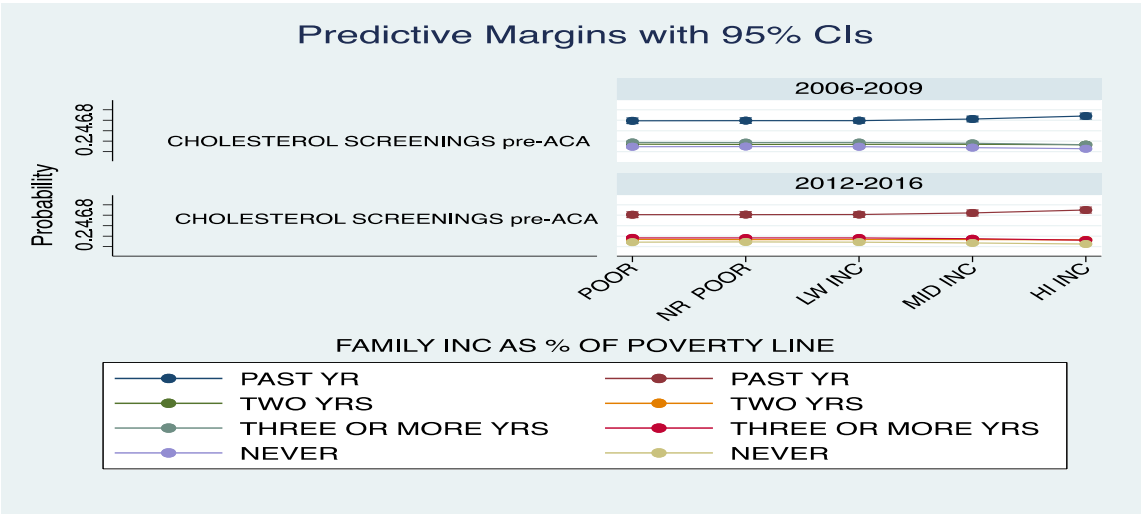
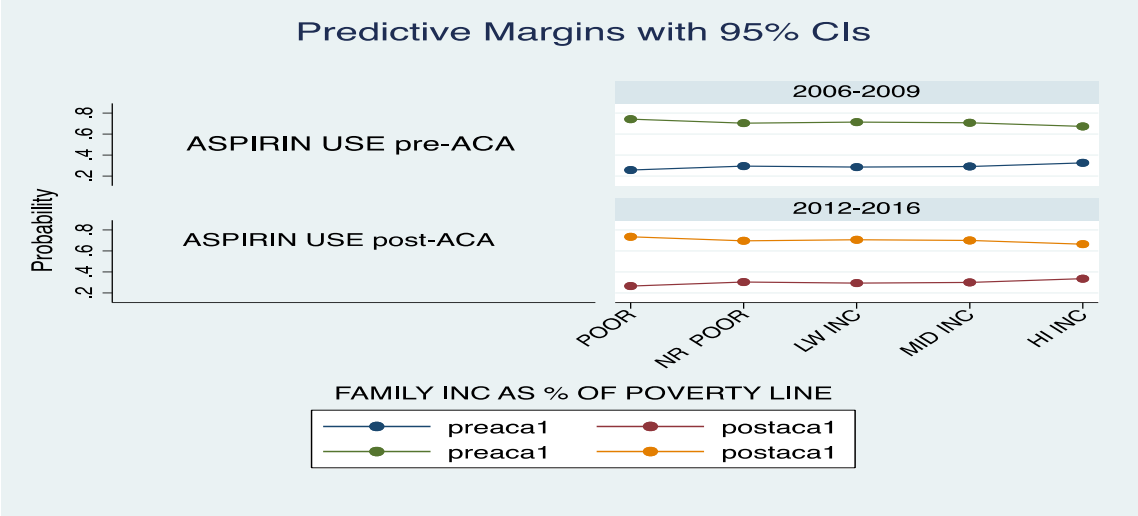
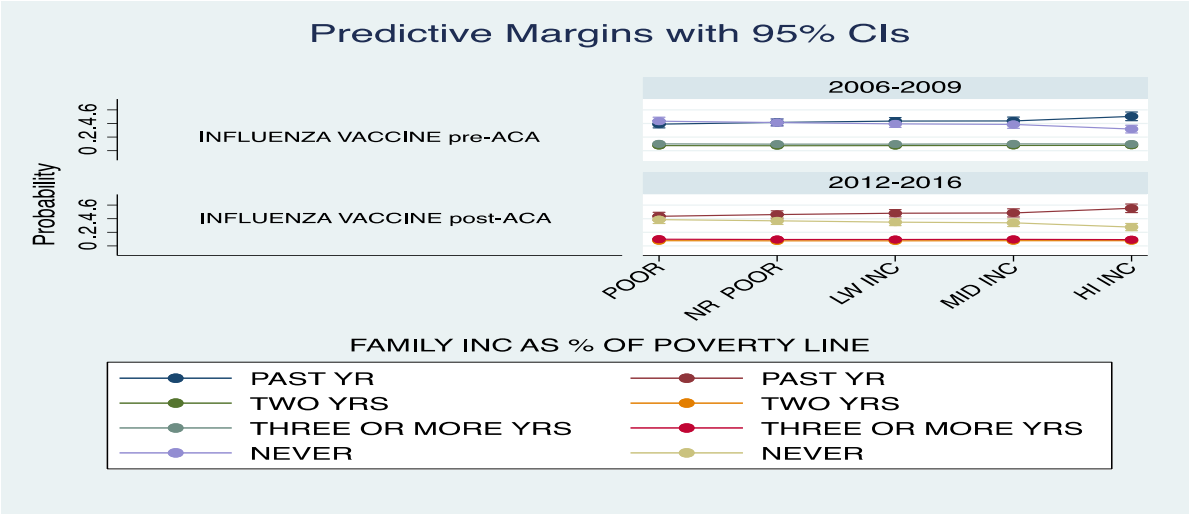


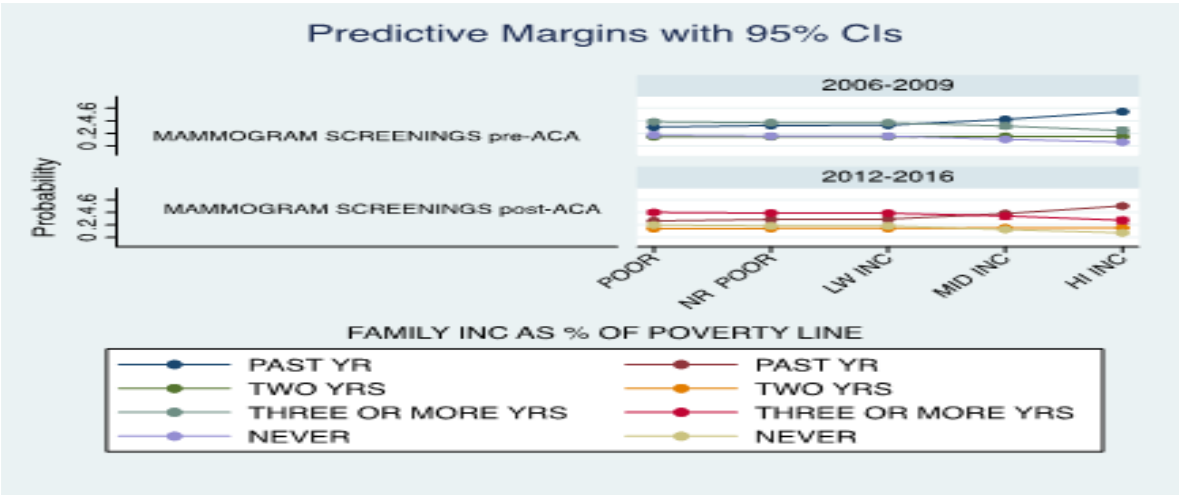

Figure 10: Differences in receipt of preventive care services by income

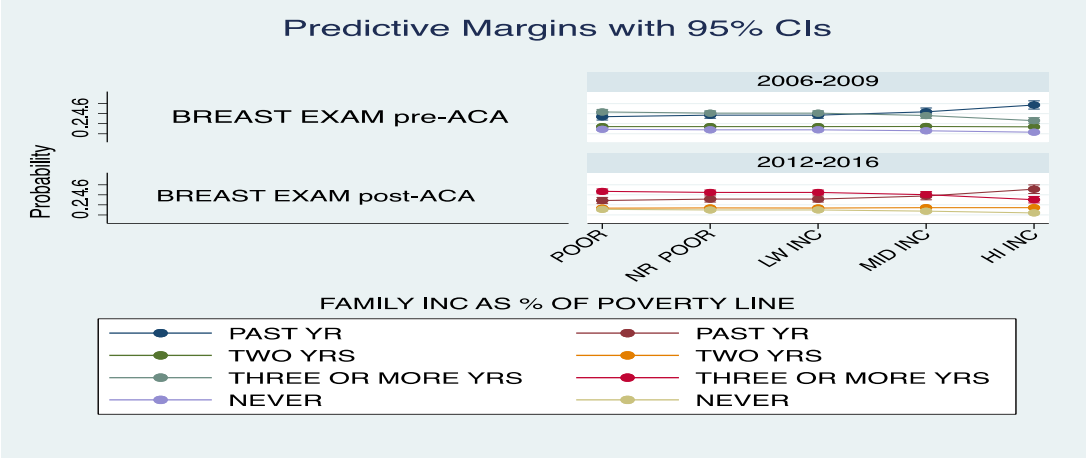


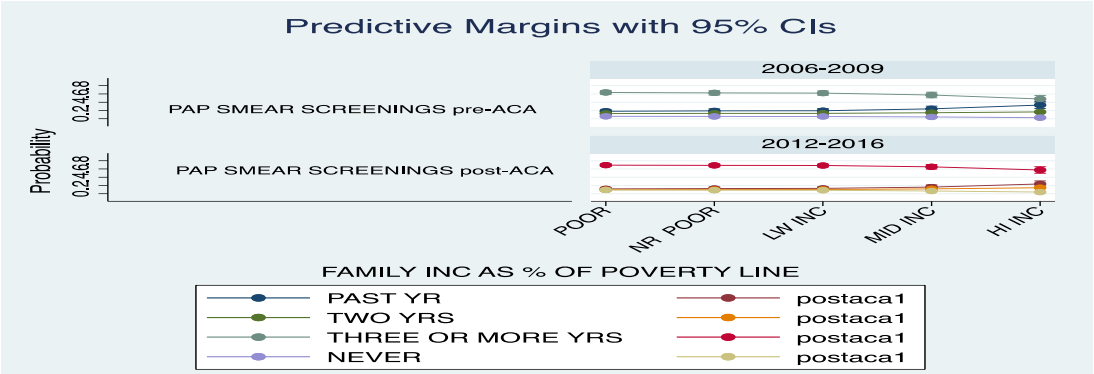



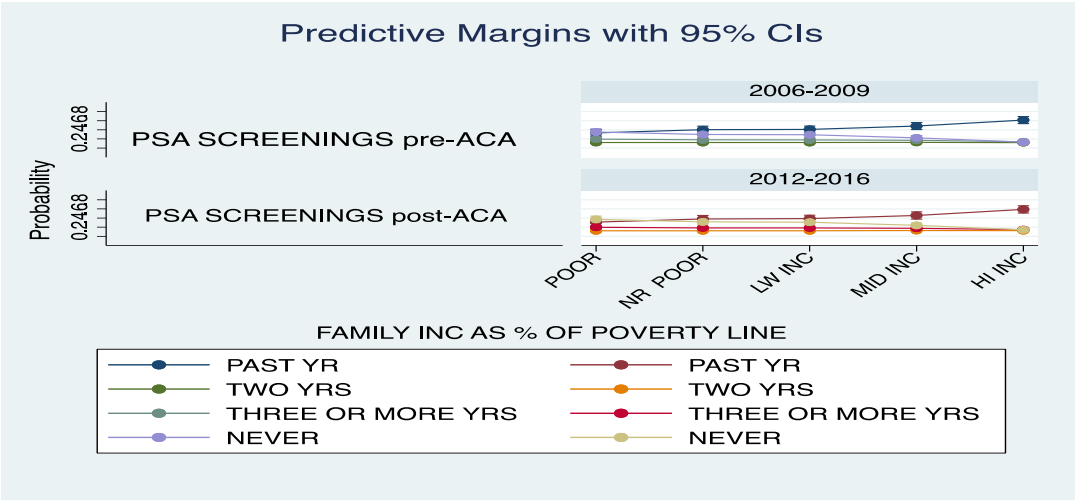

Predictive Margins with 95% CIs
2006-2009
2012-2016
ASPIRIN USE pre-ACA
ASPIRIN USE post-ACA
Probability
.2 .4 .6 .8
POOR
NR POOR
LW INC
MID INC
HI INC
FAMILY INC AS % OF POVERTY LINE
preaca1
preaca1
postaca1
postaca1

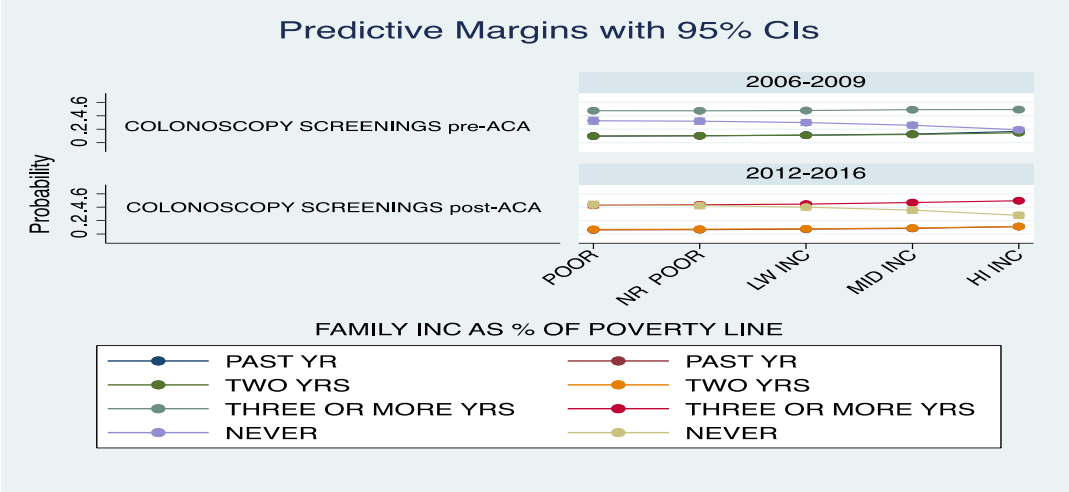

Predictive Margins with 95% CIs
2006-2009
2012-2016
INFLUENZA VACCINE pre-ACA
INFLUENZA VACCINE post-ACA
Probability
0.2.4.6
POOR
NR POOR
LW INC
MID INC
HI INC
FAMILY INC AS % OF POVERTY LINE
PAST YR
TWO YRS
THREE OR MORE YRS
NEVER
PAST YR
TWO YRS
THREE OR MORE YRS
NEVER

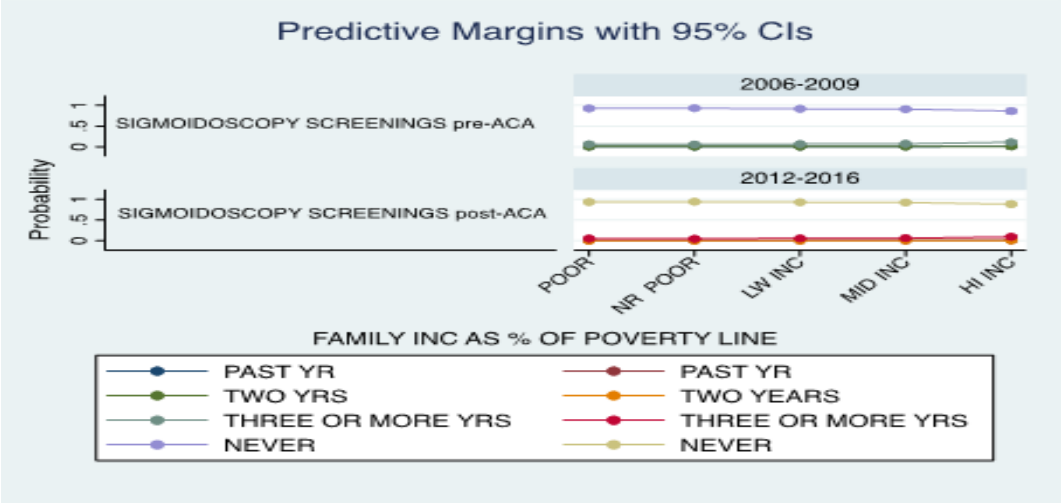

Predictive Margins with 95% CIs
2006-2009
2012-2016
MAMMOGRAM SCREENINGS pre-ACA
MAMMOGRAM SCREENINGS post-ACA
Probability
0.2.4.6
POOR
NR POOR
LW INC
MID INC
HI INC
FAMILY INC AS % OF POVERTY LINE
PAST YR
TWO YRS
THREE OR MORE YRS
NEVER
PAST YR
TWO YRS
THREE OR MORE YRS
NEVER


Predictive Margins with 95% CIs
2006-2009
BREAST EXAM pre-ACA
2012-2016
BREAST EXAM post-ACA
Probability
0.2.4.6
POOR
NR POOR
LW INC
MID INC
HI INC
FAMILY INC AS % OF POVERTY LINE
PAST YR
TWO YRS
THREE OR MORE YRS
NEVER


Predictive Margins with 95% CIs
2006-2009
PAP SMEAR SCREENINGS pre-ACA
2012-2016
PAP SMEAR SCREENINGS post-ACA
Probability
0.2468
POOR
NR POOR
LW INC
MID INC
HI INC
FAMILY INC AS % OF POVERTY LINE
PAST YR
TWO YRS
THREE OR MORE YRS
NEVER
postaca1


Predictive Margins with 95% CIs
2006-2009
PSA SCREENINGS pre-ACA
2012-2016
PSA SCREENINGS post-ACA
Probability
0.2468
POOR
NR POOR
LW INC
MID INC
HI INC
FAMILY INC AS % OF POVERTY LINE
PAST YR
TWO YRS
THREE OR MORE YRS
NEVER




Discussion:

The results showed mixed variances in the utilization of preventive services for race/ethnicity and income among Medicare beneficiaries. The differences in utilization rates of preventive medical condition screenings, Aspirin use and the influenza vaccine among Blacks and Hispanics modestly improved compared to Whites and Asians post-ACA period, thus reducing gaps in disparities. The study also observed improved equality in receipt of cancer screenings post-ACA, but substantial gaps in utilization

continue to exist among minorities. It was noticed some cancer screenings such as Mammograms, PSAs, and colonoscopies, decreased among all races during post-ACA, but this may be attributed to increased adherence to updated USPSTF grade A and B recommendations during the post-ACA period. For income minimal improvement for decreases in disparities was observed. The utilization rates of the influenza vaccine, Mammograms, Breast exams, colonoscopies, and Prostate cancer screenings, decreased post-ACA for the poor and near-poor groups compared to the middle-income group. Medical condition screenings are a regular part of a primary care visit and take less time to administer. Before the ACA, most insurers covered with either minimal or no cost-sharing requirements. In addition, older adults have options for the influenza vaccines now offered outside of primary care visits which are more convenient, so there is an assumption that they may be using alternative sites such as their local pharmacy or urgent care. But the utilization of cancer screenings, susceptible to cost-sharing before the ACA implementation, was expected to significantly impact those not previously covered. The ACA's removal of financial barriers increases access to preventive care services. Introducing interventions such as the Annual Wellness Visits dedicated to personalized prevention planning was expected to improve screening rates (e.g., colonoscopies) among poorer vulnerable Medicare beneficiaries. The prevalence of at least one chronic condition among minority adults 65 years and older is another crucial consideration when considering the low utilization rates for Blacks and Hispanics for cancer screenings. This research used a modified CCI index that was found to be a significant factor associated with the receipt of cancer-related screenings amongst minorities. The existence of comorbidities among Blacks and Hispanics should have dramatically improved the use of

preventive care services, considering the prevalence of chronic comorbidities and ACA provisions targeting improved access with the removal of financial barriers. The current research shows that out of the ten preventive services, five were significantly ($P<0.05$) associated with the CCI index, with a score indicating three preventive services associated with one chronic condition and three preventive services associated with two or more chronic conditions. When comparing differences in CCI Index by race before and after the ACA implementation, it was found 58.7% of Blacks had at least one chronic condition pre-ACA and increased to 81.7% post-ACA. For Hispanics it was found 68.9% had a least one chronic condition pre-ACA increasing to 73.7% post-ACA. Whites with at least one chronic condition was 77.2% pre-ACA which increased to 80.2% post-ACA. Asians with at least one condition was 74.3% pre-ACA, but it was found decreased to 62.4% post-ACA (Appendix). Although chronic conditions diagnosis increased significantly for Black and Hispanics, it may be an indication of increased access to preventive care screenings following the ACA provision. Research also suggests that comorbidities can impact the use of cancer screening outcomes amongst minorities, and strategies should be considered to mitigate cancer's economic and social impact on this population. For example, conducting routine screening activities in persons with predicted 10-year mortality and similarly advanced age is not generally recommended under USPSTF guidelines which can also impact utilization rates for those most suspectable to certain chronic diseases due to socioeconomic factors. Although Blacks have a higher incidence of cancer-related deaths, they are often no longer eligible due to age-based criteria. These recommendations can contribute to early mortality. For example, Prostate cancer screenings (grade D) are not recommended for men over 70,

Mammograms are not recommended for women over 75 (grade I), and colonoscopies with selective offerings of service (grade C) are recommended depending on health risk history. This study found that the utilization of cancer screenings for minorities was significantly lower than for Whites and Asians. For Prostate cancer screenings, the study found Blacks were 8.5% lower than Whites and 13.4% lower than Asians pre-ACA which increased to 8.8% compared to Whites and 12% lower than Asians post-ACA. Hispanics were 15.3% lower than Whites and 20.2% lower than Hispanics pre-ACA and post-ACA they were 7.8% lower than Whites and 19.1% lower than Asians. For biennial Breast cancer screenings, pre-ACA, it was found Black women were 1.6% lower than Whites and 6.2% lower than Asians post-ACA, and Blacks were 2% lower than Whites and 4.7% lower than Asians. Hispanics were 12.6% lower than Whites and 17.2% lower than Asians pre-ACA and post-ACA they were 13.5% lower than Whites and 16.1% lower than Asians. For colon cancer screenings, Blacks were 0.5% lower than Whites and 0.8% lower than Asians pre-ACA and 2.5% lower than Whites, and 2.9% lower than Asians post-ACA. Hispanics were 2.5% lower than Whites for colon cancer screenings and 2.8% lower than Asians pre-ACA and post-ACA they were 5.9% lower than Whites and 6.3% lower than Asians. Racial gaps were found to increase in disparities in receipt of cancer screenings for Blacks and Hispanics following the implementation of the ACA. This finding has policy implications that question whether the ACA has effectively increased access to preventive services. This is also a huge concern since African Americans have a higher incidence of death from cancer-related diseases than Whites, according to a recent report published by the American Cancer Society Surveillance Research for Cancer Facts & Figures for African Americans from 2019-2021. Prostate

cancer was the most diagnosed cancer in Black men and Breast cancer for Black women. They also found that the second cause of death for most Black men and women is lung cancer, and the third is colon cancer. The most common cancers (lung, breast, prostate, and colorectal) accounted for more than half of all cancer cases among non-Hispanic Blacks. They also had a higher avoidable death incidence than non-Hispanic Whites (ACS, 2019). Early diagnosis of cancer-related diseases with recommended preventive care screenings could help prolong Black lives and improve their quality of life (Bach et al., 2002; Hayes et al., 2017; Lisseden et al., 2017; Magnani et al., 2019; McCarthy et al., 2016). One of the ACA's main goals was to increase access to USPSTF-recommended preventive care screenings without cost-sharing, targeting equality of services for disadvantaged socioeconomic groups. But recent CDC surveillance found that for Black men, the highest cancer deaths are from lung cancer (25%) and prostate cancer (15%). For Black women, the highest cancer-related deaths are from lung cancer (20%) and Breast cancer (18%). Colorectal cancer is the third-leading cause of cancer-related deaths among both Black men and women. Over time (2006-2016), they have found the incidence of the most common cancer deaths for men has declined faster for non-Hispanic Blacks compared to Non-Hispanic Whites (2.4% vs. 1.7%), along with a decline in deaths for both males and females compared to non-Hispanic Whites (2.6% vs. 1.6% and 1.5% vs. 1.3%). The study concluded that these recent decreases in prostate, cervical, and colon cancer deaths among Blacks are attributed to decreased racial disparities in cancer-related deaths (ACS, 2019). The five-year cancer survival rates for Blacks were lower (62%) compared to Whites (67%) which was attributed to socioeconomic factors that impacted access to timely, judicious preventive healthcare

(Bach et al., 2002; Zeng et al., 2015). However, other studies report that racial disparities persist even after accounting for socioeconomic factors and access to care (Albain et al., 2009; Du et al., 2011; Kish et al., 2014; Newman et al., 2006; Singh et al., 2017).

Barriers are also an important consideration, including the lack of studies on Black men only. Prior research evaluated the state of research in the Black population and needed efforts to improve screening among Black men for colorectal screenings. One study examined barriers associated with the lack of screenings among Black men and found enhancing participation in research studies among this population would help to identify barriers and focus on addressing how to improve screening rates in Black men underrepresented in research studies. Increasing colonoscopy screening rates among Blacks will require a comprehensive and well-coordinated approach involving providers, public health and community-based organizations, and federal, state, and local governments. Targeting the inclusion of Black men in research would also improve identifying disparities in this population and provide the necessary evidence-based research needed to promote revising the current cancer screening recommendations. This may result in lowering the age requirements for colonoscopies and mammograms to improve early diagnosis for older minorities most susceptible to premature cancer-related mortality, thus increasing access to appropriate screening surveillance.

Patient navigators work in many areas of healthcare and help patients "navigate" the healthcare system and get timely care. They help coordinate preventive care and follow-up appointments, connect patients with resources, and help patients understand the healthcare system. Patient navigators, along with improved reporting and monitoring of

colorectal cancer screening rates, should target older populations (Kwaan et al., 2018). Other relevant research has found that addressing disparities among Black men for access to health services, particularly colon cancer preventive screenings, can improve life expectancy and avoid early mortality (Agrawal et al. 2005; Bromley et al., 2015; Carethers et al., 2015; DeSanis et al. 2016; Gupta et al., 2012; Laiyemo et al., 2010; Myers et al., 2014; Paquette et al., 2015; Rogers et al., 2017; Waghray et al., 2016, Xirasagar et al., 2014). Other researchers have found racial bias continues to be a significant predictor in minorities for receipt of certain screenings compared to their White counterparts (May et al., 2015; Shariff-Marco et al., 2010; Shi et al., 2011).

Other community advocacy organizations such as the Cancer Prevention and Control Research Network (CPCRN), the Intercultural Cancer Council (ICC), the National Medical Association (NMA), and the African American Collaborative Obesity Research Network (AACORN) are committed to improving the quality and health of minorities and disadvantaged populations. They could help engage these groups and ensure that emerging strategies are community driven. The American Cancer Society Cancer Action Network (ACS CAN) is also dedicated to reducing cancer incidence and mortality rates among minority and medically underserved populations. They advocate ensuring the adherence to provisions under the Affordable Care Act to help end discrimination against those with cancer and other high-risk diseases. The network also expands access for minorities at high risk, refocuses the health system on prevention, and works with Federal and State agencies to protect research funding dedicated to early

cancer health disparities for vulnerable populations by reducing barriers to access (ACS, 2019).

The results of this study agree with previously mentioned studies that found minorities and individuals from marginalized communities may be receiving inadequate cancer-related preventive care screenings. The higher death rates among Black men and women could be attributed to disparities in receipt of appropriate preventive care services. With over 75% of adults 65 years and older reported as having at least one chronic condition, there should be a focus of promoting the benefits of Annual Wellness Visits dedicated to addressing prevention. Time constraints during provider visits focused on treating acute chronic conditions and diseases can impact receipt of other needed preventive services to avoid incidence of prevalence. Encouraging beneficiaries to take advantage of the Annual Wellness Visit provides an opportunity for the provider to explain the benefits of preventive services, go over medical history to determine risk factors and improve provider-patient relationships with personalized attention. This study's observation of existing disparities for preventive services among minorities could be attributed to not having a dedicated primary care provider, not knowing about the new Medicare coverage benefits, lack of patient-provider relationships impacting trust in health systems stemming from historical intentions to harm minorities with promises of prevention, such as the Tuskegee experiment. As a result of the Tuskegee experiment, many African Americans developed a lingering, deep mistrust of public health officials and vaccines. The Tuskegee Syphilis Study was a study conducted between 1932 and 1972 by the U.S. Public Health Service (PHS) and the CDC on a group of nearly 400

African Americans with latent syphilis and a control group of 200 without the disease. The aim was to study the process of the disease, but ended up being the most controversial research ever performed on the Black race. The researchers recruited participants with the promise of free healthcare. But during the study it was exposed that the participants, most of whom had never been to a physician, were intentionally given placebo treatments resulting in unnecessary deaths. They were also not informed of the study and were recruited without consent. The controversy surrounding this experiment was the fact the U.S. government abused the constitutional rights of the victims of the Tuskegee study. They intentionally did not treat the patients who had syphilis. The victims were not asked to give consent before the study which was racially motivated with no regulations (CDC, 2021; Park et al., 2017). Although not studied in this research, other factors such as language barriers and cultural beliefs could also be hindering utilization rates without the appropriate representation of providers that looks like the communities that they service.

Another thing to consider is for preventive service, “One size does not fit all”, individuals with health risk factors exposed to different environmental factors should be considered for certain age restricted screenings. These screenings would target vulnerable lower income beneficiaries found to be most likely to have multiple chronic conditions that could be previously missed due to lack of access to these services.

The limitations of this research include the changing USPSTF guidelines during the study period that could hinder the use of preventive screening necessary for disadvantaged minority Medicare beneficiaries due to updated age requirements. Self-

reported data for screening intervals and lack of access to Annual Wellness Visits data may have improved this analysis with the participation of minorities compared to Whites and Asians to estimate better screening rates and measure existing gaps in disparities. A collaborative effort to align guideline recommendations from both ACS and USPSTF could help to reduce the current age limitations for specific screenings, such as colon, breast, and lung cancer, which are the leading causes of death among older minorities.

Conclusion:

This study found the ACA has moderately reduced gaps in health disparities associated with Race/ethnicity and Income. Although the removal of financial barriers has made a substantial impact on improving access to preventive care services, there continue to be existing barriers that go beyond the scope of this research. The uptake of preventive services is limited within minority and disadvantaged populations. This finding has policy implications that question whether the ACA has effectively increased access to preventive services. Future research should focus on other factors impacting inequity. These include patient-provider relationships, promoting education on the benefits of preventive care services, building community trust that services are beneficial and not harmful, and increasing the inclusion of minorities, particularly Black men, in research studies.

Key Findings:

- The differences in utilization rates of preventive medical condition screenings and the influenza vaccine among Blacks and Hispanics modestly improved compared to Whites and Asians post-ACA period, thus reducing gaps in disparities.
- This study also observed improved equity in receipt of cancer screenings post-ACA, but substantial gaps in utilization continue to exist among minorities. It was noticed that some cancer screenings such as Mammograms, PSAs, and colonoscopies, decreased among all races during post-ACA, but this may be attributed to updated USPSTF grade A and B recommendations during the post-ACA period.
- For Income minimal improvement for decreases in disparities was observed. The utilization rates for cancer screenings (Mammograms, Breast exams, colonoscopies, PSA) decreased post-ACA.
- Differences in uptake of preventive care service utilization is limited within minority and disadvantaged populations.

LIST OF REFERENCES

Achman L, Gold M (2002) Out-Of-Pocket Health Care Expenses for Medicare HMO Beneficiaries: Estimates By Health Status, 1999-2001 Mathematica Policy Research, Inc. Book.

ACL 2019 Profile of Older Americans (2020) https://acl.gov/sites/default/files/Aging%20and%20Disability%20in%20America/2019ProfileOlderAmericans508.pdf

Actualizing Better Health and Health Care for Older Adults, Health Affairs 2021 40:2, 219-225

Adepoju O, Preston, M Gonzales G (2015) Health Care Disparities in the Post–Affordable Care Act Era.). Am J Public Health. 2015;105: S665–S667. doi:10.2105/AJPH.2015.302611).

Adini B (2019) Ethnic inequality within the elderly population in utilizing healthcare services. Isr J Health Policy Res. 2019 May 1;8(1):39. doi: 10.1186/s13584-019-0311-y. PMID: 31043164; PMCID: PMC6495501.

Advance Payment Accountable Care Organization (ACO) Model. https://innovation.cms.gov/Files/fact-sheet/Advanced-Payment-ACO-Model-Fact-Sheet.pdf

Agency for Healthcare Research and Quality: A Profile. Content last reviewed July 2022. Agency for Healthcare Research and Quality, Rockville, MD.

Agirdas C, Holdling J (2018) Effects of the ACA on Preventive Care Disparities. Health Economics and Health Policy 16:859-869

Agrawal S, Bhupinderjit A, Bhutani M, et al. Colorectal cancer in African Americans. Am J Gastroenterol. 2005;100(3):515–523. https://doi. org/10.1111/j.1572-0241.2005.41829.

Albain KS, Unger JM, Crowley JJ, Coltman CA, Jr., Hershman DL. (2009) Racial disparities in cancer survival among randomized clinical trials patients of the Southwest Oncology Group. J Natl Cancer Inst. 2009;101(14):984-992.

Albright B, Lewis V, Ross J, Colla C (2017) preventive care quality of Medicare Accountable Care Organizations: Associations of organizational characteristics with performance. Med Care: 54326-335.

Albright, B. B., Lewis, V. A., Ross, J. S., & Colla, C. H. (2016). Preventive Care Quality of Medicare Accountable Care Organizations: Associations of Organizational Characteristics with Performance. Medical care, 54(3), 326–335. https://doi.org/10.1097/MLR.0000000000000477

Alva M, Hoerger TJ, Jeyaraman R, Amico P, Rojas-Smith L (2014) Impact of The YMCA Of the USA Diabetes Prevention Program on Medicare Spending and Utilization. Health Affairs 2017 36:3, 417-424

American Cancer Society. Cancer Facts & Figures for African Americans 2019-2021. Atlanta: American Cancer Society, 2019.

American Cancer Society. Cancer Facts & Figures for African Americans 2019-2021. Atlanta: American Cancer Society, 2019.

Anderson NB, Bulatao RA (2014) National Research Council (US) Panel on Race, Ethnicity, and Health in Later Life;. Understanding Racial and Ethnic Differences in Health in Late Life: A Research Agenda. Washington (DC): National Academies Press (US); 2004. Available from: https://www.ncbi.nlm.nih.gov/books/NBK24692/doi: 10.17226/11036.

Aron-Dine, A., Einav, L., & Finkelstein, A. (2013). The RAND Health Insurance Experiment, three decades later. The journal of economic perspectives: a journal of the American Economic Association, 27(1), 197–222. https://doi.org/10.1257/jep.27.1.197

Ashkenazy R, Abrahamson MJ, (2006) Medicare Coverage for Patients with Diabetes a National Plan with Individual Consequences Journal of general internal medicine, Springer

Atallah, S (2019). The impact of the ACA cost-sharing elimination provision on the utilization of breast, cervical, and colorectal cancer screening services among insured individuals in the United States.

Augustus, G. J., & Ellis, N. A. (2018). Colorectal Cancer Disparity in African Americans: Risk Factors and Carcinogenic Mechanisms. The American journal of pathology, 188(2), 291–303. https://doi.org/10.1016/j.ajpath.2017.07.023

Ayres CG, Griffith HM. Perceived barriers to and facilitators of the implementation of priority clinical preventive services guidelines. Am J Manag Care. 2007 Mar;13(3):150-5. PMID: 17335358.

Bagatini, M. D., Cardoso, A. M., Reschke, C. R., & Carvalho, F. B. (2018). Immune System and Chronic Diseases 2018. Journal of immunology research, 2018, 8653572. https://doi.org/10.1155/2018/8653572

Baicker K, Chandra A, Skinner J, and Wennberg J (2004) Who You Are And Where You Live: How Race And Geography Affect The Treatment Of Medicare Beneficiaries, Health Affairs 2004 23: Suppl2, VAR-33-VAR-44

Baicker K, Chandra A, Skinner J, Wennberg J (2004) Who You Are and Where You Live: How to Race and Geography Affect the Treatment of Medicare Beneficiaries Health Affairs 2004 23: Suppl2, VAR-33-VAR-44.

Baicker K, Chernew M, Robbins J (2013) The spillover effects of Medicare managed care: Medicare Advantage and hospital utilization, Journal of Health Economics, Volume 32, Issue 6, Pages 1289-1300, ISSN 0167-6296, https://doi.org/10.1016/j.jhealeco.2013.09.005. 50. 42 CFR § 422.208 Physician incentive plans: requirements and limitations

Baicker K, Taubman S, Allen H, Bernstein M, Gruber J, Newhouse J, Schneider E Bill Wright B, Zaslavsky A, Finkelstein A (2013) The Oregon Experiment — Effects of Medicaid on Clinical Outcomes. N Engl J Med; 368:1713-22. DOI: 10.1056/NEJMsa1212321

Berchick E (2019) Health Insurance Coverage in the United States: 2018—Current Population Reports (U.S. Census Bureau, Nov. 2019), https://www.census.gov/content/dam/Census/library/publications/2019/demo/p60-267.pdf.

Berenson R, and Holahan J. (2011) Preserving Medicare: A Practical Approach to Controlling Spending. Urban Institute. https://www.urban.org/sites/default/files/publication/27566/412405-Preserving-Medicare-A-Practical-Approach-to-Controlling-Spending.PDF

Bhandari, N. R., & Li, C. (2019, March). Impact of the Affordable Care Act's elimination of cost-sharing on the guideline-concordant utilization of cancer preventive screenings in the United States using Medical Expenditure Panel Survey. In Healthcare (Vol. 7, No. 1, p. 36). Multidisciplinary Digital Publishing Institute.

Blumenthal D, Abrams M, Nuzum R (2015) The Affordable Care Act at 5 Years. N Engl J Med 2015; 372:2451-2458 DOI: 10.1056/NEJMhpr1503614

Blustein J (1995). Medicare coverage, supplemental insurance, and the use of mammography by older women. N Engl J Med 1995;332: 1138 – 43.

Bowling B, Newman, D RN, White C, Wood A, Coustasse A (2018) Provider Reimbursement Following the Affordable Care Act. The Health Care Manager Volume 37, Number 2, pp. 129–135 Wolters Kluwer Health, Inc.

Brassell SA, Rice KR, Parker PM, Chen Y, Farrell JS, Cullen J, McLeod DG. Prostate cancer in men 70 years old or older, indolent or aggressive: clinicopathological analysis

and outcomes. J Urol. 2011 Jan;185(1):132-7. doi: 10.1016/j.juro.2010.09.014. Epub 2010 Nov 12. PMID: 21074211.

Bromley EG, May FP, Federer L, Spiegel B, Van O (2015) Explaining persistent under-use of colonoscopic cancer screening in African Americans: a systematic review. Prev Med. 2015; 71:40–48. https://doi.org/10.1016/j.ypmed.2014.11.022.

Brook, RH, Keeler E, Lohr K, Newhouse JP, Ware J, Rogers W, Davies A, Sherbourne C, Goldberg G, Camp P, Kamberg C, Leibowitz A, Keesey J, Reboussin D (2006) The Health Insurance Experiment: A Classic RAND Study Speaks to the Current Health Care Reform Debate. Santa Monica, CA: RAND Corporation, 2006 https://www.rand.org/pubs/research_briefs/RB9174.html.

Brooks Carthon JM, Barnes H, Sarik DA (2015), Federal Polices Influence Access to Primary Care and Nurse Practitioner Workforce, The Journal for Nurse Practitioners, Volume 11, Issue 5, Pages 526-530, ISSN 1555-4155.

Brown, E. C. F. (2018). Health reform and theories of cost control. Journal of Law, Medicine & Ethics, 46(4), 846-856.

Buchmueller T, Levy H (2020) The ACA's Impact on Racial and Ethnic disparities in health insurance coverage and access to care. Health Affairs 39, No. 3(2020): 395-402.

Buchmueller, T. C., Levinson, Z. M., Levy, H. G., & Wolfe, B. L. (2016). Effect of the Affordable Care Act on Racial and Ethnic Disparities in Health Insurance Coverage. American journal of public health, 106(8), 1416–1421. https://doi.org/10.2105/AJPH.2016.303155

BUDGETARY IMPLICATIONS OF THE BALANCED BUDGET ACT OF 1997 https://www.cbo.gov/sites/default/files/105th-congress-1997-1998/reports/bba-97.pdf CBO MEMO 1997.

Bynum J, Song Y, Fisher E. Variation in prostate-specific antigen screening in men aged 80 and older in fee-for-service Medicare. J Am Geriatr Soc. 2010 Apr;58(4):674-80. doi: 10.1111/j.1532-5415.2010.02761. x. Epub 2010 Mar 22. PMID: 20345867; PMCID: PMC2930768.

Burns L, Pauly M (2012) Accountable care organizations may have difficulty avoiding the failures of integrated networks of the 1990s. Health Affairs Nov.

Camacho, F., Yao, N. A., & Anderson, R. (2017). The Effectiveness of Medicare Wellness Visits in Accessing Preventive Screening. Journal of primary care & community health, 8(4), 247–255. doi:10.1177/2150131917736613

Card D, Dobkin C, Maestas N (2008) The Impact of Nearly Universal Insurance Coverage on Health Care Utilization: Evidence from Medicare. Am Econ Rev. 2008

Dec;98(5):2242-2258. doi: 10.1257/aer.98.5.2242. PMID: 19079738; PMCID: PMC2600774.

Carethers JM. Screening for colorectal cancer in African Americans: determinants and rationale for an earlier age to commence screening. Dig Dis Sci. 2015;60(3):711–721. https://doi.org/10.1007/s10620-014- 3443-5.

Carpenter, C. E. (2011) 'Federal Health Reform's Impact on Employer-Sponsored Health Insurance,' Journal of Financial Service Professionals, 65(2), pp. 23–26. Available at: http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=59244548&site=ehost-live&scope=site (Accessed: 1 October 2020).

Carrasquillo O, Lantigua RA, Shea S. (2001) Preventive services among Medicare beneficiaries with supplemental coverage versus HMO enrollees, Medicaid recipients, and elders with no additional cover- age. Med Care 2001; 39:616–26

Carrasquillo, O., Lantigua, R., & Shea, S. (2001). Preventive Services among Medicare Beneficiaries with Supplemental Coverage versus HMO Enrollees, Medicaid Recipients, and Elders with No Additional Coverage. Medical Care, 39(6), 616-626. Retrieved March 4, 2021, from http://www.jstor.org/stable/3767636

Carter E, Lind K, Miller CN (2019) Annual Wellness Visits among Medicare Advantage Enrollee: Trends, Differences by Race and Ethnicity, and Association with Preventive Service Use. AARP Public Policy Institute.

Castle S, (2000) Clinical Relevance of Age-Related Immune Dysfunction, Clinical Infectious Diseases, Volume 31, Issue 2, August 2000, Pages 578–585, https://doi.org/10.1086/313947.

CDC (2018) National Center for Health Statistics: Health, US Table 42. Gross domestic product, national health expenditures, per capita amounts, percent distribution, and average annual percent change: United States, selected years 1960–2017.https://www.cdc.gov/nchs/data/hus/2018/042.pdf

Centers for Disease Control and Prevention. Hypertension Cascade: Hypertension Prevalence, Treatment and Control Estimates Among U.S. Adults Aged 18 Years and Older Applying the Criteria from the American College of Cardiology and American Heart Association's 2017 Hypertension Guideline—NHANES 2015–2018external icon. Atlanta, GA: U.S. Department of Health and Human Services; 2021. Accessed March 12, 2021

Centers for Medicare and Medicaid Services. Press release: 7.9 million people with Medicare have saved over $9.9 billion on prescription drugs. 2014. https://www.cms.gov/newsroom/press-releases/79-million-people-medicare-have-saved-over-99-billion-prescription-drugs.

CFR Part 425 -Medicare Program; Medicare Shared Savings Program; Accountable Care Organizations--Pathways to Success and Extreme and Uncontrollable Circumstances Policies for Performance Year 2017. https://s3.amazonaws.com/public-inspection.federalregister.gov/2018-27981.pdf

Chaiken L, Waddell L, Sellers K, Jarris P (2016) Communicating the Value of the Preventive Health and Health Services Block Grant, Journal of Public Health Management and Practice: May/June 2016 - Volume 22 - Issue 3 - p 316-317 DOI: 10.1097/PHH.0000000000000414.

Chaikind H, Merck C, O'Sullivan J, Smith M (2001) Medicare Provisions in the Medicare, Medicaid, and SCHIP Benefits Improvement and Protection Act of 2000 (BIPA, PL 106-554). https://greenbookwaysandmeans.house.gov/sites/greenbook.waysandmeans.house.gov/files/2011/documents/RL30707%20v2_gb.pdf

Chait N, Glied S (2018) Promoting Prevention Under the Affordable Care Act. Annual Review of Public Health 2018 39:1, 507-524

Chait, N, Glied, S. (2018) Promoting Prevention Under the Affordable Care Act. Annu. Rev. Public Health, 2018. 39:507–24

Chambers J, Cangelosi M, Neumann P (2015) Medicare's use of cost-effectiveness analysis for prevention (but not for treatment), Health Policy, Volume 119, Issue 2, Pages 156-163, ISSN 0168-8510, https://doi.org/10.1016/j.healthpol.2014.11.012.

Chandra, A., Gruber, J., & McKnight, R. (2010). Patient Cost-Sharing and Hospitalization Offsets in the Elderly. The American economic review, 100(1), 193–213. https://doi.org/10.1257/aer.100.1.193

Chang CH, O'Malley J, Goodman DC (2016) Association between Temporal Changes in Primary Care Workforce and Patient Outcomes. Health Services Research. https://onlinelibrary.wiley.com/doi/pdf/10.1111/1475-6773.12513?casa_token=t7_pqc8I0vQAAAAA:Wquy57b7j_TPOt9L3suYuOk29B313AJ5UwoOxTlY7HtDPSdoyb_O3S2C-RMPZo7X95WF_5dDP6630SE

Chen J, Fox S, Cantrell C (2007) Susan E. Stockdale, Ph.D.; Marjorie Kagawa-Singer, Health disparities, and prevention: racial/ethnic barriers to flu vaccinations. Journal of Community Health, Vol. 32, No. 1. DOI: 10.1007/s10900-006-9031-7

Chen, J., Vargas-Bustamante, A., Mortensen, K., & Ortega, A. N. (2016). Racial and Ethnic Disparities in Health Care Access and Utilization Under the Affordable Care Act. Medical care, 54(2), 140–146. https://doi.org/10.1097/MLR.0000000000000467

Chernew M, Newhouse JP (2008) What Does the RAND Health Insurance Experiment Tell Us About the Impact of Patient Cost-Sharing on Health Outcomes? The American Journal of Managed Care, July, Volume 14, Issue 7

Chou A, Brown A, Jensen R, Shih S, Pawlson G, Scholle S (2007) Gender and Racial Disparities in the Management of Diabetes Mellitus Among Medicare Patients, Women's Health Issues, Volume 17, Issue 3, 2007, Pages 150-161, ISSN 1049-3867, https://doi.org/10.1016/j.whi.2007.03.003.

Chung S, Lesser L, Lauderdale D, Johns N, Palaniappan L, Luft H (2015) Medicare Annual Preventive Care Visits: Use Increased Among Fee-For-Service Patients, But Many Do Not Participate Health Affairs 2015 34:1, 11-20

Chung S, Romanelli R, Stults C, Luft H (2018) Preventive visit among older adults with Medicare introduction of Annual Wellness Visit: Closing gaps in underutilization. Preventive Medicine 115:110-118

CMS – Accountable Care Organizations https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/ACO/index

CMS -ACO https://www.medicare.gov/manage-your-health/coordinating-your-care/accountable-care-organizations.

CMS Finalizes "Pathways to Success," an Overhaul of Medicare's National ACO Program. Press release. https://www.cms.gov/newsroom/press-releases/cms-finalizes-pathways-success-overhaul-medicares-national-aco-program.

CMS Press release (3/2014) 7.9 million people with Medicare have saved over $9.9 billion on prescription drugs. https://www.cms.gov/newsroom/press-releases/79-million-people-medicare-have-saved-over-99-billion-prescription-drugs

Colla CH, Lewis VA, Kao L, O'Malley AJ, Chang C, Fisher ES. Association Between Medicare Accountable Care Organization Implementation and Spending Among Clinically Vulnerable Beneficiaries. JAMA Intern Med.2016;176(8):1167–1175. doi: https://doi.org/10.1001/jamainternmed.2016.2827

Cooper G, Kou DT, Dor A, Koroukian S, Scluchter M (2017) Cancer Preventive Service, Socioeconomic Status, and the Affordable Care Act. Cancer: 123:1585-9 (American Cancer Society).

Cooper GS, Koroukian SM. (2004) Racial disparities in the use of and indications for colorectal procedures in Medicare beneficiaries. Cancer. 2004 Jan 15;100(2):418-24. doi: 10.1002/cncr.20014. PMID: 14716780.

Cooper, G. S., Kou, T. D., Schluchter, M. D., Dor, A., & Koroukian, S. M. (2015). Changes in Receipt of Cancer Screening in Medicare Beneficiaries Following the Affordable Care Act. Journal of the National Cancer Institute, 108(5), djv374. https://doi.org/10.1093/jnci/djv374.

Corbelli J, Borrero S, Bonnema R, McNamara M, Kraemer K, Rubio D, Karpov I, McNeil M (2014) Differences among primary care physicians' adherence to 2009 ACOG guidelines for cervical cancer screening. J Women's Health (Larchmt). 23:397–403.

CRS Report R41278. Redhead S, Heisler E. Public Health, Workforce, Quality, and Related Provisions in ACA: Summary and Timeline. https://fas.org/sgp/crs/misc/R41278.pdf

CRS Report R44798. Lister S (2017) The ACA Prevention and Public Health Fund: In Brief Congressional Research Service7-5700. www.crs.gov R44796 https://fas.org/sgp/crs/misc/R44796.pdf.

Cubanski, J., Neuman, T., & Freed, M. (2018). The facts on Medicare spending and financing. Washington, DC: Kaiser Family Foundation.

Cunningham, P (2011) State Variation in Primary Care Physician Supply: Implications for Health Reform Medicaid Expansions. Center for Studying Health System Change. Research Brief No. 19.https://folio.iupui.edu/bitstream/handle/10244/1004/72046.pdf?sequence=1

Cunningham, T. J., Croft, J. B., Liu, Y., Lu, H., Eke, P. I., & Giles, W. H. (2017). Vital Signs: Racial Disparities in Age-Specific Mortality Among Blacks or African Americans - the United States, 1999-2015. MMWR. Morbidity and mortality weekly report, 66(17), 444–456. https://doi.org/10.15585/mmwr.mm6617e1

Dave, D., & Kaestner, R. (2009). Health insurance and ex ante moral hazard: evidence from Medicare. International journal of health care finance and economics, 9(4), 367-390.

Davis K, Scheon C, Bandearli F (2015) Medicare: Ensuring 50 years of coverage and Care https://www.commonwealthfund.org/sites/default/files/documents/___media_files_publications_fund_report_2015_apr_1812_davis_medicare_50_years_coverage_care.pdf.

De Preux, L. B. (2011). Anticipatory ex ante moral hazard and the effect of Medicare on prevention. Health economics, 20(9), 1056-1072.

Desai P, Aggarwal A. Breast Cancer in Women Over 65 years- a Review of Screening and Treatment Options. Clin Geriatr Med. 2021 Nov;37(4):611-623. doi: 10.1016/j.cger.2021.05.007. Epub 2021 Jul 30. PMID: 34600726

DeSantis CE, Siegel RL, Sauer AG (2016) Cancer statistics for African Americans, 2016: progress and opportunities in reducing racial disparities. CA Cancer J Clin. 2016;66(4):290–308. https://doi.org/10.3322/ caac.21340.

Dhanani, N., O'Leary, J. F., Keeler, E., Bamezai, A., & Melnick, G. (2004). The effect of HMOs on the inpatient utilization of Medicare beneficiaries. Health services

research, 39(5), 1607–1627. https://doi.org/10.1111/j.1475-6773.2004.00306.x https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1361086/pdf/hesr_00306.pdf

DHHS: The Lewin Group (2015) Health Practitioner Bonuses and Their Impact on the Availability and Utilization of Primary Care Services Health Practitioner Bonuses and Their Impact on the Availability and Utilization of Primary Care Services https://aspe.hhs.gov/system/files/pdf/116816/FinalReport_HealthPractitionerBonuses_8_13_15%20%28v2%29.pdf.

Diamant AL, Hays RD, Morales LS (2004) Delays and unmet need for health care among adult primary care patients in a restructured urban public health system. Am J Public Health 2004; 94:783 – 9.

Dolan NC, Ramirez-Zohfeld V, Rademaker AW (2015) The effective- ness of a physician-only and physician-patient intervention on colorectal cancer screening discussions between providers and African American and Latino patients. J Gen Intern Med. 2015;30(12):1780– 1787. https://doi.org/10.1007/s11606-015-3381-8.

Doty M (2022) How Discrimination in Health Care Affects Older Americans, and What Health Systems and Providers Can Do (Commonwealth Fund, Apr. 2022). https://doi.org/10.26099/yffm-2x15.

Doubeni C, Laiyemo A, Reed G, Field T, Fletcher R (2009) Socioeconomic and Racial Patterns of Colorectal Cancer Screening among Medicare Enrollees in 2000 to 2005. Cancer Epidemiol Biomarkers Prev. (18) (8) 2170-2175; DOI: 10.1158/1055-9965.EPI-09-0104.

Douglas N (2013) Can Accountable Care organizations improve population health? J AMA viewpoint vol329, No 11.

Du XL, Lin CC, Johnson NJ, Altekruse S. (2004) Effects of individual-level socioeconomic factors on racial disparities in cancer treatment and survival: findings from the National Longitudinal Mortality Study, 1979-2003. Cancer. 2011;117(14):3242-3251.

DuBard CA, Schmid D, Yow A, Rogers AB, Lawrence W. (2014) Recommendation for and receipt of cancer screenings among Medicaid recipients 50 years and older. Arch Intern Med. 2008 Oct 13;168(18):2014-21. doi: 10.1001/archinte.168.18.2014. PMID: 18852404.

Eichner, and Vladeck B (2005) Medicare as A Catalyst for Reducing Health Disparities. HEALTH AFFAIRS ~ Volume 24, Number 2 365 DOI 10.1377/hlthaff.24.2.365

Einav L, Finkelstein A, Ryan S, Schrimpf P, Cullen, M (2011) Selection on Moral Hazard in Health Insurance. NBER Working Paper No. w16969.

Einav L, Finkelstein, A (2018) "Moral Hazard in Health Insurance: What We Know and How We Know It." Journal of the European Economic Association vol. 16,4 (2018): 957-982. doi:10.1093/jeea/jvy017

Elo I, and Preston P (1997) National Research Council (US) Committee on Population; Racial and Ethnic Differences in the Health of Older Americans. Washington (DC): National Academies Press (US); 1997.

Environmental Scan and Literature Review: Factors that Influence Preventive Service Utilization among Adults Covered by Medicaid - Improving Quality of Care in Medicaid and CHIP through Increased Access to Preventive Services https://www.urban.org/sites/default/files/publication/24721/413237-Factors-that-Influence-Preventive-Service-Utilization-among-Adults-Covered-by-Medicaid.pdf

Espiridion M, Mulinti R, Kemper S, Goebel L, (2016) Patient Satisfaction with the Annual Wellness Visit. MJM Vol. 2I. https://mds.marshall.edu/cgi/viewcontent.cgi?article=1047&context=mjm

Farley TA, Dalal MA, Mostashari F, Frieden TR. Deaths preventable in the U.S. by improvements in the use of clinical preventive services. Am J Prev Med. 2010 Jun;38(6):600-9. doi: 10.1016/j.amepre.2010.02.016. PMID: 20494236.

Fedewa, S. A., Goodman, M., Flanders, W. D., Han, X., Smith, R. A., M. Ward, Jemal, A. (2015). Elimination of cost-sharing and receipt of screening for colorectal and breast cancer. Cancer, 121(18), 3272-3280.

Feldman, W. How serious are the adverse effects of screening? *J Gen Intern Med* 5 (Suppl 2), S50–S53 (1990). https://doi.org/10.1007/BF02600842

Fernandez, B (2011) Grandfathered Health Plans Under the Patient Protection and Affordable Care Act (PPACA). Congressional Research Service (CRS) 7-5700 www.crs.gov R41166. CRS Report for Congress. https://www.ncsl.org/documents/health/GrndfthrPlans.pdf

Final Rules for Grandfathered Plans, Preexisting Condition Exclusions, Lifetime and Annual Limits, Rescissions, Dependent Coverage, Appeals, and Patient Protections Under the Affordable Care Act. https://www.govinfo.gov/content/pkg/FR-2015-11-18/pdf/2015-29294.pdf

Finkelstein A, Taubman S, Wright B, Bernstein M, Gruber J, Newhouse J, Allen H, Baicker, K (2011), Oregon Health Study Group, The Oregon Health Insurance Experiment: Evidence from the First Year*, The Quarterly Journal of Economics, Volume 127, Issue 3, August 2012, Pages 1057–1106, https://doi.org/10.1093/qje/qjs020

Fiscella K, Holt K (2007) Impact of Primary Care Patient Visits on Racial and Ethnic Disparities in Preventive Care in the United States. The Journal of the American Board of Family Medicine Nov 2007, 20 (6) 587-597; DOI: 10.3122/jabfm.2007.06.070053.

Fischer E, McClellan, Bertko, J, Lieberman, Lee J, Kinner J. (2019) Fostering Accountable Health Care: Moving Forward in Medicare https://www.healthaffairs.org/doi/pdf/10.1377/hlthaff.28.2.w219

Flowers L, Noel-Miller C, Okrent D (2013) Colonoscopy screening after the Affordable Care Act: Cost barriers persist for Medicare beneficiaries. AARP.ORG https://www.aarp.org/content/dam/aarp/research/public_policy_institute/health/2013/colonoscopy-screening-after-aca-insight-AARP-ppi-health.pdf

Foote SB, Blewett (2003) Politics of Prevention: Expanding Prevention Benefits in the Medicare Program Journal of Public Health Policy Vol. 24, No. 1 (2003), pp. 26-40

Fox J, Shaw F, (2015) Clinical Preventive Services Coverage and the Affordable Care Act Am J Public Health. 2015;105: e7–e10. doi:10.2105/AJPH.2014.302289.

Fox, P. D., Snyder, R. E., & Rice, T. (2003). Medigap reform legislation of 1990: a 10-year review. Health care financing review, 24(3), 121–137.

Franco B, Fuchs BC, Lyke B, Price R. (1997) Provisions in the Balanced Budget Act of 1997 (BBA 97, P.L. 105-33) Greenbrook-ways and means. House Medicare P CRS report. https://greenbookwaysandmeans.house.gov/sites/greenbook.waysandmeans.house.gov/files/2011/images/l97-802_gb.pdf802_gb.pdf

Fulmer T, Reuben D, Auerbach J, Fick D, Galambos C, Johnson K(2021) Actualizing Better Health And Health Care For Older Adults, Health Affairs 2021 40:2, 219-225

Galvin S, Grandy R, Woodall T, Parlier A, Thach S, Landis S (2017) Improved utilization of preventive services among patients following team-based annual wellness visits

Ganguli I, Souza J, McWilliams JM, Mehrotra A (2017) Trends in Use of the US Medicare Annual Wellness Visit, 2011-2014. JAMA. 2017;317(21):2233–2235. doi:10.1001/jama.2017.4342

Ganguli I, Souza J, McWilliams M, Mehrotra A (2018) Practices Caring for underserved are less likely to adopt Medicare's Annual Wellness Visit. Health Affairs 37, NO 2(2018) 283-29.

García-Albéniz X, Hsu J, Bretthauer M (2016) Effectiveness of Screening Colonoscopy to Prevent Colorectal Cancer Among Medicare Beneficiaries Aged 70 to 79 Years: A Prospective Observational Study. Ann Intern Med.2017; 166:18-26. [Epub 27 September 2016]. doi:10.7326/M16-0758.

Geyman, J. P. (2007). Moral hazard and consumer-driven health care: a fundamentally flawed concept. International Journal of Health Services, 37(2

Ghimire E, Colligan E, Howell B, Perlroth D, Marrufo G, Rusev E, Packard M, (2015) Effects of a Community-Based Fall Management Program on Medicare Cost Savings. Am J Prev Med 2015;49(6): e109–e116e109.

Ginsburg, P (2012) Fee-For-Service Will Remain. A Feature of Major Payment Reforms, Requiring More Changes in Medicare Physician Payment. 10.1377/hlthaff.2012.0350 HEALTH AFFAIRS 31, NO. 9 (2012): 1977–1983. https://www.healthaffairs.org/doi/pdf/10.1377/hlthaff.2012.0350

Goodwin, S. M., & Anderson, G. F. (2012). Effect of cost-sharing reductions on preventive service use among Medicare fee-for-service beneficiaries. Medicare & Medicaid research review, 2(1), 002.01.a03. https://doi.org/10.5600/mmrr.002.01.a03.

Gorbeniko, Metcalf S, Mazumdar M, Cru, p C (2017) Annual Physical Examinations and Wellness Exams: Translating guideline into Practice. Am Prev Med; 52(6):813-815.

Gornick M (2008) A Decade of Research on Disparities in Medicare Utilization: Lessons for the Health and Health Care of Vulnerable Men American Journal of Public Health 98, S162_S168, https://doi.org/10.2105/AJPH.98.Supplement_1.S162.

Government Accountability Office (US). Medicare: many factors, including administrative challenges, affect access to Part D vaccinations. 2011 [cited 2014 Jun 24]. Available from: URL: http://www. gao. gov/products/GAO-12-61

Griffith K, Evans L, Bor J (2017) The Affordable Care Act Reduced Socioeconomic Disparities in Health Care Access. doi: 10.1377/hlthaff.2017.0083 HEALTH AFFAIRS 36, NO. 8.

Gross DJ, Alecxih L, Gibson MJ, Corea J, Caplan C, Brangan N. (1999) Out- of-pocket health spending by poor and near-poor elderly Medicare beneficiaries. Health Serv Res 1999; 34:241 – 54.

Gupta S, Shah J, Balasubramanian BA. Strategies for reducing colorectal cancer among blacks (2012) Arch Intern Med. 172(2):182–184. https://doi.org/10.1001/archinternmed.2011.594.

H.R.2015 - Balanced Budget Act of 1997.https://www.congress.gov/bill/105th-congress/house-bill/2015

Haas, J.S., Sprague, B.L., Klabunde, C.N. (2016) Provider Attitudes and Screening Practices Following Changes in Breast and Cervical Cancer Screening Guidelines. J GEN INTERN MED 31, 52–59. https://doi.org/10.1007/s11606-015-3449-5.

Hacker, K., & Walker, D. K. (2013). Achieving population health in accountable care organizations. American journal of public health, 103(7), 1163–1167. https://doi.org/10.2105/AJPH.2013.301254

Haffer, S.C., Bowen, S.E., Shannon, E.D (2003) Assessing Beneficiary Health Outcomes and Disease Management Initiatives in Medicare. Dis-Manage-Health-Outcomes 11, 111–124. https://doi.org/10.2165/00115677-200311020-00005

Haider AH, Schneider EB, Sriram N (2015) Unconscious race and social class bias among acute care surgical clinicians and clinical treatment decisions. JAMA Surg.150(5):457–464. https://doi.org/10.1001/ jamasurg.2014.4038.

Hamman M, Kapinos K (2015) Affordable Care Act Provision Lowered Out of Pocket Cost and increased Colonoscopy Rates among Men in Medicare. Health Affairs 34, No. 12 (2015): 2069-2076.

Han PK, Klabunde CN, Breen N, Yuan G, Grauman A, Davis WW, Taplin SH (2011) Multiple clinical practice guidelines for breast and cervical cancer screening: perceptions of US primary care physicians. Med Care. 2011;49:139–48.

Han PK, Klabunde CN, Noone AM, Earle CC, Ayanian JZ, Ganz PA, Virgo KS, Potosky AL (2013) Physicians' beliefs about breast cancer surveillance testing are consistent with test overuse. Med Care. 51:315–23.

Han X, Yabroff KR, Guy, GP, Zheng, Z, Jemal, A (2015) Has recommended preventive service use increased after elimination of cost-sharing as part of the Affordable Care Act in the United States? Elsevier: Preventive Medicine, 78 85-91.

Hausman, Jerry, and Daniel McFadden (1984) "Specification Tests for the Multinomial Logit Model." Econometrica, vol. 52, no. 5, [Wiley, Econometric Society], pp. 1219–40, https://doi.org/10.2307/1910997.

Hayes SL, Riley P, Radley DC, McCarthy D (2017) Reducing Racial and Ethnic Disparities in Access to Care: Has the Affordable Care Act Made a Difference? Issue brief (Commonw Fund). 2017; 2017:1-14.

Himmelstein, D. U., & Woolhandler, S. (2016). Public Health's Falling Share of US Health Spending. American journal of public health, 106(1), 56–57. https://doi.org/10.2105/AJPH.2015.302908

Hoffman J, Shumway-Cook A, Yorkston K, Ciol M, Dudgeon B, Chan L (2007) Association of Mobility Limitations with Health Care Satisfaction and Use of Preventive Care: A Survey of Medicare Beneficiaries, Archives of Physical Medicine and Rehabilitation, Volume 88, Issue 5, Pages 583-588, ISSN 0003-9993.

Holmes, C.E. and Muss, H.B. (2003), Diagnosis and Treatment of Breast Cancer in the Elderly. CA: A Cancer Journal for Clinicians, 53: 227-244. https://doi.org/10.3322/canjclin.53.4.227

Hood, R. G. (2007). Pay-for-performance--financial health disparities and the impact on healthcare disparities. Journal of the National Medical Association, 99(8), 953.

Horne HN, Phelan-Emrick DF, Pollack CE (2015) Effect of patient navigation on colorectal cancer screening in a community-based randomized controlled trial of urban African American adults. Cancer Causes Control.26(2):239–246. https://doi.org/10.1007/s10552-014- 0505-0.

Huckfeldt PJ, Escarce JJ, Rabideau B, Karaca-Mandic P, Sood N (2017) Less intense post-acute care, better outcomes for enrollees in Medicare Advantage than those in fee-for-service. Health Aff (Millwood).36(1):91-100. doi:10.1377/hlthaff.2016.1027.

Jacobson G, Damico A, Neuman T (2017) Medicare Advantage 2017 Medicare Enrollment National Trends, 1997-2007. Center for Medicare and Medicaid Services Spotlight: Enrollment Market Update. https://www.kff.org/medicare/issue-brief/medicare-advantage-2017-spotlight-enrollment-market-update/

Jacobson N, T Jones BIPA: The Medicare, Medicaid, and SCHIP Benefits Improvement and Protection Act of 2000. Policy, Politics, & Nursing Practice, 2001 - journals.sagepub.com

Jensen G, Salloum R, Hu J, Ferdows NB, Tarraf W (2015) A slow start: Use of preventive services among seniors following the Affordable Care Act's enhancement of Medicare benefits in the US. Elsevier preventive Medicine, 76 37-42.

Jiang M, Hughes D, Wang W (2018) The effect of Medicare's Annual Wellness Visits on preventive care for the elderly. Elsevier: preventive Medicine 116: 126-133.

Jiang M, Hughes DR, Appleton CM, McGinty G, Duszak R (2015) Recent trends in adherence to continuous screening for breast cancer among Medicare beneficiaries. Prev Med. Apr; 73:47-52. doi: 10.1016/j.ypmed.2014.12.031. Epub 2015 Jan 11. PMID: 25584984.

Kadivar, H., Goff, B. A., Phillips, W. R., Andrilla, C. H., Berg, A. O., & Baldwin, L. M. (2014). Guideline-inconsistent breast cancer screening for women over 50: a vignette-based survey. Journal of general internal medicine, 29(1), 82–89. https://doi.org/10.1007/s11606-013-2567-1

Kahn CN, Kuttner H (1999) Budget Bills and Medicare Policy: The Politics of the BBA. health affairs vol. 18, no. 1 https://www.healthaffairs.org/doi/10.1377/hlthaff.18.1.37

Kish JK, Yu M, Percy-Laurry A, Altekruse SF (2014) Racial and ethnic disparities in cancer survival by neighborhood socioeconomic status in Surveillance, Epidemiology, and End Results (SEER) Registries. J Natl Cancer Inst Monogr. (49):236-243.

Knowler, W. C., Barrett-Connor, E., Fowler, S. E., Hamman, R. F., Lachin, J. M., Walker, E. A., Nathan, D. M., & Diabetes Prevention Program Research Group (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. The New England journal of medicine, 346(6), 393–403. https://doi.org/10.1056/NEJMoa012512

Koh, H.K., Sebelius, K.G(2010) Promoting prevention through the Affordable Care Act. N.Engl. J. Med. 363 (14), 1296–1299.

Kurichi J, Pezzin L, Streim J, Kwong PL, Na L, Bogner HR, Xie D, Hennessy S (2017) Perceived barriers to healthcare and receipt of recommended medical care among elderly Medicare beneficiaries. Archives of Gerontology and Geriatrics, Volume 72,2017, Pages 45-51, ISSN 0167-4943, https://doi.org/10.1016/j.archger.2017.05.007. (http://www.sciencedirect.com/science/article/pii/S016749431630265

Kwaan, M, Jones-Webb, R (2018). Colorectal Cancer Screening in Black Men: Recommendations for Best Practices. Am J Prev Med;55(5S1): American Journal of Preventive Medicine. Published by Elsevier Inc.

Laiyemo AO, Doubeni C, Pinsky PF (2010) Race and colorectal cancer disparities: health-care utilization vs. different cancer susceptibilities. J Natl Cancer Inst. 2010;102(8):538–546. https://doi.org/10.1093/jnci/ djq068.

Landon BE, Zaslavsky AM, Bernard SL, Cioffi MJ, Cleary PD (2004) Comparison of Performance of Traditional Medicare vs. Medicare Managed Care. JAMA.;291(14):1744–1752. doi:10.1001/jama.291.14.1744

Lesser L, Krist A, Kamerow D, Bazemore A (2011) Comparison Between US Preventive Services Task Force Recommendations and Medicare Coverage the Annals of Family Medicine Jan 2011, 9 (1) 44-49; DOI: 10.1370/afm.1194

Lewis, J. H., Kilgore, M. L., Goldman, D. P., Trimble, E. L., Kaplan, R., Montello, M. J., ... & Escarce, J. J. (2003). Participation of patients 65 years of age or older in cancer clinical trials. Journal of clinical oncology, 21(7), 1383-1389

Li Y, Cen X, Cai X, Thirukumaran C, Zhou J, Glance L (2017) Medicare Advantage Associated with More Racial Disparity Than Traditional Medicare for Hospital Readmissions. Health Affairs 2017 36:7, 1328-1335

Liang, S. Y., Phillips, K. A., Tye, S., Haas, J. S., & Sakowski, J. (2004). Does patient cost sharing matter? Its impact on recommended versus controversial cancer screening services. American Journal of Managed Care, 10(2; PART 1), 99-107.

Lipscomb, E. R., Finch, E. A., Brizendine, E., Saha, C. K., Hays, L. M., & Ackermann, R. T. (2009). Reduced 10-year risk of coronary heart disease in patients who participated in a community-based diabetes prevention program: the DEPLOY pilot study. Diabetes care, 32(3), 394–396. https://doi.org/10.2337/dc08-1622.

Lissenden B, Yao NA (2017) Affordable Care Act Changes to Medicare Led to Increased Diagnoses of Early-Stage Colorectal Cancer Among Seniors Health Affairs 2017 36:1, 101-107

Lynk M. V. (1998). Medicare + Choice: "arguably the most significant change in the Medicare program since 1965". Journal of the National Medical Association, 90(10), 585–587. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2608369/pdf/jnma00364-0025.pdf

Ma W, Wang K, Nguyen LH, et al. Association of Screening Lower Endoscopy with Colorectal Cancer Incidence and Mortality in Adults Older Than 75 Years. JAMA Oncol. 2021;7(7):985–992. doi:10.1001/jamaoncol.2021.1364

Maciosek MV, Coffield AB, Flottemesch TJ, Edwards NM, Solberg LI (2010) Greater use of preventive services in US health care could save lives at little or no cost. Health Affairs; 29:1656–1660. PubMed: 20820022

Magnani, C. J., Li, K., Seto, T., McDonald, K. M., Blayney, D. W., Brooks, J. D., Hernandez-Boussard, T. (2019). PSA Testing Use and Prostate Cancer Diagnostic Stage After the 2012 U.S. Preventive Services Task Force Guideline Changes. Journal of the National Comprehensive Cancer Network : JNCCN, 17(7), 795–803. https://doi.org/10.6004/jnccn.2018.7274

Martino SC, Elliott MN, Hambarsoomian K (2016) Racial/ethnic dis- parities in Medicare beneficiaries' care coordination experiences. Med Care. 54(8):765–771. https://doi.org/10.1097/MLR.00000000000 00556.

May FP, Almario CV, Ponce N, Siegel (2015) Racial minorities are more likely than whites to report lack of provider recommendation for colon cancer screening. Am J Gastroenterol. 110:1388–1394. https://doi.org/10.1038/ajg.2015.138.

McBean MA, Li, S, Gilbertson D, Collins A (2004) Differences in Diabetes Prevalence, Incidence, and Mortality Among the Elderly of Four Racial/Ethnic Groups: Whites, Blacks, Hispanics, and Asians. Diabetes Care Oct 27 (10) 2317-2324; DOI: 10.2337/diacare.27.10.2317

McCalln N, Cromwell J (2011) Results of the Medicare Health Support Disease-Management Pilot Program N Engl J Med 2011; 365:1704-1712 DOI: 10.1056/NEJMsa1011785

McCarthy AM, Kim JJ, Beaber EF (2016) Follow-Up of Abnormal Breast and Colorectal Cancer Screening by Race/Ethnicity. Amer J Prev Med. 2016;51(4):507-512.

McClellan M, McKethan A, Lewis J, Roski, J, Fisher E. (2010) National Strategy to Put Accountable Care into Practice. Health Affairs May 2010 29.5.

McConnell KJ, Renfro S, Chan BKS (2017) Early Performance in Medicaid Accountable Care Organizations: A Comparison of Oregon and Colorado. JAMA Intern Med. 177(4):538–545. doi:10.1001/jamainternmed.2016.9098.

McGuire, T. G., Newhouse, J. P., & Sinaiko, A. D. (2011). An economic history of Medicare part C. The Milbank Quarterly, 89(2), 289–332. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3117270/pdf/milq0089-0289.pdf

McWilliams JM, Gilstrap LG, Stevenson DG, Chernew ME, Huskamp HA, Grabowski DC(2017) Changes in Post-acute Care in the Medicare Shared Savings Program. JAMA Intern Med.177(4):518–526. doi:10.1001/jamainternmed.2016.9115.

McWilliams M, Hatfield L, Landon B, Haned P, Chernew M (2018) Medicare Spending after 3 Years of the Medicare Shared Savings Program. N Engl J Med 2018; 379:1139-1149. DOI: 10.1056/NEJMsa1803388.

Meissner HI, Breen N, Taubman ML, Vernon SW, Graubard BI (2007) Which women aren't getting mammograms, and why? (United States). Cancer Causes Control. 2007 Feb;18(1):61-70. DOI: 10.1007/s10552-006-0078-7. PMID: 17186422.

Meissner HI, Klabunde CN, Breen N, Zapka JM. (2012) Breast and colorectal cancer screening: U.S. primary care physicians' reports of barriers. Am J Prev Med. Dec;43(6):584-9. DOI: 10.1016/j.amepre.2012.08.016. PMID: 23159253.

Meissner HI, Klabunde CN, Han PK, Benard VB, Breen N (2011) Breast cancer screening beliefs, recommendations and practices: primary care physicians in the United States. Cancer.

Mendelson D, Eileen Salinsky EM (1997) Health Information Systems and the Role of State Government Health Affairs 1997 16:3, 106-119

Mendoza, R. L. (2016). Which moral hazard? Health care reform under the Affordable Care Act of 2010. Journal of Health Organization and Management

Meyer C, Krasnova, A, Sammon J, Lipsitz S, Weissman J (2017) Accountable care organizations and the use of cancer screening. Prev med 101(201& 15-17.

Michalopoulos, C., Wittenburg, D., Israel, D., & Warren, A. (2012). The Effects of Health Care Benefits on Health Care Use and Health: A Randomized Trial for Disability Insurance Beneficiaries. Medical Care, 50(9), 764-771. Retrieved February 21, 2021, from http://www.jstor.org/stable/41714557

Misra A, Lloyd T, Strawbridge L, Wensky SG (2018) Use of Welcome to Medicare Visits Among Older Adults Following the Affordable Care Act. Am J Prev Med 2018,54(1) 37-43

Mobley, L.R., Amaral, P., Kuo, TM (2017) Medicare modernization and diffusion of endoscopy in FFS Medicare. Health Econ Rev 7, 13. https://doi.org/10.1186/s13561-017-0147-5

Moy E, Greenberg L, and Borsky AE (2008) Community Variation: Disparities in Health Care Quality Between Asian and White Medicare Beneficiaries Health Affairs 2008 27:2, 538-549

Mullins, C. D., Jain, R., Weir, M. R., Franey, C. S., Shih, Y. C., Pradel, F. G., Bikov, K., & Bartlett, S. (2013). Benefits Improvement and Protection Act's impact on transplantation rates among elderly MEDICARE beneficiaries with end-stage renal disease. Transplantation, 95(3), 463–469. https://doi.org/10.1097/TP.0b013e3182774366

Myers RE, Sifri R, Daskalakis C (2014) Increasing colon cancer screening in primary care among African Americans. J Natl Cancer Inst.106(12): dju344. https://doi.org/10.1093/jnci/dju344.

National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP). https://www.cdc.gov/chronicdisease/about/index.htm.

National Center for Health Statistics. Health, United States, 2011: In Brief. Hyattsville, MD. 2012.

National Council on Aging (NCOA). https://www.ncoa.org/news/resources-for-reporters/get-the-facts/healthy-aging-facts/

NCI-AA - National Cancer Institute: Facts for African- Americans – Cancer https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/cancer-facts-and-figures-for-african-americans/cancer-facts-and-figures-for-african-americans-2019-2021.pdf

Nelson, A. R., Smedley, B. D., & Stith, A. Y. (2003). Institute of Medicine. Unequal treatment: confronting racial and ethnic disparities in health care.

Newhouse JP, Price M, McWilliams JM, Hsu J, McGuire TG. How much favorable selection is left in Medicare Advantage? Am J Health Econ. 2015;1(1):1-26. doi:10.1162/ajhe_a_00001PubMedGoogle ScholarCrossref https://doi.org/10.1016/j.apmr.2007.02.005.

Newhouse, J. P. 1978, The Economics of Medical Care. Reading, MA: Addison-Wesley.

Newhouse, J.P. Free for All? Lessons from the RAND Health insurance Experiment. Cambridge, MA: Harvard, 1993

Newman LA, Griffith KA, Jatoi I, Simon MS, Crowe JP, Colditz GA. Meta-analysis of survival in African American and white American patients with breast cancer: ethnicity compared with socioeconomic status. J Clin Oncol. 2006;24(9):1342-1349.

NIA: Goal F: Understand health disparities related to aging and develop strategies to improve the health status of older adults in diverse populations.

https://www.nia.nih.gov/about/aging-strategic-directions-research/goal-health-disparities-adults

Nissa, A, McWilliams M, Epstein S Smulowitz P (2017) Emergency Department Involvement in Accountable Care Organizations in Massachusetts: A survey study. American College of Emergency Physicians.

O'Sullivan J, Franco C, Fuchs B, Lyke B Price R, Swendiman, K (1997) Medicare Provisions in the Balanced Budget Act of 1997 (BBA 97, P.L. 105-33) Congressional Research Service. https://greenbookwaysandmeans.house.gov/sites/greenbook.waysandmeans.house.gov/files/2011/images/l97-802_gb.pdf

ODPHP - https://www.healthypeople.gov/2020

Okoro, K Strine TW, Young SL, Balluz LS, Mokdad AH (2005) Access to health care among older adults and receipt of preventive services. Results from the Behavioral Risk Factor Surveillance System, 2002, Preventive Medicine, Volume 40, Issue 3, Pages 337-343, ISSN 0091-7435.

Palazzolo J, Ozcan Y (2018) Do the most efficient Accountable Care Organization earn shared saving? Elsevier 0038-0121

Paquette IM, Ying J, Shah SA, Abbott DE, Ho S-M (2015) African Americans should be screened at an earlier age for colorectal cancer. Gastrointest Endosc. 82(5):878–883. https://doi.org/10.1016/j.gie.2015.03.1899.

Park, J. (2017). Historical origins of the Tuskegee experiment: the dilemma of public health in the United States. Korean Journal of Medical History, 26(3), 545-578.

Park S, White L, Fishman P, Larson EB, Coe NB. Health Care Utilization, Care Satisfaction, and Health Status for Medicare Advantage and Traditional Medicare Beneficiaries with and Without Alzheimer Disease and Related Dementias. JAMA Netw Open. 2020;3(3): e201809. doi:10.1001/jamanetworkopen.2020.1809

Parrott S, Friedman J, Kogan R, and Van de Water P (2013) President Obama's Deficit-Reduction Package and Other Proposals in the 2014 Budget. center@cbpp.org. https://www.cbpp.org/sites/default/files/atoms/files/4-11-13bud.pdf.

Patient Protection and Affordable Care Act of 2010 (PPACA), Pub. L. 111-148 (March 23, 2010) §4106, 4002, 4003 and 4004.

Peek ME, Cargill A, Huang E (2007) Diabetes Health Disparities. Medical Care Research and Review. 64(5_suppl):101S-156S. doi:10.1177/1077558707305409

Peng B, Jensen G, Fritz H (2017) Effects of Medicare Coverage of a "Welcome to Medicare" visit on use of preventive services among new Medicare enrollees. Journal of Aging Research Vol 2017, article ID 2074810.

Peng Ng B, Jensen, G, Fritz H, (2017)"Effects of Medicare Coverage of a “Welcome-to-Medicare” Visit on Use of Preventive Services among New Medicare Enrollees", Journal of Aging Research, vol. Article
ID 2074810, 9 pages, 2017.https://doi.org/10.1155/2017/2074810

Penner LA, Dovidio JF, Gonzalez (2016) The effect of oncologist implicit racial bias in racially discordant oncology interactions. J Clin Oncol.34(24):2874–2880. https://doi.org/10.1200/JCO.2015.66. 3658.

Petroski Ng, B. P., Jensen, G. A., & Fritz, H. (2017). Effects of Medicare coverage of a “welcome-to-medicare” visit on use of preventive services among new Medicare enrollees. Journal of Aging Research, 2017.

Petroski, C. A., & Regan, J. F. (2009). Use and knowledge of the new enrollee "welcome to Medicare" physical examination benefit. Health care financing review, 30(3), 71–76.

Phillips, R. L., Jr, Fryer, G. E., Chen, F. M., Morgan, S. E., Green, L. A., Valente, E., & Miyoshi, T. J. (2004). The Balanced Budget Act of 1997 and the financial health of teaching hospitals. Annals of family medicine, 2(1), 71–78. https://doi.org/10.1370/afm.17

PPACA – congress.gov. https://www.congress.gov/111/plaws/publ148/PLAW-111publ148.pdf

Prevention and Health Fund https://www.hhs.gov/open/prevention/index.html. HHS.go

Promoting cancer screening: Learning from experience. Published 2004 by the American Cancer Society*DOI 10.1002/cncr. https://doi.org/10.1002/cncr.20507.

Ratner R, Goldberg R, Haffner S (2005) Impact of intensive lifestyle and metformin therapy on cardiovascular disease risk factors in the diabetes prevention program. Diabetes Care.28(4):888-894. doi:10.2337/diacare.28.4.888

Reed, M. (2016). The Effects of Eliminating Cost-sharing on the Use of Preventive Services Following Aca Implementation (Doctoral dissertation, Georgetown University).

Rein DB, Wittenborn JS, Zhang X (2011) The Cost-effectiveness of Welcome to Medicare Visual Acuity Screening and a Possible Alternative Welcome to Medicare Eye Evaluation Among Persons Without Diagnosed Diabetes Mellitus. Arch Ophthalmol. 2012;130(5):607–614. doi:10.1001/archopthalmol.1921

Report to Congress: The Centers for Medicare & Medicaid Services' Evaluation of Community-based Wellness and Prevention Programs under Section 4202 (b) of the Affordable Care Act https://innovation.cms.gov/files/reports/communitywellnessrtc.pdf

Rezayatmand, R., Pavlova, M., & Groot, W. (2013). The impact of out-of-pocket payments on prevention and health-related lifestyle: a systematic literature review. The European Journal of Public Health, 23(1), 74-79.

Rice T, Matsuoka KY (2004) The impact of cost-sharing on appropriate utilization and health status: a review of the literature on seniors. Med Care Res Rev.Dec;61(4):415-52. doi: 10.1177/1077558704269498. PMID: 15536208.

Rittenhouse D, Shortell S, Fisher E (2009) Primary Care and Accountable Care — Two Essential Elements of Delivery-System Reform. n Engl j med 361; 24 nejm.org

Robyn I. Stone DrPH & Natasha Bryant MA (2012) The Impact of Health Care Reform on the Workforce Caring for Older Adults, Journal of Aging & Social Policy, 24:2, 188-205, DOI: 10.1080/08959420.2012.659144

Rogers CR, Mitchell JA, Franta GJ, Foster MJ, Shires D. (2017) Masculinity, racism, social support and colorectal cancer screening uptake among African American men: a systematic review. Am J Mens Health.11(5):1486–1500. https://doi.org/10.1177/1557988315611227.

Sabatino SA, Lawrence B, Elder R, Mercer SL, Wilson KM, DeVinney B, Melillo S, Carvalho M, Taplin S, Bastani R, Rimer BK, Vernon SW, Melvin CL, Taylor V, Fernandez M, Glanz K (2012) Community Preventive Services Task Force. Effectiveness of interventions to increase screening for breast, cervical, and colorectal cancers: nine updated systematic reviews for the guide to community preventive services. Am J Prev Med. Jul;43(1):97-118. DOI: 10.1016/j.amepre.2012.04.009. PMID: 22704754.

Sabatino, S. A., Thompson, T. D., Guy Jr, G. P., de Moor, J. S., & Tangka, F. K. (2016). Mammography use among Medicare beneficiaries after elimination of cost sharing. Medical care, 54(4), 394.

Salloum E, Kohler R, Jensen G, Sheridan S, Carpenter W, Biddle A (2014) U.S. Preventive Services Task Force Recommendations and Cancer Screening Among Female Medicare Beneficiaries Journal of Women's Health 2014 23:3, 211-217.

Salloum R, Jensen G, Biddle A (2013) The "Welcome to Medicare" Visit: A Missed Opportunity for Cancer Screening Among Women? Journal of Women's Health 2013 22:1, 19-25.

Satcher D. The prevention challenge and opportunity. Health Affairs. 2006; 25:1009–1011. PubMed: 16835179.

Schoen C, David K, Willink A (2017) Medicare Beneficiaries High Out of Pocket costs: Cost Burden by Income and Health Status. The Commonwealth Fund: Issue Brief May 2017.

SEC. 1202. PAYMENTS TO PRIMARY CARE PHYSICIANS -111TH CONGRESS 2D SESSION II (2015) GPO, Calendar No. 331 H. R. 4872. https://www.govinfo.gov/content/pkg/BILLS-111hr4872pcs/pdf/BILLS-111hr4872pcs.pdf

Seidman ML, Trudel J (2012) Achieving Meaningful Use of Health Information Technology: A Guide for Physicians to the EHR Incentive Programs. Arch Intern Med. 2012;172(9):731–736. doi:10.1001/archinternmed.2012.872.

Seshamani M, Zhu J, Volpp K (2006) Did Postoperative Mortality Increase after implementing the Medicare Balanced Budget Act? Medical Care. Vol 44 No.6 pp 527-533. Wolters Kluwer.

Shariff-Marco S, Klassen AC, Bowie JV (2010) Racial/ethnic differences in self-reported racism and its association with cancer-related health behaviors. Am J Public Health. 2010;100(2):364–374. https://doi.org/ 10.2105/AJPH.2009.163899.

Shavers V. L. (2007). Measurement of socioeconomic status in health disparities research. Journal of the National Medical Association, 99(9), 1013–1023.

Shelley L. Galvin, Rebecca Grandy, Tasha Woodall, Anna Beth Parlier, Sarah Thach, and Suzanne E(2017) Landis improved Utilization of Preventive Services Among Patients Following Team-Based Annual Wellness Visits. North Carolina Medical Journal September-October 2017 78:287-295; doi:10.18043/ncm.78.5.287

Shen AK, Warnock R, Kelman JA (2017) Driving immunization through the Medicare annual wellness visit: a growing opportunity Vaccine, 35 (50) (2017), pp. 6938-6940

Shen AK, Warnock R, Selna W, MaCurdy T, Chu S, Kelman J (2019) Vaccination among Medicare fee for service beneficiaries: characteristics and predictors of vaccine receipt 2014-2017.

Sherrill C, Cavanaugh J, Shilliday B, (2017) Patient Satisfaction with Medicare Annual Wellness Visits Administered by a Clinical Pharmacist Practitioner. J Manag Care Spec Pharm, Nov;23(11):1125-1129. https://doi.org/10.18553/jmcp.2017.23.11.1125

Shi L, Lebrun LA, Zhu J, Tsai J (2011) Cancer screening among racial/ethnic and insurance groups in the United States: a comparison of disparities in 2000 and 2008. J Health Care Poor Underserved. 22(3):945– 961. https://doi.org/10.1353/hpu.2011.0079.

Shih S, McCullough CM, Wang JJ, Singer J, Parsons AS (2011) Health Information Systems in Small Practices: Improving the Delivery of Clinical Preventive Services,

American Journal of Preventive Medicine, Volume 41, Issue 6, 2011, Pages 603-609, ISSN 0749-3797, https://doi.org/10.1016/j.amepre.2011.07.024.

Singh GK, Jemal A. (2017) Socioeconomic and Racial/Ethnic Disparities in Cancer Mortality, Incidence, and Survival in the United States, 1950-2014: Over Six Decades of Changing Patterns and Widening Inequalities. J Environ Public Health.

Skinner, J., & Chandra, A. (2016). The past and future of the Affordable Care Act. JAMA, 316(5), 497-499.

Sloan, F. A., Acquah, K. F., Lee, P. P., & Sangvai, D. G. (2012). Despite the 'welcome to Medicare' benefit, one in eight enrollees delay the first use of part B services for at least two years. Health affairs (Project Hope), 31(6), 1260–1268. https://doi.org/10.1377/hlthaff.2011.0479

Smith AA, Kepka D, Yabroff KR. Advanced practice registered nurses, physician assistants and cancer prevention and screening: a systematic review. BMC Health Serv Res. 2014; 14:68.

Smith RA, Andrews K, Brooks D, et al. Cancer screening in the United States, 2015. A review of current American Cancer Society guidelines and current issues in cancer screening. Ca Cancer J Clin. 2015; 65:30–54

Solanki, G., & Schauffler, H. H. (1999). Cost-sharing and the utilization of clinical preventive services. American Journal of Preventive Medicine, 17(2), 127-133.

Solanki, G., Schauffler, H. H., & Miller, L. S. (2000). The direct and indirect effects of cost-sharing on the use of preventive services. Health services research, 34(6), 1331.

Tang, L. (2010). The impact of health insurance on cancer prevention: Ex ante and ex post moral hazards (Order No. 3426305). Available from ProQuest Dissertations & Theses A&I; ProQuest Dissertations & Theses Global. (762374398). Retrieved from https://www.proquest.com/dissertations-theses/impact-health-insurance-on-cancer-prevention-ex/docview/762374398/se-2?accountid=10901

Tao W, Agerholm J Burström B (2016) The impact of reimbursement systems on equity in access and quality of primary care: A systematic literature review. BMC Health Services Research 16:542 DOI 10.1186/s12913-016-1805-8

Tetuan TM, Ohm R, Herynk MH, Ebberts M, Wendling T, Mosier MC (2014). The Affordable Health Care Act annual wellness visits: the effectiveness of a nurse-run clinic in promoting adherence to mammogram and colonoscopy recommendations. J Nurs Adm, 44 (5), p. 270

The Health Care and Education Reconciliation Act of 2010 https://www.govinfo.gov/content/pkg/PLAW-111publ152/html/PLAW-111publ152.htm

The Patient Protection and Affordable Care Act
https://www.govinfo.gov/content/pkg/PLAW-111publ148/html/PLAW-111publ148.htm

Tollen L. Physician organization in relation to quality and efficiency of care: a synthesis of recent literature. New York: The Common- wealth Fund, April 2008.

Toseef, M. U., Jensen, G. A., & Tarraf, W. (2020). Effects of the Affordable Care Act's enhancement of Medicare benefits on preventive services utilization among older adults in the US. Preventive Medicine, 138, 106148.

Trimble EL, Carter CL, Cain D, et al. Representation of older patients in cancer treatment trials. Cancer 1994; 74: 2208–2214.

Trivedi, A. N., Rakowski, W., & Ayanian, J. Z. (2008). Effect of cost sharing on screening mammography in Medicare health plans. New England Journal of Medicine, 358(4), 375-383.

Trivedi, B Leyva, Y Lee, OA Panagiotou, IJ Dahabreh (2018) Elimination of Cost Sharing for Screening Mammography in Medicare Advantage Plans New England Journal of Medicine

U.S. General Accounting Office, Medicare: Beneficiary Use of Clinical Preventive Services, GAO-02-422 (Washington, D.C.: April 2002).
https://www.gao.gov/assets/gao-02-422.pdf.

U.S. General Accounting Office, Medicare: Most Beneficiaries Receive Some but Not All Recommended Preventive Services, GAO-03-958 (Washington, D.C.: September 2003). https://www.gao.gov/assets/gao-04-1004t.pdf

U.S. General Accounting Office, Medicare: Use of Preventive Services Is Growing but Varies Widely, GAO-02-777T (Washington, D.C.: May 23, 2002)
https://www.gao.gov/assets/gao-02-777t.pdf

U.S. Preventive Services Task Force. Screening for prostate cancer: US Preventive Services Task Force recommendation statement. JAMA. 2018; 319 (June 19): 1901-1913. doi:10.1001/jama.2018.3710.

University Press Volume 10, Number 1, pp. 45-7110.1353/hpu.2010.0799

US Census https://www.census.gov

Vijverberg, Wim. (2011). Testing for IIA with the Hausman-Mcfadden Test. SSRN Electronic Journal. 10.2139/ssrn.1882845.

Waghray A, Jain A, Waghray N. Colorectal cancer screening in African Americans: practice patterns in the United States. Are we doing enough? Gastroenterol Rep (Oxf). 2016;4(2):136–140. https://doi.org/ 10.1093/gastro/gow005.

Waidmann T, Ormand B, Bovbjerg R (2011) The Role of Prevention in Bending the Cost Curve. Urban Institute.

Wan T, Ortiz J, Berzon R, Lin YL (2015) Variations in Colorectal Cancer Screening of Medicare Beneficiaries Served by Rural Health Clinics. Health Services Research and Managerial Epidemiology1-7a. DOI: 10.1177/2333392815597221

Ward CD, Koenig KT (2017) Does Disability Affect Receipt of Preventive Care Services among Older Medicare Beneficiaries? - cms.gov. https://www.cms.gov/About-CMS/Agency-Information/OMH/Downloads/Data-Highlight-ADA-2017.pdf

Wehby, G.L. and Lyu, W. (2018), The Impact of the ACA Medicaid Expansions on Health Insurance Coverage through 2015 and Coverage Disparities by Age, Race/Ethnicity, and Gender. Health Serv Res, 53: 1248-1271. doi:10.1111/1475-6773.12711

Weyand, C. M., & Goronzy, J. J. (2016). Aging of the Immune System. Mechanisms and Therapeutic Targets. Annals of the American Thoracic Society, 13 Suppl 5(Suppl 5), S422–S428. https://doi.org/10.1513/AnnalsATS.201602-095AW

WHO (2009) Systems Thinking for Health System Strengthening, Alliance for Health Policy and Systems Research.

WHO's Framework of Action. Everybody's Business (2007) Strengthening Health Systems to Improve Health Outcomes. https://www.who.int/healthsystems/strategy/everybodys_business.pdf?

Williams DR, Wyatt R. Racial bias in health care and health: challenges and opportunities. JAMA. 2015;314(6):555–556. https://doi. org/10.1001/jama.2015.9260.

Xirasagar S, Li Y-J, Burch JB, et al. Reducing colorectal cancer incidence and disparities: performance and outcomes of a screening colonoscopy program in South Carolina. Adv Public Health. 2014; 2014:787282. https://doi.org/10.1155/2014/787282.

Xu M, Kelly A, Kushi L, Reed M, Koh H, Spiegelman D (2020) Impact of the Affordable Care Act on Colorectal Cancer Outcomes: A Systematic Review, American Journal of Preventive Medicine, Volume 58, Issue 4, 2020, Pages 596-603, ISSN 0749-3797.

Xu W Yi, Dowd B. Lessons from Medicare Coverage of Colonoscopy and Prostate-Specific Antigen Test Medical Care Research and Review 2015, Vol. 72(1) 3–24. Sage.

Xu, WY, Wickizer T, Jung JK (2019) Effectiveness of Medicare cost-sharing elimination for cancer screening on utilization. BMC Health Services Research 19:392

Yabroff KR, Klabunde CN, Yuan G, McNeel TS, Brown ML, Casciotti D, Buckman DW, Taplin S. Are physicians' recommendations for colorectal cancer screening guideline-consistent? J Gen Intern Med. 2011; 26:177–84.

Ya-Chen Shih T, Zhao L, Elting L (2006) Does Medicare Coverage of Colonoscopy Reduce Racial/Ethnic Disparities in Cancer Screening Among the Elderly? Health Affairs 2006 25:4, 1153-1162.

Yamada T, Chen CC, Murata C, Hirai H, Ojima T, Kondo K, Harris JR 3rd. Access disparity and health inequality of the elderly: unmet needs and delayed healthcare. Int J Environ Res Public Health. 2015 Feb 3;12(2):1745-72. doi: 10.3390/ijerph120201745. PMID: 25654774; PMCID: PMC4344691.

Zarabozo C. (2000). Milestones in Medicare Managed Care. Health care financing review, 22(1), 61–67.

Zeng C, Wen W, Morgans AK, Pao W, Shu XO, Zheng W. Disparities by race, age, and sex in the improvement of survival for major cancers: results From the National Cancer Institute Surveillance, Epidemiology, and End Results (SEER) program in the United States, 1990 to 2010. JAMA Oncol. 2015;1(1):88-96.

Zhangn Y, Baik SH (2013) Race/Ethnicity, Disability, and Medication Adherence Among Medicare Beneficiaries with Heart Failure. Gen Intern Med 29(4):602–7DOI: 10.1007/s11606-013-2692-x

Zuckerman S, Holahan J (2012) Despite Criticism, The Affordable Care Act Does Much to Contain Health Care Costs. Urban Institute: Health Policy Center. http://webarchive.urban.org/UploadedPDF/412665-Despite-Criticism-The-Affordable-Care-Act-Does-Much-to-Contain-Health-Care-Cost.pdf

Zusman E, Carr S, Robinson C, Kasirye O, Zell B, Miller W, Duarte T, Engel A, Hernandez M, Horton M, Williams, F. (2014) Moving toward implementation: The potential for accountable care organizations and private-public partnerships to advance active neighborhood design. Preventive Medicine, Volume 69, Supplement, 2014, Pages S98-S101, https://doi.org/10.1016/j.ypmed.2014.08.009.

# APPENDICES

## Demographics

Table 7. Descriptive Characteristics of sample MEPS

| | Medicare only | 95% CI | Medicare Managed care | 95% CI | Medicare only + Public | 95% CI | Medicare only + Private | 95% CI | Uninsured | 95% CI |
|---|---|---|---|---|---|---|---|---|---|---|
| **Age** | % | | % | | | % | | | % | |
| *65-74 n=24,253* | 98 | [97.34,98.07] | 28.6 | [27.16,30.17] | 7.15 | [6.557,7.803] | 49.4 | [48.05,50.87] | 0.7 | [.5832,.8491] |
| *75-90 n = 21,218* | 86.9 | [86.12,87.8] | 27.9 | [26.47,29.47] | 6.9 | [6.226,7.77] | 35.8 | 34.2,37.35] | 0.3 | [.2213,.4402] |
| **Sex n = 42,850** | | | | | | | | | | |
| *Female* **n= 24,374** | 55.2 | [54.59,55.84] | 17.2 | [16.42,18.15] | 5.06 | [4.649,5.5] | 23.9 | [23.21,24.7] | 0.3 | [.2722,.4038] |
| *Male n = 18,739,337* | 43.3 | [42.66,43.87] | 12.8 | [12.15,13.58] | 2.4 | [2.197,2.738] | 21.7 | [20.95,22.45] | 0.2 | [.1688,.282] |
| **Race n = 42,850** | | | | | | | | | | |
| **Black** | 5.9 | 5.303,6.689] | 2.04 | [1.765,2.357] | 1.09 | [.9306,1.279] | 2.1 | [1.795,2.446] | 0.05 | [.0329,.0878] |
| **Hispanic** | 7.2 | [6.334,8.08] | 2.9 | [2.631,3.373] | 2.06 | [1.731,2.47] | 1.5 | [1.317,1.724] | 0.3 | [.1953,.3468] |
| **White** | 42.3 | [41.08,43.56] | 13.5 | [12.57,14.42] | 2.2 | [1.985,2.469] | 20.9 | [20.01,21.91] | 0.12 | [.0878,.16] |
| **Asian** | 42.4 | [40.91,43.17] | 11.3 | [10.65,12.06] | 2.0 | [1.786,2.304] | 20.7 | [19.79,21.55] | 0.12 | [.0804,.1707] |
| **Other** | 1.0 | [.771,1.316] | 0.29 | [.2158,.3865] | 0.11 | [.0701,.165] | 0.43 | [.3038,.6117] | 0 | 0 |
| **Education n=32,199** | % | | % | | % | | % | | % | |
| *Less HS* | 20.6 | [19.59,21.58] | 5.9 | 5.444,6.306] | 4.2 | [3.79,4.685] | 5.7 | 5.279,6.124] | 0.28 | [.2087,.3659] |
| *HS* | 28.9 | [27.95,30.04] | 8.5 | 7.858,9.082] | 1.4 | [1.272,1.636] | 13.2 | [12.46,13.91] | 0.09 | [.0517,.1389] |
| *Some college* | 25.9 | [25.06,26.7] | 8.05 | [7.494,8.632] | 1.1 | [.9573,1.265] | 13.4 | [12.7,14.04] | 0.07 | [.0394,.1155] |
| *College* | 13.3 | [12.48,14.08] | 3.8 | 3.436,4.297] | 0.4 | [.3107,.5262] | 7.4 | [6.903,8.025] | 0.05 | [.0277,.0813] |
| *Advanced college degree* | 9.9 | [9.195,10.57] | 2.5 | [2.131,2.883] | 0.16 | [.1081,.2558] | 6.3 | [5.826,6.919] | 0.02 | [.0114,.0445] |
| **Marital Status n = 42,849** | % | | % | | % | | % | | % | |
| **Married** | 54.4 | [53.05,55.69] | 16.4 | [15.43,17.37] | 2.2 | [1.855,2.496] | 29.2 | [28.06,30.35] | 0.3 | [.2139,.3555] |
| *Widowed* | 26.1 | [25.16,27.11] | 8.0 | [7.486,8.547] | 2.7 | [2.412,2.948] | 9.6 | [9.066,10.25] | 0.16 | [.1169,.2181] |
| *Divorced* | 12.02 | [11.43,12.64] | 3.9 | [3.58,4.291] | 1.6 | [1.4,1.796] | 4.6 | [4.286,4.993] | 0.06 | [.04,.0907] |
| *Separated* | 1.06 | [.9254,1.206] | 0.28 | [.2212,.344] | 0.25 | [.2042,.304] | 0.3 | [.2296,.3877] | 0.014 | [.0074,.0262] |
| *Never* | 4.02 | [3.69,4.37] | 1.3 | [1.144,1.487] | 0.8 | [.6721,.8963] | 1.5 | [1.246,1.751] | 0.033 | [.0189,.0578] |
| **Region n = 42,847** | % | | % | | % | | % | | % | |
| *Northeast* | 18.9 | [17.46,20.44] | 5.7 | [4.882,6.709] | 1.8 | [1.534,2.101] | 8.5 | [7.661,9.474] | 0.07 | [.0475,.1019] |
| *Midwest* | 21.7 | [20.27,23.27] | 5.8 | [5.029,6.575] | 0.9 | [.8323,1.176] | 11.3 | [10.26,12.42] | 0.05 | [.0279,.0761] |
| *South* | 36.7 | [34.64,38.7] | 9.7 | [8.799,10.7] | 2.6 | [2.239,2.981] | 16.4 | [15.21,17.68] | 0.3 | [.192,.3492] |
| *West* | 21.2 | [19.73,22.75] | 8.9 | [8.107,9.823] | 2.1 | [1.813,2.529] | 9.4 | [8.546,10.35] | 0.17 | [.1369,.2241] |
| *Poverty-line n = 42,850* | % | | % | | % | | % | | % | |
| *Poor* | 9.2 | [8.66,9.716] | 2.5 | [2.308,2.748] | 2.5 | [2.272,2.857 | 2.1 | [1.909,2.363] | 0.09 | [.0621,.1274] |
| *Near poor* | 6.3 | [5.903,6.684] | 2.01 | [1.863,2.292] | 1.2 | [1.034,1.376] | 1.6 | [1.375,1.762] | 0.06 | [.0345,.0964] |
| *Low income* | 17.01 | [16.42,17.75] | 5.8 | [5.39,6.261] | 1.8 | [1.586,2] | 5.6 | [5.232,5.92 | 0.13 | [.0905,.1741] |
| *Middle income* | 28.4 | [27.55,29.24] | 9.4 | [8.839,10.04] | 1.4 | [1.266,1.588] | 13.1 | [12.51,13.74] | 0.16 | [.1237,.2044] |
| *High income* | 37.6 | [36.27,38.87] | 10.3 | [9.543,11.11] | 0.6 | [.4706,.6888] | 23.3 | [22.2,24.39] | 0.2 | [.0854,.1648] |
| **USC N = 42,223** | % | | % | | % | | % | | % | |
| *Yes* | 92.1 | [91.56,92.56] | 28.9 | [27.58,30.37] | 6.9 | [6.424,7.622] | 43.5 | [42.23,44.73] | 0.3 | [.2538,.3767] |
| *No* | 6.5 | [6.05,6.91] | 1.3 | [1.203,1.508] | 0.5 | [.4401,.6149] | 2.4 | [2.14,2.588] | 0.2 | [.1685,.2795] |
| **Perceived health status n =42,241** | % | | % | | % | | % | | % | |
| *Excellent* | 16.06 | [15.4,16.75] | 4.8 | [4.437,5.193] | .48 | [8.144,9.154] | 8.6 | [.4094,.5703] | 0.75 | [.0502,.1113] |
| *Very good* | 30.05 | [29.36,30.74] | 9.4 | [8.879,10.02] | 1.15 | [15.01,16.3] | 15.6 | [1.025,1.295] | .12 | [.0972,.1597] |
| *Good* | 31.7 | [31.05,32.31] | 9.6 | [9.426,10.5] | 2.5 | [13.45,14.58] | 14.1 | [2.24,2.718] | .19 | [.1465,.2397] |
| *Fair* | 15.1 | [14.57,15.67] | 4.5 | [4.172,4.849] | 2.3 | [5.285,6.01] | 5.6 | [2.025,2.595] | .13 | [.097,.1697 |
| *Poor* | 5.6 | [5.267,5.889] | 1.5 | [1.327,1.66] | 1.1 | [1.63,1.997] | 1.8 | [.9327,1.223] | .04 | [.0213,.0748] |
| **Chronic condition n = 42,641,072** | % | | % | | % | | % | | % | |
| **None** | 21.5 | 20.81,22.29] | 6.2 | [5.752,6.607] | 1.2 | 1.056,1.325] | 10.5 | [9.946,11] | 0.26 | [.2078,.3329] |
| **One chronic condition** | 76.3 | [75.56,77.13] | 23.8 | [22.66,24.97] | 6.3 | 5.746,6.901] | 34.8 | [33.81,35.91] | 0.29 | [.2326,.3533 |
| **≥2 chronic condition** | 0.6 | [.4679,.724] | 0.03 | [.0997,.2291] | 0.03 | [.0134,.0596] | 0.3 | [.2315,.4517] | 0.0 | 0.0 |
| **Office visits n = 42,850** | % | | % | | % | | % | | % | |
| **None** | 17.6 | [17.04,18.34] | 4.6 | 4.339,4.97] | 1.4 | [1.258,1.588] | 7.1 | [6.67,7.495]] | 0.4 | [.3111,.4732] |
| **2-3** | 18.9 | [18.33,19.51] | 5.9 | [5.549,6.301] | 1.5 | [1.311,1.629] | 8.6 | [8.189,9.062] | 0.07 | [.0542,.1024] |
| **4-6** | 21.7 | [21.27,22.19] | 6.9 | [6.602,7.366] | 1.6 | [1.404,1.776] | 10.1 | [9.67,10.5] | 0.05 | [.0321,.0757] |
| **7-10** | 16.9 | [16.5,17.45] | 5.4 | [5.004,5.824] | 1.3 | [1.161,1.494] | 8.3 | [7.947,8.711] | 0.02 | [.0125,.0481] |
| **11-14** | 39.9 | [9.511,10.46] | 3.2 | [2.906,3.451] | 0.8 | [.6485,.8919] | 4.9 | [4.659,5.322] | 0.01 | [.0021,.0521] |
| **15 0r more** | 13.2 | [12.6,13.88] | 4.2 | 3.681,4.38] | 0.9 | [.8606,1.111] | 6.6 | [6.127,7.043] | 0.007 | [.0026,.0199] |
| **Healthcare expenditure n = 42,750** | % 95.4 | 95.11,95.79] | % 29.5 | [28.11,30.91] | % 7.3 | [6.673,7.929] | % 44.8 | [43.56,46.02] | % 0.37 | [.308,.4465] |
| **OOP n = 42,641,072** | 56.8 | [55.65,57.93] | 20.5 | [19.23,21.75] | 2.03 | [1.847,2.24] | 27.8 | [26.83,28.72]] | 0.19 | [.1467,.2382] |

Table 8: Descriptive Characteristics by Preventive services

| | Medicare-only | | Medicare Managed care | | Medicare only +Medicaid | | Medicare-only + Private | | Uninsured | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Blood Pressure N=40,714** | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI | % | 95% CI |
| *Past year* | 94.3 | [93.87,94.65] | 29.2 | [27.83,30.64] | 7.14 | [6.539,7.787] | 44.3 | [43.08,45.51] | 0.4 | [.3221,.4612] |
| *Within 2 years* | 2.0 | [1.845,2.209] | 0.6 | [.4885,.6579] | 0.1 | [.0925,.1736] | 0.9 | [.7669,.9994] | 0.05 | [.0364,.0773] |
| *Three Years or more* | 2.0 | [.7009,.9121] | 0.52 | [.1379,.2344] | 0.2 | [.0431,.0939] | 0.7 | [.225,.3817] | 0.06 | [.0082,.0287] |
| *Never* | 0.2 | [.1764,.3136] | 0.05 | [.0343,.0841] | 7.4 | [6.827,8.107] | 0.08 | [.0477,.1233] | 0.02 | [.0125,.0435] |
| **BMI screen N = 40,983** | | | | | | | | | | |
| *Underweight* | 9.5 | [8.927,10.04] | 2.6 | [2.282,2.861] | 0.8 | [.6913,.9033] | 4.7 | [4.337,5.035] | 0.07 | [.0437,.1014] |
| *Normal* | 29.3 | [28.51,30.15] | 9.3 | [8.785,9.897] | 2.1 | [1.891,2.349] | 13.3 | [12.67,13.97] | 0.19 | [.1392,.2489] |
| *Overweight* | 34.1 | [33.41,34.91] | 10.7 | [10.02,11.32] | 2.2 | [1.982,2.512] | 16.3 | [15.59,16.95] | 0.17 | [.1374,.2208] |
| *Obese* | 25.5 | [24.72,26.37] | 7.8 | [7.274,8.341] | 2.3 | [2.035,2.55] | 11.6 | [11,12.22] | 0.11 | [.0798,.16] |
| **Cholesterol N = 40,714** | | | | | | | | | | |
| ***Past year*** | 88.2 | [87.59,88.77] | 27.7 | [26.4,29.07] | 6.8 | [6.207,7.401] | 41.5 | [40.41,42.78] | 0.31 | [.2579,.3721] |
| *Within 2 years* | 5.3 | [5.006,5.655] | 1.5 | [1.332,1.672] | 0.3 | [.2583,.3803] | 2.4 | [2.225,2.644] | 0.07 | [.049,.115] |
| *Within 3 years* | 3.8 | [1.33,1.642] | 0.9 | [.2835,.436] | 0.2 | [.0744,.1372] | 1.6 | [.5892,.7912] | 0.08 | [.018,.0607] |
| *Never* | 1.2 | [1.066,1.379] | 0.27 | [.2159,.3479] | 0.09 | [.0651,.125] | 0.34 | [.2642,.4386] | 0.05 | [.0296,.0713] |
| **Blood Cholesterol N = 7,380** | | | | | | | | | | |
| *Yes* | 89.3 | 88.48,90.21] | 30.14 | 28.19,32.18] | 10.05 | [8.84,11.4] | 39.2 | [37.43,41.16 | .25 | [.1568,.398] |
| *No* | 9.7 | [8.913,10.5] | 3.4 | [2.89,3.929] | 1.4 | [1.107,1.739] | 3.0 | [37.43,41.16 | .08 | [.0442,.15] |
| **Aspirin N = 41,718** | | | | | | | | | | |
| *Yes* | 49.8 | [48.94,50.74] | 15.48 | [14.65,16.35] | 3.5 | [3.154,3.801] | 23.9 | 23.05,24.79] | 0.14 | [.1071,.1882] |
| *No* | 44.6 | [[47.79,49.52] | 14.83 | [14.06,15.63] | 3.9 | [3.603,4.409] | 21.9 | 21.16,22.75] | 0.39 | [.3243,.4888] |
| **Flu Vaccine N = 41,388** | | | | | | | | | | |
| *Past year* | 70.6 | [69.53,71.57] | 22.4 | [21.2,23.59] | 4.9 | 4.508,5.426] | 33.9 | 32.84,35.07] | 0.18 | [.1423,.2294] |
| *Within 2 years* | 6.07 | [5.742,6.415] | 1.8 | [1.647,1.983] | 0.58 | .4859,.6823] | 2.6 | [2.385,2.801] | 0.05 | [.0293,.0771] |
| *Within 3 years* | 6.7 | [1.454,1.764] | 1.9 | [.3595,.5166] | 0.5 | [.1297,.2058] | 2.8 | [.5128,.7006] | 0.3 | [.005,.0194] |
| ***Never*** | 15.2 | 14.53,15.95] | 4.2 | 3.869,4.579] | 1.4 | [1.22,1.61] | 6.6 | [6.1,7.097] | 0.2 | [.1899,.3171] |
| **Mammogram N = 22,778** | | | | | | | | | | |
| *Past year* | 55.9 | [54.77,56.97] | 18.3 | [17.32,19.29] | 3.9 | [3.565,4.318] | 27.4 | [26.21,28.59] | 0.09 | [.056,.1507] |
| *Within 2 years* | 14.8 | [14.15,15.41] | 4.7 | [4.338,5.09] | 1.4 | [1.189,1.556] | 6.3 | [5.918,6.827] | 0.06 | [.0421,.0935] |
| *Within 3 years* | 23.2 | [5.612,6.431] | 7.1 | [1.625,2.193] | 2.6 | [.5917,.8293] | 8.3 | [2.083,2.571] | 0.2 | [.0227,.0679] |
| ***Never*** | 4.9 | [4.436,5.312] | 1.2 | [1.029,1.424] | 0.9 | [.7306,1.058] | 1.5 | [1.264,1.777] | 0.16 | [.1127,.2196] |
| **Breast Exam N = 22,582** | | | | | | | | | | |
| *Past year* | 56.3 | [55.16,57.48] | 18.2 | 17.1,19.29] | 4.2 | 3.81,4.537] | 27.0 | [25.85,28.21] | 0.14 | [[.0972,.2026] |
| *Within 2 years* | 13.7 | [13.13,14.31] | 4.4 | [4.042,4.734] | 1.2 | [1.079,1.448] | 6.1 | [5.681,6.552] | 0.06 | [.0414,.098] |
| *Within 3 years* | 10.9 | [5.485,6.354] | 8.0 | [1.73,2.211] | 2.8 | .5015,.7172] | 9.6 | [2.041,2.522] | 0.2 | [.027,.0743] |
| ***Never*** | 2.7 | [2.43,3.00 | 0.8 | [.6175,.9198 | 0.5 | [.4222,.6575] | 0.8 | [.6528,.977]] | 0.08 | [.0559,.1211] |
| **PSA N = 16,508** | | | | | | | | | | |
| *Past year* | 6.4 | 63.34,65.62] | 19.2 | [[18.01,20.53] | 2.8 | 2.418,3.163] | 34.8 | [33.48,36.13] | 0.12 | [.0741,.21] |
| *Within 2 years* | 11.7 | [11.14,12.43] | 3.8 | [3.413,4.201] | 0.6 | [.5162,.7689] | 5.8 | [5.304,6.32] | 0.04 | [.0214,.0626] |
| *Within 3 years* | 12.8 | [4.192,5.006] | 3.9 | [1.107,1.568] | 0.7 | [.2124,.3789] | 6.01 | [1.914,2.526] | 0.03 | [.0048,.0541] |
| ***Never*** | 9.4 | [8.746,10.09] | 2.6 | [2.327,2.974] | 1,12 | [.9396,1.348] | 3.5 | [3.14,3.934] | 0.3 | [.1817,.3857] |
| **Colonoscopy N = 36,250** | | | | | | | | | | |
| *Past year* | 15.2 | [14.65,15.85] | 4.8 | [4.493,5.132] | 1.1 | [.9719,1.26] | 7.6 | [7.201,8.054] | 0.03 | [.0164,.0552] |
| *Within 2 years* | 13.7 | [13.15,14.26] | 4.1 | [3.862,4.46] | 0.8 | [.7359,.9599] | 7.08 | [6.66,7.542] | 0.04 | [.0187,.0698] |
| *Within 3 years* | 49.3 | [12.13,13] | 16.1 | [3.573,4.149] | 2.6 | [.65,.8591] | 24.5 | [6.148,6.91] | 0.11 | [.0097,.039] |
| *Never* | 20.4 | [19.51,21.36] | 6.2 | [5.69,6.717] | 2.4 | [2.126,2.76] | 7.8 | [7.293,8.34] | 0.3 | [.2291,.3782] |
| **Sigmoidoscopy N = 29,647** | | | | | | | | | | |
| ***Past year*** | 1.7 | [1.532,1.925] | 0.6 | [.5204,.7376] | .245 | [.1929,.32] | 0.7 | [.5628,.8308] | 0.07 | [.002,.0223] |
| ***Within 2 years*** | 1.2 | [1.011,1.337] | 0.4 | [.3446,.5333] | 0.14 | [.1045,.2021] | 0.5 | [.4049,.599] | 0.002 | [6.9e-04,.0077] |
| ***Within 3 years*** | 12.4 | [.8459,1.159] | 4.6 | [.3214,.4876] | 0.36 | [.0684,.1663] | 6.4 | [.3624,.5807] | 0.013 | [7.6e-04,.0391] |
| ***Never*** | 83.2 | [82.32,84.06] | 26.8 | [25.44,28.15] | 6.5 | [5.88,7.133] | 37.9 | [36.75,39.16] | 0.49 | [.4015,.6085] |

CCI Index

**Table 11: Modified Comorbidity Index**

| |
|---|
| gen gcci2 = 6 if (ccgrp16 == 1\| ccgrp17 == 1) |
| replace gcci2 = 3 if ccgrp15 == 1 & gcci2 == . |
| replace gcci2 = 2 if (ccgrp12 == 1 \|ccgrp13 == 1) & gcci2 == . |
| replace gcci2 = 1 if (ccgrp1 == 1\| ccgrp2 == 1\| ccgrp3 == 1\| ccgrp4 == 1\| |
| ccgrp5 == 1\| ccgrp6 == 1\| ccgrp7 == 1\| ccgrp8 == 1\| ccgrp9 == 1 \|ccgrp10 == 1\| |
| ccgrp11 == 1\| ccgrp14 == 1) & gcci2 ==. |
| replace gcci2 = 0 if gcci2 == . |

Table 12: CCI Descriptives

Descriptive Characteristics of MEPS pooled sample (2006-2016) by Insurance Type and CCI Index for Adults 65 years and older, with 95% CI.

| | Medicare only | 95% CI | Medicare Managed care | 95% CI | Medicare only + Public | 95% CI | Medicare only + Private | 95% CI | Uninsured | 95% CI |
|---|---|---|---|---|---|---|---|---|---|---|
| **Chronic condition n = 42,641,072** | | | | | | | | | | |
| **None** | 21.5% | 20.81,22.29] | 6.2% | [5.752,6.607] | 1.2% | 1.056,1.325] | 10.5 | [9.946,11] | 0.26% | [.2078,.3329] |
| **One chronic condition** | 76.3% | [75.56,77.13] | 23.8% | [22.66,24.97] | 6.3% | 5.746,6.901] | 34.8% | [33.81,35.91] | 0.29% | [.2326,.3533 |
| **≥2 chronic condition** | 0.6% | [.4679,.724] | 0.03% | [.0997,.2291] | 0.03%% | [.0134,.0596] | 0.3% | [.2315,.4517] | 0.0% | 0.0 |

**Chronic Conditions (CCI) by RACE for MEPS sample 65 years and older- Pre and Post ACA**

| CCI | % | Std.Err. | [95%Conf. | Interval] |
|---|---|---|---|---|
| BLACK | | | | |
| One chronic condition | | | | |
| POST | 81.7 | 0.011 | 0.793 | 83.8 |
| PRE | 58.7 | 0.030 | 0.526 | 64.5 |
| 2> chronic condition | | | | |
| POST | 0.40 | 0.002 | 0.20 | 1.1 |
| PRE | | (no | observations) | |
| HISPANIC | | | | |
| One chronic condition | | | | |
| POST | 73.7 | 0.012 | 71.3 | 76.0 |
| PRE | 68.9 | 0.017 | 65.6 | 72.1 |
| 2> chronic condition | | | | |
| POST | 0.20 | 0.001 | 0.10 | 0.60 |
| PRE | 0.20 | 0.002 | 0.00 | 1.4 |
| WHITE | | | | |
| One chronic condition | | | | |
| POST | 80.2 | 0.006 | 78.9 | 81.3 |
| PRE | 77.2 | 0.012 | 74.8 | 79.5 |
| 2> chronic condition | | | | |
| POST | 0.70 | 0.001 | 0.50 | 0.10 |
| PRE | 0.10 | 0.001 | 0.00 | 0.50 |
| ASIAN | | | | |
| One chronic condition | | | | |
| POST | 62.4 | 0.018 | 58.9 | 65.9 |
| PRE | 74.3 | 0.006 | 73.0 | 75.5 |
| 2> chronic condition | | | | |
| POST | 0.10 | 0.001 | 0.000 | 0.40 |
| PRE | 0.40 | 0.001 | 0.003 | 0.70 |

Table 13 - Female 65+ Cancer Screening Preventive services

| Subpopulation N = 30,803,599.3 | Mammogram | | Mammogram | P>t | Pap Smear | P>t | Pap Smear | P>t | Breast Exam | P>t | Breast Exam | P>t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **OLS regression model with Interaction** | R-squared = 0.1697 N = 8,941,042.47 | | R-squared = 0.1312 N = 7,803,640.69 | | R-squared = 0.0903 N = 8,77***9,623.31 | | R-squared = 0.0677 N = 8,779,623.31 | | R-squared = 0.1384 N = 7,609,725.45 | | R-squared = 0.0894 N = 7,724,017.27 | |
| | **Female Age 65-74** | | **Female Age 75-90** | | **Female Age 65-74** | | **Female Age 75-90** | | **Female Age 65-74** | | **Female Age 75-90** | |
| | **Coef.** | **P>t** | **Coef.** | **P>t** | **Coef.** | **P>t** | **Coef.** | **P>t** | **Coef.** | **P>t** | **Coef.** | **P>t** |
| **RACE/ETHNICITY** | | | | | | | | | | | | |
| *Hispanic* | -0.291 | 0.109 | 0.378 | 0.312 | -.7095 | 0.001** | 0.249 | 0.574 | -0.221 | 0.293 | 0.048 | 0.927 |
| *White* | -0.064 | 0.701 | 0.528 | 0.163 | -.2970 | 0.161 | 0.512 | 0.242 | -0.084 | 0.659 | 0.110 | 0.832 |
| *Black* | -0.235 | 0.169 | 0.593 | 0.134 | -.6555 | 0.001** | 0.399 | 0.379 | -0.327 | 0.095 | 0.170 | 0.748 |
| *Asian* | 0.017 | 0.922 | 0.810 | 0.034* | -.1576 | 0.457 | 0.754 | 0.091 | 0.036 | 0.858 | 0.363 | 0.488 |
| **MARITAL STATUS** | | | | | | | | | | | | |
| *Married* | -0.126 | 0.498 | 0.118 | 0.477 | -0.100 | 0.622 | -0.105 | 0.635 | -0.164 | 0.322 | 0.095 | 0.651 |
| *Divorced* | 0.022 | 0.908 | 0.585 | 0.001** | 0.143 | 0.489 | 0.228 | 0.292 | 0.010 | 0.951 | 0.414 | 0.049* |
| *Widowed* | 0.028 | 0.882 | 0.396 | 0.047* | 0.148 | 0.453 | 0.164 | 0.479 | 0.045 | 0.787 | 0.294 | 0.151 |
| *Separated* | -0.156 | 0.507 | -0.340 | 0.299 | -0.303 | 0.244 | -0.800 | 0.068 | -0.224 | 0.258 | -0.482 | 0.122 |
| *Never* | 0.203 | 0.347 | 0.672 | 0.002 | 0.240 | 0.275 | 0.532 | 0.035* | 0.059 | 0.760 | 0.570 | 0.024* |
| **EDUCATION** | | | | | | | | | | | | |
| *Less than High school* | 0.392 | 0.000*** | 0.408 | 0.005** | 0.566 | 0.000*** | 0.521 | 0.000*** | 0.371 | 0.000*** | 0.392 | 0.000*** |
| *High school degree* | 0.131 | 0.045* | 0.176 | 0.187 | 0.400 | 0.000*** | 0.429 | 0.002** | 0.167 | 0.018** | 0.248 | 0.012* |
| *Some College* | 0.134 | 0.065 | 0.190 | 0.142 | 0.246 | 0.007** | 0.394 | 0.002** | 0.119 | 0.087 | 0.159 | 0.097 |
| *College degree or higher* | 0.064 | 0.400 | -0.127 | 0.367 | 0.066 | 0.554 | 0.186 | 0.197 | 0.061 | 0.409 | -0.047 | 0.648 |
| **REGION** | | | | | | | | | | | | |
| *Northeast* | -0.137 | 0.036* | -0.053 | 0.583 | -0.279 | 0.007** | -0.076 | 0.410 | -0.244 | 0.000*** | -0.263 | 0.009** |
| *Midwest* | -0.067 | 0.222 | -0.256 | 0.005** | -0.044 | 0.646 | -0.008 | 0.930 | -0.099 | 0.089 | -0.344 | 0.000*** |
| *South* | -0.068 | 0.184 | -0.249 | 0.005** | -0.186 | 0.022* | -0.255 | 0.005** | -0.091 | 0.087 | -0.312 | 0.001** |
| *West* | | | | | | | | | | | | |
| **POVERTY LINE** | | | | | | | | | | | | |
| *Poor* | 0.220 | 0.001** | 0.252 | 0.005** | 0.106 | 0.202 | 0.243 | 0.003** | 0.227 | 0.002** | 0.299 | 0.000*** |
| *Nr. poor* | 0.220 | 0.012* | 0.243 | 0.012* | 0.090 | 0.384 | 0.360 | 0.000*** | 0.188 | 0.042* | 0.234 | 0.010** |
| *Low inc* | 0.259 | 0.000*** | 0.210 | 0.006** | 0.164 | 0.027* | 0.288 | 0.000*** | 0.191 | 0.000*** | 0.230 | 0.002** |
| *Mid inc* | 0.148 | 0.003** | 0.019 | 0.776 | 0.146 | 0.012** | 0.132 | 0.067 | 0.171 | 0.001** | 0.131 | 0.036* |
| **ALL OFFICE VISITS** | | | | | | | | | | | | |
| 2-3 | -0.384 | 0.000*** | -0.109 | 0.447 | -0.062 | 0.573 | 0.117 | 0.312 | -0.337 | 0.000*** | 0.055 | 0.709 |
| 4-6 | -0.555 | 0.000*** | -0.407 | 0.007** | -0.138 | 0.236 | -0.007 | 0.955 | -0.375 | 0.000*** | -0.268 | 0.061 |
| 7-10 | -0.637 | 0.000*** | -0.627 | 0.000*** | -0.344 | 0.005** | -0.048 | 0.705 | -0.532 | 0.000*** | -0.341 | 0.018* |
| 11-14 | -0.632 | 0.000*** | -0.676 | 0.000*** | -0.350 | 0.037* | -0.095 | 0.560 | -0.618 | 0.000*** | -0.260 | 0.170 |
| 15 OR MORE | -0.740 | 0.000*** | -0.964 | 0.000*** | -0.417 | 0.004** | -0.357 | 0.019 | -0.664 | 0.000*** | -0.750 | 0.000*** |
| **OFFICE VISITS X OOP** | | | | | | | | | | | | |
| 2-3#1 | 0.087 | 0.557 | -0.048 | 0.831 | -0.016 | 0.922 | 0.045 | 0.808 | 0.003 | 0.985 | -0.133 | 0.552 |
| 4-6#1 | 0.192 | 0.141 | 0.275 | 0.241 | -0.155 | 0.339 | 0.215 | 0.283 | -0.038 | 0.769 | 0.320 | 0.148 |
| 7-10#1 | 0.249 | 0.088 | 0.243 | 0.255 | 0.124 | 0.486 | 0.225 | 0.236 | 0.084 | 0.545 | 0.170 | 0.399 |
| 11-14#1 | 0.194 | 0.237 | -0.032 | 0.891 | 0.146 | 0.477 | 0.195 | 0.441 | 0.221 | 0.200 | -0.065 | 0.794 |
| 15 OR MORE#1 | 0.173 | 0.213 | 0.200 | 0.375 | 0.145 | 0.416 | 0.233 | 0.282 | 0.187 | 0.206 | 0.264 | 0.245 |
| **INSURANCE COVERAGE** | | | | | | | | | | | | |
| *Medicare +Medicaid* | -0.049 | 0.581 | 0.159 | 0.234 | -0.019 | 0.822 | 0.110 | 0.345 | -0.039 | 0.644 | 0.112 | 0.406 |
| *Medicare only* | -0.049 | 0.752 | 0.211 | 0.660 | -0.324 | 0.164 | -0.137 | 0.827 | -0.092 | 0.580 | 0.027 | 0.954 |
| *Medicare Advantage* | -0.176 | 0.000*** | -0.227 | 0.000*** | -0.090 | 0.117 | -0.105 | 0.071 | -0.136 | 0.001** | -0.145 | 0.014 |
| *Medicare +private* | -0.009 | 0.892 | -0.116 | 0.156 | -0.014 | 0.852 | -0.078 | 0.318 | -0.033 | 0.610 | 0.010 | 0.905 |
| *Uninsured* | 0.674 | 0.013* | 1.001 | 0.052 | -0.146 | 0.637 | 0.430 | 0.501 | 0.404 | 0.136 | 0.572 | 0.281 |
| ***TOTAL HEALTH EXP*** | -0.696 | 0.000*** | -0.524 | 0.006** | -0.591 | 0.000*** | -0.253 | 0.156 | -0.723 | 0.000*** | -0.593 | 0.002** |
| **SOURCE OF PAYMENT:** | | | | | | | | | | | | |
| *Out of Pocket* | -0.217 | 0.079 | -0.177 | 0.348 | -0.000 | 0.837 | 0.000 | 0.156 | -0.000 | 0.856 | 0.000 | 0.907 |
| *Medicare expenses* | -0.189 | 0.001** | -0.239 | 0.032 | -0.135 | 0.314 | -0.202 | 0.246 | -0.154 | 0.200 | -0.176 | 0.342 |
| *Medicaid expense* | -0.037 | 0.676 | -0.059 | 0.605 | -0.028 | 0.667 | -0.115 | 0.250 | -0.165 | 0.003** | -0.124 | 0.253 |
| *Private expense* | -0.275 | 0.000*** | -0.144 | 0.082 | -0.055 | 0.556 | -0.080 | 0.491 | -0.112 | 0.181 | -0.115 | 0.369 |
| *All other expense* | -0.253 | 0.000*** | -0.116 | 0.112 | -0.236 | 0.003** | -0.002 | 0.983 | -0.229 | 0.000*** | -0.226 | 0.007** |
| | | | | | | | | | | | | |
| *Perceived Health Status* | 0.138 | 0.000*** | 0.133 | 0.000*** | 0.156 | 0.000*** | 0.070 | 0.004** | 0.125 | 0.000*** | 0.100 | 0.000*** |
| *Usual Source of Care Provider* | 0.783 | 0.000*** | 0.553 | 0.000*** | 0.430 | 0.000*** | 0.244 | 0.016* | 0.624 | 0.000*** | 0.465 | 0.000*** |
| **Chronic Conditions** | | | | | | | | | | | | |
| *One chronic condition* | -0.063 | 0.163 | -0.151 | 0.082 | 0.091 | 0.110 | 0.058 | 0.449 | 0.005 | 0.905 | -0.042 | 0.566 |
| *Two or more* | 0.037 | 0.893 | -0.264 | 0.391 | 0.161 | 0.690 | 0.248 | 0.446 | 0.216 | 0.490 | -0.389 | 0.183 |
| **Year** | | | | | | | | | | | | |
| 2007 | -0.052 | 0.371 | 0.112 | 0.134 | -0.016 | 0.832 | -0.031 | 0.699 | -0.002 | 0.980 | 0.114 | 0.146 |
| 2008 | -0.062 | 0.377 | -0.039 | 0.700 | 0.011 | 0.902 | 0.021 | 0.836 | 0.034 | 0.656 | 0.000 | 0.999 |
| 2009 | -0.107 | 0.109 | 0.094 | 0.330 | 0.005 | 0.956 | 0.096 | 0.271 | -0.036 | 0.598 | 0.092 | 0.312 |
| 2010 | -0.096 | 0.129 | 0.018 | 0.850 | 0.159 | 0.071 | 0.150 | 0.123 | 0.012 | 0.871 | 0.018 | 0.832 |
| 2011 | -0.132 | 0.047* | 0.097 | 0.330 | 0.161 | 0.051 | 0.260 | 0.012** | -0.016 | 0.810 | 0.216 | 0.025* |
| 2012 | -0.088 | 0.302 | 0.442 | 0.001** | 0.307 | 0.006** | 0.614 | 0.000*** | 0.112 | 0.209 | 0.483 | 0.001** |
| 2014 | -0.015 | 0.844 | 0.382 | 0.000*** | 0.507 | 0.000*** | 0.669 | 0.000*** | 0.182 | 0.029* | 0.403 | 0.000*** |
| 2016 | -0.049 | 0.525 | 0.613 | 0.000*** | 0.619 | 0.000*** | 0.807 | 0.000*** | 0.223 | 0.006** | 0.651 | 0.000*** |
| **_cons** | **2.285** | **0.000*** ** | **1.461** | **0.043*** | **2.986** | **0.000*** ** | **2.259** | **0.008** ** | **2.367** | **0.000*** ** | **1.958** | **0.008** ** |

***<0.00, **<0.01, ***P<0.05**

Table 14 Number of Women 65 + Cancer Screening Preventive services

| | Colonoscopy | | Colonoscopy | | Sigmoidoscopy. | | Sigmoidoscopy. | |
|---|---|---|---|---|---|---|---|---|
| **OLS regression model with Interaction** | R-squared = 0.1495<br>N = **7,972,892.23**<br>**Obs = 8206** | | R-squared = 0.1789<br>N = **6,739,019.51**<br>**Obs = 6,575** | | R-squared =0.0247<br>N = **6,171,879.95**<br>**Obs = 6358** | | R-squared = **4,960**<br>N = 5,004,831.01<br>**Obs = 0.0255** | |
| | **Women 65 -74 years** | | **Women 75-90 years** | | **Women 65 -74 years** | | **Women 75-90 years** | |
| | **Coef** | | **Coef** | P>t | **Coef** | P>t | **Coef** | P>t |
| **RACE/ETHNICITY** | | | | | | | | |
| *Hispanic* | -0.323 | 0.285 | 1.150 | 0.002** | -0.197 | 0.180 | -0.161 | 0.391 |
| *White* | -0.226 | 0.435 | 1.098 | 0.002** | 0.071 | 0.593 | 0.014 | 0.938 |
| *Black* | -0.301 | 0.300 | 1.091 | 0.003** | 0.010 | 0.941 | 0.029 | 0.877 |
| *Asian* | -0.163 | 0.581 | 1.365 | 0.000*** | 0.074 | 0.580 | -0.028 | 0.882 |
| **MARITAL STATUS** | | | | | | | | |
| *Married* | 0.276 | 0.305 | 0.218 | 0.351 | 0.424 | 0.166 | 0.152 | 0.514 |
| *Divorced* | 0.335 | 0.221 | 0.515 | 0.024* | 0.369 | 0.221 | 0.138 | 0.543 |
| *Widowed* | 0.329 | 0.238 | 0.356 | 0.160 | 0.397 | 0.190 | 0.015 | 0.949 |
| *Separated* | 0.159 | 0.653 | 0.052 | 0.927 | 0.339 | 0.293 | 0.370 | 0.123 |
| *Never* | 0.546 | 0.065 | 0.323 | 0.307 | 0.470 | 0.129 | 0.058 | 0.807 |
| **EDUCATION** | | | | | | | | |
| *Less than High school* | 0.208 | 0.093 | -0.010 | 0.949 | 0.050 | 0.565 | 0.036 | 0.696 |
| *High school degree* | 0.241 | 0.030* | 0.005 | 0.974 | 0.132 | 0.103 | 0.047 | 0.591 |
| *Some College* | 0.105 | 0.333 | -0.136 | 0.354 | 0.035 | 0.667 | 0.019 | 0.836 |
| *College degree or higher* | 0.111 | 0.362 | -0.125 | 0.382 | 0.006 | 0.943 | -0.073 | 0.454 |
| **REGION** | | | | | | | | |
| *Northeast* | -0.158 | 0.120 | -0.140 | 0.182 | 0.040 | 0.567 | 0.141 | 0.031* |
| *Midwest* | -0.114 | 0.264 | -0.210 | 0.052 | 0.137 | 0.019* | 0.085 | 0.211 |
| *South* | -0.120 | 0.193 | -0.128 | 0.169 | 0.137 | 0.015* | 0.125 | 0.042 |
| *West* | | | | | | | | |
| **POVERTY LINE** | | | | | | | | |
| *Poor* | 0.173 | 0.068 | 0.246 | 0.018* | 0.058 | 0.317 | 0.039 | 0.545 |
| *Nr poor* | 0.203 | 0.109 | 0.204 | 0.041* | 0.107 | 0.150 | 0.129 | 0.057 |
| *Low inc* | 0.110 | 0.224 | 0.186 | 0.023* | 0.041 | 0.475 | 0.023 | 0.650 |
| *Mid inc* | 0.151 | 0.026* | 0.067 | 0.356 | 0.051 | 0.147 | 0.086 | 0.100 |
| **ALL OFFICE VISITS** | | | | | | | | |
| 2-3 | -0.360 | 0.016* | -0.020 | 0.883 | -0.014 | 0.860 | -0.009 | 0.912 |
| 4-6 | -0.442 | 0.004** | -0.194 | 0.177 | -0.043 | 0.656 | -0.127 | 0.149 |
| 7-10 | -0.858 | 0.000*** | -0.586 | 0.000*** | -0.109 | 0.410 | -0.055 | 0.515 |
| 11-14 | -1.083 | 0.000*** | -0.384 | 0.042* | -0.150 | 0.254 | -0.271 | 0.032* |
| 15 OR MORE | -1.131 | 0.000*** | -0.982 | 0.000*** | -0.259 | 0.076 | -0.361 | 0.019* |
| **OFFICE VISITS X OOP** | | | | | | | | |
| 2-3#1 | 0.171 | 0.417 | -0.189 | 0.391 | 0.067 | 0.515 | 0.147 | 0.388 |
| 4-6#1 | -0.022 | 0.907 | -0.000 | 0.999 | 0.114 | 0.297 | 0.157 | 0.340 |
| 7-10#1 | 0.181 | 0.402 | 0.115 | 0.618 | 0.222 | 0.096 | 0.159 | 0.318 |
| 11-14#1 | 0.333 | 0.141 | -0.237 | 0.337 | 0.083 | 0.586 | 0.304 | 0.143 |
| 15 OR MORE#1 | 0.341 | 0.126 | 0.068 | 0.756 | 0.229 | 0.123 | 0.373 | 0.060 |
| **INSURANCE COVERAGE** | | | | | | | | |
| *Medicare +Medicaid* | -0.049 | 0.709 | 0.088 | 0.543 | -0.017 | 0.270 | -0.017 | 0.799 |
| *Medicare eonly* | -0.267 | 0.271 | -0.113 | 0.850 | 0.232 | **0.001**** | 0.232 | 0.647 |
| *Medicare Advantage* | 0.008 | 0.895 | -0.074 | 0.265 | -0.077 | **0.026*** | -0.077 | 0.062 |
| *Medicare +private* | 0.065 | 0.393 | 0.098 | 0.290 | -0.049 | 0.072 | -0.049 | 0.432 |
| *Uninsured* | 0.378 | 0.335 | 0.479 | 0.428 | 0.458 | 0.904 | 0.458 | 0.347 |
| ***TOTAL HEALTH EXP*** | -0.413 | 0.004** | -0.505 | **0.006**** | -0.150 | **0.005**** | -0.158 | 0.070 |
| **SOURCE OF PAYMENT:** | | | | | | | | |
| *Out of Pocket* | -0.000 | 0.190 | 0.000 | 0.082 | -0.000 | 0.704 | 0.000 | 0.167 |
| *Medicare expenses* | -0.221 | 0.150 | -0.012 | 0.948 | -0.116 | 0.135 | -0.186 | 0.198 |
| *Medicaid expense* | -0.303 | **0.000**** | -0.290 | **0.010*** | -0.002 | 0.977 | 0.062 | 0.352 |
| *Private expense* | 0.036 | 0.782 | 0.136 | 0.281 | -0.014 | 0.859 | 0.021 | 0.772 |
| *All other expense* | -0.193 | **0.024*** | -0.254 | **0.016*** | -0.036 | 0.461 | 0.067 | 0.244 |
| | | | | | | | | |
| *Perceived Health Status* | 0.055 | **0.050** | 0.008 | 0.793 | -0.010 | 0.630 | 0.008 | 0.600 |
| *USC Provider* | 0.588 | **0.000**** | 0.700 | **0.000**** | 0.035 | 0.511 | 0.071 | 0.216 |
| **Chronic Conditions** | | | | | | | | |
| *None* | | | | | | | | |
| *One chronic condition* | -0.123 | 0.064 | -0.152 | **0.076** | -0.036 | 0.420 | -0.102 | 0.056 |
| *Two or more* | -0.851 | **0.006**** | -0.419 | 0.284 | -0.122 | 0.595 | -0.178 | 0.334 |
| **Year** | | | | | | | | |
| 2007 | 0.064 | 0.516 | -0.063 | 0.486 | | | | |
| 2008 | 0.053 | 0.588 | 0.131 | 0.180 | | | | |
| 2009 | 1.217 | **0.000**** | 1.474 | **0.000**** | | | | |
| 2010 | 1.215 | **0.000**** | 1.482 | **0.000**** | 0.060 | 0.207 | 0.117 | 0.064 |
| 2011 | 1.231 | **0.000**** | 1.447 | **0.000**** | 0.043 | 0.459 | 0.100 | 0.155 |
| 2012 | 1.320 | **0.000**** | 1.886 | **0.000**** | 0.111 | 0.128 | 0.210 | 0.004** |
| 2014 | 1.496 | **0.000**** | 1.646 | **0.000**** | 0.115 | 0.087 | 0.160 | **0.029*** |
| 2016 | 1.203 | **0.000**** | 1.615 | **0.000**** | 0.137 | **0.027*** | 0.218 | **0.001**** |
| **_cons** | 3.550 | **0.000**** | 2.144 | **0.006**** | 6.480 | **0.000**** | 6.219 | **0.000**** |

***<0.00, **<0.01, ***P<0.05**

Table 15: Number of Men 65+ Cancer Screening Preventive services

| | PSA | | PSA | | Colonoscopy | | Colonoscopy | | Sigmoidoscopy. | | Sigmoidoscopy. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **OLS regression model with Interaction** | R-squared = 0.2154<br>N = 7,455,578.88<br>Obs = 7,396 | | R-squared = 0.1224<br>N = **5,075,882.06**<br>**Obs = 4,967** | | R-squared = 0.1619<br>N = **7,010,506.23**<br>**Obs = 6,853** | | R-squared = 0.1557<br>N = **4,771,804.12**<br>**Obs = 4,587** | | R-squared = **0.0359**<br>N = **5,361,486.06**<br>**Obs = 5241** | | R-squared = **0.0319**<br>N = **3,436,393**<br>**Obs = 3309** | |
| | **Men 65 -74 years** | | **Men 75-90 years** | | **Men 65 -74 years** | | **Men 75-90 years** | | **Men 65 -74 years** | | **Men 75-90 years** | |
| | Coef | P>t | Coeff | P>t | Coef | P>t | Coef | P>t | Coef | P>t | Coef | P>t |
| **RACE/ETHNICITY** | | | | | | | | | | | | |
| *Hispanic* | -0.034 | 0.905 | 0.153 | 0.664 | -0.622 | 0.031* | -0.380 | 0.381 | -0.125 | 0.586 | -0.491 | **0.000*** ** |
| *White* | 0.041 | 0.887 | -0.076 | 0.825 | -0.580 | 0.026* | -0.577 | 0.189 | 0.140 | 0.534 | -0.294 | **0.000*** ** |
| *Black* | 0.056 | 0.853 | 0.295 | 0.427 | -0.719 | 0.007** | -0.658 | 0.146 | 0.037 | 0.868 | -0.428 | **0.000*** ** |
| *Asian* | -0.006 | 0.985 | 0.043 | 0.901 | -0.331 | 0.217 | -0.232 | 0.586 | 0.141 | 0.549 | -0.364 | **0.007**** |
| **MARITAL STATUS** | | | | | | | | | | | | |
| *Married* | -0.498 | 0.133 | -0.018 | 0.938 | -0.910 | 0.030* | 0.526 | 0.112 | 0.508 | 0.242 | 0.704 | 0.099 |
| *Divorced* | -0.392 | 0.252 | 0.209 | 0.379 | -0.591 | 0.169 | 0.719 | 0.029 | 0.401 | 0.360 | 0.607 | 0.160 |
| *Widowed* | -0.279 | 0.399 | 0.038 | 0.881 | -0.777 | 0.073 | 0.352 | 0.341 | 0.404 | 0.356 | 0.705 | 0.103 |
| *Separated* | -0.269 | 0.509 | -0.142 | 0.683 | -0.583 | 0.206 | 0.123 | 0.820 | 0.518 | 0.250 | 0.781 | 0.101 |
| *Never* | -0.107 | 0.757 | 0.222 | 0.479 | -0.545 | 0.220 | 0.538 | 0.165 | 0.431 | 0.316 | 0.580 | 0.189 |
| **EDUCATION** | | | | | | | | | | | | |
| *Less than High school* | 0.345 | **0.000*** ** | 0.208 | **0.040*** | 0.263 | 0.015* | 0.232 | 0.082 | 0.081 | 0.396 | 0.029 | 0.766 |
| *High school degree* | 0.212 | **0.006**** | 0.211 | **0.042*** | 0.098 | 0.335 | 0.321 | 0.009** | 0.067 | 0.395 | 0.010 | 0.927 |
| *Some College* | 0.088 | 0.254 | -0.001 | 0.989 | 0.158 | 0.115 | -0.110 | 0.415 | 0.028 | 0.730 | -0.077 | 0.439 |
| *College degree or higher* | 0.000 | 0.998 | 0.031 | 0.752 | 0.040 | 0.674 | 0.053 | 0.692 | 0.028 | 0.727 | -0.092 | 0.377 |
| **REGION** | | | | | | | | | | | | |
| *Northeast* | -0.158 | 0.045* | -0.126 | 0.118 | -0.188 | 0.081 | -0.001 | 0.996 | 0.169 | 0.022* | 0.048 | 0.574 |
| *Midwest* | -0.191 | 0.027* | -0.040 | 0.651 | -0.028 | 0.799 | -0.043 | 0.683 | 0.282 | 0.000*** | 0.138 | 0.123 |
| *South* | -0.184 | 0.009** | -0.205 | **0.007**** | -0.093 | 0.353 | 0.043 | 0.669 | 0.228 | 0.001** | 0.104 | 0.198 |
| *West* | | | | | | | | | | | | |
| **POVERTY LINE** | | | | | | | | | | | | |
| *Poor* | 0.265 | 0.003** | 0.258 | **0.009**** | 0.077 | 0.522 | 0.064 | 0.601 | 0.048 | 0.492 | 0.016 | 0.854 |
| *Nr. poor* | 0.207 | 0.115 | 0.010 | 0.930 | 0.168 | 0.261 | 0.448 | 0.002** | 0.058 | 0.583 | 0.114 | 0.260 |
| *Low inc* | 0.080 | 0.282 | 0.109 | 0.162 | -0.036 | 0.693 | 0.259 | 0.015* | 0.161 | 0.020* | 0.030 | 0.706 |
| *Mid inc* | 0.139 | **0.008**** | 0.096 | 0.104 | 0.017 | 0.825 | 0.089 | 0.238 | 0.124 | 0.014* | -0.021 | 0.780 |
| **ALL OFFICE VISITS** | | | | | | | | | | | | |
| 2-3 | -0.697 | **0.000*** ** | -0.179 | 0.224 | -0.351 | 0.006** | -0.350 | 0.050* | -0.006 | 0.937 | -0.063 | 0.554 |
| 4-6 | -0.715 | **0.000*** ** | -0.251 | 0.104 | -0.844 | 0.000*** | -0.422 | 0.030* | -0.193 | 0.057 | -0.096 | 0.458 |
| 7-10 | -0.780 | **0.000*** ** | -0.557 | **0.000***** | -0.697 | 0.000*** | -0.520 | 0.010* | -0.231 | 0.070 | -0.184 | 0.152 |
| 11-14 | -0.768 | **0.000*** ** | -0.409 | **0.020**** | -0.808 | 0.000*** | -1.026 | 0.000*** | -0.049 | 0.730 | -0.352 | 0.043* |
| 15 OR MORE | -0.921 | **0.000*** ** | -0.728 | **0.000***** | -0.980 | 0.000*** | -1.000 | 0.000*** | -0.135 | 0.270 | -0.399 | 0.035* |
| **OFFICE VISITS X OOP** | | | | | | | | | | | | |
| 2-3#1 | 0.302 | **0.006**** | 0.302 | 0.185 | -0.000 | 0.999 | 0.454 | 0.105 | -0.025 | 0.841 | -0.008 | 0.960 |
| 4-6#1 | 0.145 | **0.073** | 0.145 | 0.520 | 0.370 | 0.065 | 0.501 | 0.089 | - 0.163 | 0.219 | -0.022 | 0.899 |
| 7-10#1 | 0.370 | **0.031*** | 0.370 | 0.094 | -0.047 | 0.845 | 0.274 | 0.319 | -0.167 | 0.291 | 0.066 | 0.707 |
| 11-14#1 | 0.061 | 0.349 | 0.061 | 0.805 | 0.133 | 0.647 | 0.618 | 0.053 | -0.001 | 0.996 | 0.135 | 0.524 |
| 15 OR MORE#1 | 0.328 | 0.110 | 0.328 | 0.160 | 0.264 | 0.264 | 0.550 | 0.092 | -0.067 | 0.668 | -0.097 | 0.689 |
| **INSURANCE COVERAGE** | | | | | | | | | | | | |
| *Medicare +Medicaid* | 0.110 | 0.432 | 0.033 | 0.845 | 0.205 | 0.207 | 0.111 | 0.553 | 0.027 | 0.817 | -0.411 | **0.012*** |
| *Medicare only* | 0.271 | 0.083 | 0.456 | 0.388 | 0.181 | 0.338 | -0.235 | 0.726 | 0.001 | 0.994 | -0.612 | **0.000*** ** |
| *Medicare Advantage* | 0.001 | 0.982 | -0.026 | 0.673 | -0.059 | 0.406 | -0.145 | **0.034*** | -0.126 | 0.009** | -0.102 | 0.083 |
| *Medicare +private* | -0.081 | 0.219 | 0.021 | 0.784 | -0.204 | **0.019*** | -0.060 | 0.556 | -0.034 | 0.499 | 0.023 | 0.765 |
| *Uninsured* | 1.363 | **0.000*** ** | 1.705 | **0.042*** | 0.655 | **0.032*** | -0.275 | 0.756 | 0.215 | 0.124 | -0.224 | 0.214 |
| ***TOTAL HEALTH EXP*** | -1.246 | **0.000*** ** | -1.648 | **0.000***** | -0.920 | **0.000***** | -0.740 | 0.105 | -0.136 | 0.040* | -0.016 | 0.898 |
| **SOURCE OF PAYMENT:** | | | | | | | | | | | | |
| *Out of Pocket* | -0.269 | 0.054 | -0.204 | 0.270 | -0.000 | 0.585 | 0.000 | 0.089 | -0.000 | 0.244 | 0.000 | 0.126 |
| *Medicare expenses* | -0.151 | **0.012*** | -0.235 | **0.026**** | -0.063 | 0.705 | -0.401 | 0.319 | 0.005 | 0.956 | 0.057 | 0.611 |
| *Medicaid expense* | 0.254 | 0.089 | 0.247 | 0.128 | -0.149 | **0.049*** | -0.176 | 0.053 | -0.015 | 0.824 | 0.031 | 0.691 |
| *Private expense* | -0.088 | 0.196 | -0.082 | 0.350 | 0.003 | 0.984 | -0.033 | 0.092 | -0.016 | 0.902 | 0.350 | **0.022*** |
| *All other expense* | -0.254 | **0.000*** ** | -0.088 | 0.229 | -0.167 | 0.089 | -0.129 | 0.105 | -0.026 | 0.602 | -0.043 | 0.578 |
| | | | | | | | | | | | | |
| *Perceived Health Status* | 0.058 | **0.010**** | 0.107 | **0.000***** | 0.004 | 0.902 | 0.053 | 0.131 | -0.013 | 0.556 | 0.023 | 0.295 |
| *USC Provider* | 0.840 | **0.000*** ** | 0.606 | **0.000***** | 0.377 | **0.001***** | 0.547 | **0.001**** | 0.069 | 0.280 | 0.221 | **0.006**** |
| **Chronic Conditions** | | | | | | | | | | | | |
| *None* | | | | | | | | | | | | |
| *One chronic condition* | -0.092 | 0.117 | -0.162 | **0.034*** | -0.050 | **0.469** | -0.179 | 0.055 | -0.021 | 0.638 | -0.123 | 0.068 |
| *Two or more* | -0.150 | 0.374 | -0.162 | 0.522 | -0.398 | **0.250** | -1.109 | **0.001**** | -0.414 | 0.335 | -0.144 | 0.627 |
| **Year** | | | | | | | | | | | | |
| 2007 | -0.103 | 0.170 | -0.074 | 0.464 | 0.003 | **0.975** | 0.094 | 0.396 | | | | |
| 2008 | -0.104 | 0.261 | -0.044 | 0.667 | -0.005 | **0.960** | 0.115 | 0.394 | | | | |
| 2009 | -0.152 | 0.060 | -0.010 | 0.913 | 1.141 | **0.000***** | 1.091 | **0.000**** | | | | |
| 2010 | -0.177 | 0.053 | 0.052 | 0.593 | 1.095 | **0.000***** | 1.354 | **0.000**** | 0.043 | **0.532** | -0.001 | 0.995 |
| 2011 | -0.108 | 0.217 | 0.057 | 0.591 | 1.165 | **0.000***** | 1.230 | **0.000***** | 0.109 | **0.171** | 0.069 | 0.404 |
| 2012 | -0.160 | 0.125 | 0.183 | 0.200 | 1.578 | **0.000***** | 1.593 | **0.000***** | 0.153 | **0.186** | -0.016 | 0.908 |
| 2014 | -0.007 | 0.948 | 0.273 | **0.021**** | 1.419 | **0.000***** | 1.779 | **0.000***** | 0.282 | **0.001**** | 0.075 | 0.544 |
| 2016 | -0.038 | 0.702 | 0.221 | **0.054** | 1.303 | **0.000***** | 1.769 | **0.000***** | 0.219 | **0.017*** | 0.106 | 0.441 |
| **_cons** | **3.164** | **0.000*** ** | **2.734** | **0.000 *** ** | 5.181 | **0.000***** | 3.508 | **0.000***** | 5.821 | **0.000***** | 6.670 | **0.000***** |

***<0.00, **<0.01, ***P<0.05**

# Table 16: Adults 65 + and Influenza (Flu) Vaccine

| **Subpopulation**<br>**N =** 30,610,199.2 | **Flu Vaccine** | | **Flu Vaccine** | | **Flu Vaccine** | | **Flu Vaccine** | |
|---|---|---|---|---|---|---|---|---|
| **OLS regression model with Interaction** | R-squared = 0.0884<br>N = 9,105,109.48<br>Obs. = 9,559 | | R-squared = 0.1322<br>N = 7,909,284.18<br>Obs. = **7,869** | | R-squared = **0.0690**<br>N = 8,100,271.23<br>Obs. = 8025 | | R-squared = 0.0996<br>N = 5,473,095.91<br>Obs. = 5,388 | |
| | **Women 65-74 years old** | | **Men 65-74 years old** | | **Women 75-90 years old** | | **Men 75-90 years old** | |
| | **Coef.** | **P>t** | **Coef.** | **P>t** | **Coef.** | **P>t** | **Coef.** | **P>t** |
| **RACE/ETHNICITY** | | | | | | | | |
| *Hispanic* | -0.315 | 0.300 | -0.541 | 0.230 | -0.438 | 0.209 | 0.429 | 0.255 |
| *White* | -0.068 | 0.819 | -0.438 | 0.331 | -0.282 | 0.416 | 0.368 | 0.299 |
| *Black* | -0.131 | 0.677 | -0.570 | 0.236 | -0.438 | 0.222 | 0.114 | 0.759 |
| *Asian* | -0.359 | 0.239 | -0.626 | 0.170 | -0.671 | 0.061 | 0.173 | 0.637 |
| **MARITAL STATUS** | | | | | | | | |
| *Married* | 0.125 | 0.542 | -0.581 | 0.134 | -0.072 | 0.745 | 0.488 | 0.023* |
| *Divorced* | 0.134 | 0.531 | -0.544 | 0.185 | 0.006 | 0.978 | 0.316 | 0.136 |
| *Widowed* | 0.274 | 0.209 | -0.207 | 0.601 | 0.238 | 0.315 | 0.612 | 0.014* |
| *Separated* | 0.480 | 0.089 | -0.102 | 0.808 | -0.219 | 0.467 | 0.436 | 0.201 |
| *Never* | 0.310 | 0.222 | -0.339 | 0.412 | 0.333 | 0.251 | 0.442 | 0.082 |
| **EDUCATION** | | | | | | | | |
| *Less than High school* | 0.173 | 0.212 | 0.487 | 0.001** | 0.022 | 0.881 | 0.204 | 0.141 |
| *High school degree* | 0.088 | 0.486 | 0.315 | 0.002** | -0.031 | 0.832 | 0.162 | 0.207 |
| *Some College* | 0.087 | 0.479 | 0.366 | 0.002** | 0.087 | 0.574 | 0.040 | 0.746 |
| *College degree or higher* | 0.016 | 0.909 | 0.114 | 0.318 | -0.100 | 0.507 | 0.088 | 0.444 |
| **REGION** | | | | | | | | |
| *Northeast* | 0.226 | 0.030* | 0.122 | 0.304 | 0.067 | 0.488 | 0.120 | 0.235 |
| *Midwest* | 0.145 | 0.091 | 0.054 | 0.646 | 0.047 | 0.594 | 0.114 | 0.243 |
| *South* | 0.183 | 0.024* | 0.079 | 0.429 | 0.008 | 0.913 | 0.100 | 0.156 |
| *West* | | | | | | | | |
| **POVERTY LINE** | | | | | | | | |
| *Poor* | -0.030 | 0.721 | -0.027 | 0.808 | 0.227 | 0.010* | 0.223 | 0.039* |
| *Ncr_poor* | 0.134 | 0.244 | 0.247 | 0.101 | 0.288 | 0.003** | -0.070 | 0.603 |
| *Low inc* | -0.006 | 0.944 | -0.034 | 0.735 | 0.158 | 0.027* | -0.023 | 0.791 |
| *Mid inc* | 0.066 | 0.311 | 0.009 | 0.907 | 0.214 | 0.002** | 0.046 | 0.480 |
| **ALL OFFICE VISITS** | | | | | | | | |
| 2-3 | -0.362 | 0.006** | -0.451 | 0.001** | -0.106 | 0.421 | -0.215 | 0.175 |
| 4-6 | -0.572 | 0.000*** | -0.729 | 0.000*** | -0.093 | 0.515 | -0.335 | 0.029* |
| 7-10 | -0.636 | 0.000*** | -0.560 | 0.000*** | -0.150 | 0.299 | -0.422 | 0.010* |
| 11-14 | -0.576 | 0.002** | -0.726 | 0.000*** | -0.420 | 0.013 | -0.408 | 0.019* |
| 15 OR MORE | -0.723 | 0.000*** | -0.960 | 0.000*** | -0.267 | 0.125 | -0.594 | 0.000*** |
| **OFFICE VISITS X OOP** | | | | | | | | |
| 2-3#1 | 0.227 | 0.228 | 0.188 | 0.380 | 0.185 | 0.345 | 0.111 | 0.622 |
| 4-6#1 | 0.157 | 0.402 | 0.318 | 0.092 | 0.049 | 0.808 | -0.048 | 0.826 |
| 7-10#1 | 0.112 | 0.583 | -0.044 | 0.826 | -0.057 | 0.774 | 0.036 | 0.878 |
| 11-14#1 | -0.060 | 0.793 | 0.100 | 0.672 | 0.032 | 0.886 | -0.120 | 0.626 |
| 15 OR MORE#1 | 0.016 | 0.941 | 0.087 | 0.666 | -0.060 | 0.792 | 0.035 | 0.866 |
| **INSURANCE COVERAGE** | | | | | | | | |
| *Medicare +Medicaid* | -0.175 | 0.150 | -0.229 | 0.138 | -0.045 | 0.744 | 0.230 | 0.239 |
| *Medicare only* | -0.477 | 0.037* | -0.390 | 0.157 | -0.682 | 0.407 | 0.114 | 0.796 |
| *Medicare Advantage* | -0.141 | 0.023* | -0.212 | 0.005** | -0.031 | 0.592 | -0.137 | 0.039* |
| *Medicare +private* | 0.016 | 0.838 | 0.025 | 0.763 | -0.002 | 0.977 | -0.121 | 0.198 |
| *Uninsured* | 0.501 | 0.147 | 0.021 | 0.953 | -0.220 | 0.816 | 1.010 | 0.185 |
| ***TOTAL HEALTH EXP*** | -0.764 | 0.000*** | -0.864 | 0.000*** | -0.973 | 0.000*** | -1.137 | 0.000*** |
| **SOURCE OF PAYMENT:** | | | | | | | | |
| *Out of Pocket* | -0.117 | 0.463 | -0.048 | 0.756 | -0.132 | 0.438 | -0.021 | 0.915 |
| *Medicare expenses* | -0.111 | 0.131 | -0.112 | 0.164 | -0.299 | 0.008** | -0.158 | 0.186 |
| *Medicaid expense* | 0.015 | 0.906 | -0.050 | 0.752 | 0.159 | 0.249 | 0.106 | 0.597 |
| *Private expense* | -0.326 | 0.000*** | -0.273 | 0.002** | -0.090 | 0.296 | -0.157 | 0.087 |
| *All other expense* | -0.234 | 0.001** | -0.286 | 0.000*** | -0.000 | 0.996 | -0.240 | 0.000*** |
| | | | | | | | | |
| *Perceived Health Status* | -0.024 | 0.434 | -0.058 | 0.051 | -0.008 | 0.746 | -0.032 | 0.254 |
| *Usual Source of Care Provider* | 0.633 | 0.000*** | 0.689 | 0.000*** | 0.636 | 0.000*** | 0.761 | 0.000*** |
| **Chronic Conditions** | | | | | | | | |
| *None* | | | | | | | | |
| *One chronic condition* | -0.178 | 0.012* | -0.259 | 0.000*** | -0.241 | 0.004** | -0.145 | 0.057 |
| *Two or more* | -0.590 | 0.018* | 0.187 | 0.755 | -0.300 | 0.263 | -0.183 | 0.494 |
| **Year** | | | | | | | | |
| 2007 | -0.121 | 0.125 | -0.105 | 0.218 | 0.021 | 0.787 | 0.011 | 0.895 |
| 2008 | -0.260 | 0.015* | -0.031 | 0.776 | -0.092 | 0.345 | -0.055 | 0.592 |
| 2009 | -0.200 | 0.039* | 0.200 | 0.065 | -0.069 | 0.434 | 0.048 | 0.637 |
| 2010 | -0.202 | 0.047* | 0.053 | 0.629 | 0.026 | 0.786 | 0.059 | 0.560 |
| 2011 | -0.187 | 0.070 | 0.074 | 0.504 | 0.073 | 0.426 | 0.027 | 0.796 |
| 2012 | -0.457 | 0.000*** | -0.160 | 0.267 | -0.381 | 0.001** | 0.065 | 0.653 |
| 2014 | -0.403 | 0.000*** | -0.170 | 0.175 | -0.317 | 0.005** | -0.083 | 0.521 |
| 2016 | -0.581 | 0.000*** | -0.255 | 0.022* | -0.408 | 0.000*** | -0.101 | 0.378 |
| _cons | 3851 | 0.000*** | 4.707 | 0.000*** | 4.036 | 0.000*** | 1.999 | 0.005*** |

***<0.00, **<0.01, ***P<0.05**

# Table 17: Logistic Regression Medical Preventive Services

| SCREENING INTERVAL | chk_bpchek53 = **ADULTS 65 YEARS AND OLDER** n = 30,803,599.3 | | chk_cholck53 = **ADULTS 65 YEARS AND OLDER** n = 30,084,672.4 | | chk_flush53 = **ADULTS 65 YEARS AND OLDER** n =30,610,199.2 | | chk_dsch53 = **YES ADULTS 65 YEARS AND OLDER** n = 4,520,649.46 | | chk_asprin53 = **YES ADULTS 65 YEARS AND OLDER** **n = 30,790,265.6** | |
|---|---|---|---|---|---|---|---|---|---|---|
| PAST YEAR | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t |
| **v_allvisits** | 1.222 | 0.187 | 1.336 | 0.000*** | 1.197 | 0.000*** | 1.180 | 0.000*** | 1.059 | 0.000*** |
| **any_expenditure** | 7.015 | 0.000*** | 6.820 | 0.000*** | 2.505 | 0.000*** | 6.683 | 0.001** | 2.325 | 0.000*** |
| **exp_self** | 1.533 | 0.240 | 1.101 | 0.556 | 0.956 | 0.394 | 1.132 | 0.301 | 1.026 | 0.448 |
| **exp_medicare** | 4.384 | 0.002** | 1.834 | 0.003** | 1.263 | 0.000*** | 1.328 | 0.087 | 1.182 | 0.000*** |
| **exp_medicaid** | 0.144 | 0.031* | 0.661 | 0.351 | 0.824 | 0.101 | 0.860 | 0.502 | 1.008 | 0.909 |
| **exp_prv** | 0.945 | 0.924 | 1.835 | 0.006** | 1.387 | 0.000*** | 1.092 | 0.598 | 1.105 | 0.049* |
| **exp_alloth** | 1.379 | 0.542 | 1.953 | 0.002** | 1.401 | 0.000*** | 1.010 | 0.950 | 1.065 | 0.150 |
| **LESS HS** | 0.145 | 0.020* | 0.236 | 0.000*** | 0.699 | 0.003** | 0.738 | 0.307 | 1.141 | 0.097 |
| **HS** | 0.289 | 0.104 | 0.306 | 0.002** | 0.766 | 0.016* | 0.837 | 0.554 | 1.117 | 0.110 |
| **SOME COLLEGE** | 0.195 | 0.045* | 0.351 | 0.008** | 0.768 | 0.025* | 0.928 | 0.801 | 1.111 | 0.168 |
| **COLLEGE GRAD** | 0.438 | 0.346 | 0.609 | 0.261 | 0.907 | 0.399 | 0.680 | 0.242 | 0.968 | 0.629 |
| **MARRIED** | 7.877 | 0.008** | 2.626 | 0.015** | 0.818 | 0.315 | 3.024 | 0.010** | 1.193 | 0.272 |
| **WIDOW** | 8.679 | 0.004** | 2.842 | 0.011** | 0.978 | 0.914 | 2.380 | 0.050* | 1.289 | 0.111 |
| **DIVORCED** | 9.362 | 0.007** | 1.929 | 0.098 | 0.639 | 0.030* | 2.226 | 0.071 | 1.090 | 0.597 |
| **SEPARATED** | 8.406 | 0.046* | 4.956 | 0.013** | 0.553 | 0.014* | 1.327 | 0.573 | 0.848 | 0.432 |
| **NEVER** | 2.738 | 0.238 | 1.265 | 0.619 | 0.681 | 0.095 | 2.106 | 0.132 | 1.048 | 0.796 |
| **POOR** | 1.034 | 0.927 | 0.637 | 0.040* | 0.930 | 0.393 | 1.242 | 0.251 | 0.932 | 0.277 |
| **NR POOR** | 1.295 | 0.662 | 0.663 | 0.107 | 0.864 | 0.145 | 1.089 | 0.715 | 0.955 | 0.509 |
| **LW INC** | 1.187 | 0.708 | 0.552 | 0.007** | 1.038 | 0.627 | 1.032 | 0.858 | 0.955 | 0.337 |
| **MID INC** | 1.228 | 0.605 | 0.635 | 0.015* | 0.927 | 0.235 | 1.095 | 0.568 | 0.949 | 0.224 |
| **NORTHEAST** | 0.615 | 0.177 | 1.116 | 0.590 | 0.766 | 0.007** | 1.446 | 0.061 | 1.106 | 0.100 |
| **MIDWEST** | 2.645 | 0.047* | 0.831 | 0.370 | 0.874 | 0.145 | 0.853 | 0.438 | 1.238 | 0.000*** |
| **SOUTH** | 1.062 | 0.860 | 1.515 | 0.017* | 0.855 | 0.026 | 1.011 | 0.952 | 1.217 | 0.000*** |
| **medicaid** | 2.764 | 0.102 | 1.880 | 0.033* | 1.112 | 0.333 | 1.050 | 0.815 | 0.997 | 0.970 |
| **medicareonly** | 0.442 | 0.110 | 1.464 | 0.396 | 1.509 | 0.095 | 1.510 | 0.457 | 1.453 | 0.025* |
| **medicaremang** | 1.246 | 0.527 | 1.392 | 0.038* | 1.228 | 0.000*** | 0.963 | 0.795 | 1.111 | 0.008** |
| **private** | 0.932 | 0.856 | 1.482 | 0.068 | 1.011 | 0.867 | 1.306 | 0.117 | 1.015 | 0.742 |
| **uninsured** | 0.316 | 0.046* | 1.550 | 0.406 | 0.655 | 0.170 | 2.001 | 0.428 | 0.942 | 0.823 |
| **hs_rthlth53** | 1.263 | 0.215 | 1.235 | 0.001** | 1.039 | 0.099 | 1.031 | 0.646 | 1.024 | 0.121 |
| **usc_haveus42** | 0.234 | 0.000*** | 0.216 | 0.000*** | 0.470 | 0.000*** | 0.652 | 0.127 | 0.689 | 0.000*** |
| **gcci2** | 2.743 | 0.001** | 2.046 | 0.000*** | 1.367 | 0.000*** | 1.349 | 0.691 | 1.412 | 0.000*** |
| **2007** | 1.405 | 0.528 | 1.079 | 0.725 | 1.053 | 0.474 | 1.142 | 0.457 | 0.989 | 0.821 |
| **2008** | 0.578 | 0.282 | 0.888 | 0.596 | 1.170 | 0.089 | 1.418 | 0.079 | 1.058 | 0.432 |
| **2009** | 0.625 | 0.332 | 1.187 | 0.438 | 0.995 | 0.951 | 1.338 | 0.148 | 0.994 | 0.918 |
| **2010** | 0.724 | 0.527 | 1.434 | 0.103 | 1.027 | 0.772 | 2.064 | 0.007** | 0.998 | 0.974 |
| **2011** | 1.080 | 0.892 | 1.648 | 0.031* | 0.944 | 0.515 | 1.773 | 0.023* | 1.046 | 0.469 |
| **2012** | 2.302 | 0.225 | 1.406 | 0.326 | 1.379 | 0.003** | 1.664 | 0.020* | 1.108 | 0.186 |
| **2014** | 1.012 | 0.982 | 1.515 | 0.123 | 1.460 | 0.000*** | 0.074 | 0.171 | 1.096 | 0.217 |
| **2016** | 1.936 | 0.278 | 2.520 | 0.001** | 1.702 | 0.000*** | 1.180 | 0.000*** | 1.057 | 0.447 |
| **_cons** | 10.557 | 0.101 | 2.305 | 0.281 | 0.644 | 0.263 | 6.683 | 0.001** | 0.103 | 0.000*** |

***<0.05, **<0.01, ***<0.000**

# Table 18: Logistic Regression for Cancer screenings

| WITHIN TWO YRS | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **v_allvisits** | 1.275 | 0.002** | 1.060 | 0.308 | 1.164 | 0.000*** | 1.229 | 0.001** | 1.122 | 0.023* | 1.128 | 0.092 | 0.994 | 0.924 |
| **any_expenditure** | 1.493 | 0.218 | 0.656 | 0.390 | 2.363 | 0.000*** | 1.320 | 0.386 | 1.680 | 0.241 | 1.339 | 0.370 | 1.058 | 0.908 |
| **exp_self** | 1.174 | 0.521 | 0.814 | 0.288 | 1.044 | 0.691 | 0.947 | 0.764 | 0.855 | 0.297 | 1.242 | 0.429 | 0.916 | 0.669 |
| **exp_medicare** | 0.991 | 0.971 | 2.313 | 0.008** | 1.183 | 0.190 | 1.180 | 0.413 | 1.743 | 0.023* | 1.251 | 0.347 | 1.944 | 0.019* |
| **exp_medicaid** | 0.449 | 0.012* | 0.603 | 0.151 | 0.633 | 0.042* | 1.096 | 0.769 | 0.790 | 0.373 | 1.220 | 0.524 | 0.750 | 0.407 |
| **exp_prv** | 1.587 | 0.168 | 0.867 | 0.605 | 1.154 | 0.318 | 2.696 | 0.000*** | 1.010 | 0.966 | 0.974 | 0.941 | 1.467 | 0.196 |
| **exp_alloth** | 0.993 | 0.981 | 1.085 | 0.720 | 1.414 | 0.008** | 2.579 | 0.000*** | 1.431 | 0.050* | 1.612 | 0.102 | 1.581 | 0.068 |
| **LESS HS** | 0.878 | 0.783 | 0.623 | 0.285 | 0.653 | 0.039* | 0.434 | 0.060 | 0.431 | 0.078 | 0.155 | 0.011* | 0.324 | 0.035* |
| **HS** | 1.192 | 0.707 | 0.727 | 0.468 | 0.671 | 0.063 | 0.552 | 0.181 | 0.660 | 0.390 | 0.214 | 0.035* | 0.403 | 0.086 |
| **SOME COLLEGE** | 1.776 | 0.230 | 0.732 | 0.497 | 0.847 | 0.412 | 0.576 | 0.259 | 0.553 | 0.225 | 0.295 | 0.094 | 0.519 | 0.218 |
| **COLLEGE GRAD** | 1.389 | 0.603 | 0.758 | 0.534 | 1.233 | 0.361 | 0.701 | 0.539 | 1.007 | 0.990 | 0.266 | 0.128 | 1.013 | 0.982 |
| **MARRIED** | 0.409 | 0.148 | 0.523 | 0.344 | 1.820 | 0.229 | 0.944 | 0.917 | 0.863 | 0.810 | 0.572 | 0.358 | 0.182 | 0.014* |
| **WIDOW** | 0.394 | 0.138 | 0.270 | 0.059 | 1.320 | 0.589 | 0.828 | 0.743 | 0.415 | 0.144 | 0.495 | 0.262 | 0.124 | 0.003** |
| **DIVORCED** | 0.596 | 0.426 | 0.280 | 0.093 | 1.505 | 0.412 | 1.170 | 0.787 | 0.733 | 0.628 | 0.618 | 0.453 | 0.135 | 0.006** |
| **SEPARATED** | 0.747 | 0.723 | 0.508 | 0.542 | 2.772 | 0.091 | 1.072 | 0.918 | 0.587 | 0.617 | 0.847 | 0.841 | 0.099 | 0.026* |
| **NEVER** | 0.259 | 0.054 | 0.083 | 0.002** | 1.162 | 0.782 | 0.330 | 0.092 | 0.475 | 0.264 | 0.185 | 0.024** | 0.123 | 0.006** |
| **POOR** | 0.553 | 0.059 | 0.525 | 0.034* | 0.672 | 0.029** | 0.594 | 0.093 | 0.648 | 0.052 | 0.289 | 0.000*** | 0.636 | 0.166 |
| **NR POOR** | 0.666 | 0.258 | 0.738 | 0.410 | 0.682 | 0.111 | 0.997 | 0.995 | 0.626 | 0.103 | 0.699 | 0.444 | 1.085 | 0.831 |
| **LW INC** | 0.615 | 0.132 | 0.654 | 0.124 | 0.725 | 0.045** | 0.546 | 0.052 | 0.699 | 0.097 | 0.483 | 0.031* | 0.580 | 0.079 |
| **MID INC** | 0.560 | 0.041* | 1.073 | 0.802 | 0.844 | 0.193 | 0.656 | 0.118 | 1.144 | 0.497 | 0.515 | 0.042* | 0.949 | 0.849 |
| **NORTHEAST** | 1.002 | 0.995 | 0.635 | 0.080 | 0.928 | 0.626 | 0.835 | 0.499 | 0.599 | 0.037** | 1.571 | 0.176 | 0.900 | 0.737 |
| **MIDWEST** | 1.068 | 0.819 | 1.148 | 0.625 | 1.012 | 0.941 | 0.813 | 0.363 | 1.023 | 0.921 | 1.445 | 0.203 | 0.995 | 0.984 |
| **SOUTH** | 1.493 | 0.046 | 1.523 | 0.101 | 0.939 | 0.656 | 0.995 | 0.982 | 0.745 | 0.149 | 1.304 | 0.205 | 1.099 | 0.681 |
| **medicaid** | 1.073 | 0.805 | 0.856 | 0.676 | 0.840 | 0.357 | 0.895 | 0.691 | 0.802 | 0.425 | 1.183 | 0.551 | 0.901 | 0.785 |
| **medicareonly** | 1.822 | 0.285 | 0.952 | 0.973 | 0.554 | 0.139 | 2.227 | 0.193 | 0.237 | 0.008** | 2.309 | 0.117 | 0.714 | 0.830 |
| **medicaremang** | 1.572 | 0.043 | 1.296 | 0.171 | 1.050 | 0.665 | 1.742 | 0.014* | 1.273 | 0.115 | 1.612 | 0.049* | 0.996 | 0.980 |
| **private** | 1.679 | 0.118 | 1.663 | 0.036* | 1.020 | 0.889 | 1.109 | 0.663 | 1.279 | 0.252 | 1.699 | 0.126 | 1.129 | 0.650 |
| **uninsured** | 0.763 | 0.674 | 1.110 | 0.950 | 0.146 | 0.001** | 0.880 | 0.847 | 0.102 | 0.012* | 0.670 | 0.489 | 0.449 | 0.640 |
| **hs_rthlth53** | 0.778 | 0.014* | 1.016 | 0.833 | 0.949 | 0.230 | 1.091 | 0.403 | 1.018 | 0.791 | 1.100 | 0.430 | 1.122 | 0.144 |
| **usc_haveus42** | 0.466 | 0.005** | 0.476 | 0.026* | 0.440 | 0.000*** | 0.346 | 0.000*** | 0.425 | 0.001** | 0.465 | 0.002** | 0.527 | 0.034* |
| **gcci2** | 1.356 | 0.115 | 1.436 | 0.081 | 1.055 | 0.653 | 1.162 | 0.355 | 1.480 | 0.034* | 1.117 | 0.571 | 1.319 | 0.194 |
| **2007** | 1.186 | 0.521 | 1.685 | 0.105 | 1.244 | 0.263 | 1.533 | 0.058 | 0.801 | 0.270 | 0.810 | 0.490 | 1.022 | 0.941 |
| **2008** | 0.998 | 0.994 | 2.351 | 0.013* | 0.903 | 0.633 | 1.414 | 0.164 | 1.032 | 0.906 | 0.846 | 0.585 | 1.073 | 0.848 |
| **2009** | 1.517 | 0.147 | 1.447 | 0.228 | 1.459 | 0.044* | 2.480 | 0.001** | 1.130 | 0.622 | 1.405 | 0.295 | 0.873 | 0.673 |
| **2010** | 1.983 | 0.093 | 1.572 | 0.137 | 1.368 | 0.113 | 3.353 | 0.000*** | 1.512 | 0.130 | 1.638 | 0.178 | 1.538 | 0.186 |
| **2011** | 1.200 | 0.559 | 1.318 | 0.401 | 1.503 | 0.047 | 2.528 | 0.001** | 1.849 | 0.011* | 1.387 | 0.375 | 1.092 | 0.786 |
| **2012** | 2.621 | 0.036* | 0.923 | 0.832 | 1.563 | 0.055 | 3.538 | 0.000*** | 1.254 | 0.482 | 1.899 | 0.250 | 0.746 | 0.445 |
| **2014** | 1.372 | 0.453 | 1.172 | 0.648 | 1.176 | 0.423 | 2.271 | 0.009** | 1.837 | 0.043* | 1.201 | 0.683 | 1.074 | 0.850 |
| **2016** | 1.205 | 0.544 | 1.306 | 0.385 | 1.342 | 0.168 | 3.291 | 0.000*** | 1.637 | 0.091 | 1.474 | 0.277 | 1.215 | 0.573 |
| **_cons** | 6.782 | 0.106 | 7.221 | 0.296 | 0.930 | 0.918 | 1.378 | 0.762 | 10.891 | 0.036 | 12.210 | 0.045* | 33.984 | 0.074 |

| SCREENING INTERVAL | chk_papsmr53 = **WOMEN AGED 65-74** n = 8,779,623.31 | | chk_papsmr53 = **WOMEN AGED 75-90** n = 7,609,725.5 | | chk_psa53 = MEN 65 YEARS AND OLDER n = 12,541,410.1 | | chk_mamogr53 = **WOMEN AGED 65-74** n = 8,941,042.47 | | chk_mamogr53 = **WOMEN AGED 75-90** n = 7,803,640.7 | | chk_brstex53 = **WOMEN AGED 65-74 n = 8,879,720.07** | | chk_brstex53 = **WOMEN AGED 75-90 n = 7,724,017.3** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PAST YEAR | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t |
| **v_allvisits** | 1.307 | 0.000*** | 1.136 | 0.026* | 1.298 | 0.000*** | 1.311 | 0.000*** | 1.275 | 0.000*** | 1.223 | 0.005** | 1.120 | 0.053 |
| **any_expenditure** | 4.043 | 0.000*** | 1.021 | 0.968 | 6.700 | 0.000*** | 2.824 | 0.002** | 2.420 | 0.057 | 2.899 | 0.002** | 1.885 | 0.152 |
| **exp_self** | 1.237 | 0.372 | 0.945 | 0.744 | 0.981 | 0.844 | 1.023 | 0.891 | 0.963 | 0.775 | 1.265 | 0.361 | 1.034 | 0.854 |
| **exp_medicare** | 1.041 | 0.864 | 1.463 | 0.176 | 1.316 | 0.008** | 1.513 | 0.030* | 1.481 | 0.073 | 1.704 | 0.022* | 1.626 | 0.060 |
| **exp_medicaid** | 0.611 | 0.119 | 0.575 | 0.119 | 0.619 | 0.010** | 1.197 | 0.538 | 0.851 | 0.497 | 1.405 | 0.258 | 0.700 | 0.283 |
| **exp_prv** | 1.887 | 0.048* | 1.039 | 0.886 | 1.315 | 0.033* | 3.033 | 0.000*** | 1.297 | 0.187 | 1.395 | 0.348 | 1.829 | 0.022** |
| **exp_alloth** | 1.131 | 0.671 | 1.329 | 0.214 | 1.491 | 0.000*** | 2.967 | 0.000*** | 1.210 | 0.311 | 2.007 | 0.013* | 1.886 | 0.011* |
| **LESS HS** | 0.516 | 0.149 | 0.516 | 0.132 | 0.565 | 0.002** | 0.249 | 0.001** | 0.410 | 0.051 | 0.089 | 0.001** | 0.307 | 0.014* |
| **HS** | 0.821 | 0.665 | 0.661 | 0.352 | 0.626 | 0.010 | 0.437 | 0.050* | 0.676 | 0.407 | 0.137 | 0.006** | 0.417 | 0.073 |
| **SOME COLLEGE** | 1.378 | 0.494 | 0.704 | 0.424 | 0.891 | 0.494 | 0.446 | 0.078 | 0.656 | 0.367 | 0.189 | 0.022* | 0.565 | 0.237 |
| **COLLEGE GRAD** | 1.481 | 0.524 | 0.640 | 0.315 | 1.200 | 0.363 | 0.811 | 0.699 | 1.031 | 0.954 | 0.249 | 0.093 | 0.832 | 0.744 |
| **MARRIED** | 0.812 | 0.735 | 1.113 | 0.876 | 1.235 | 0.579 | 1.200 | 0.737 | 1.146 | 0.798 | 0.759 | 0.623 | 0.293 | 0.066 |
| **WIDOW** | 0.662 | 0.502 | 0.504 | 0.324 | 0.863 | 0.705 | 1.009 | 0.988 | 0.424 | 0.109 | 0.589 | 0.361 | 0.180 | 0.011* |
| **DIVORCED** | 1.023 | 0.972 | 0.488 | 0.335 | 0.859 | 0.683 | 1.248 | 0.694 | 0.632 | 0.406 | 0.688 | 0.527 | 0.204 | 0.024* |
| **SEPARATED** | 1.362 | 0.703 | 2.340 | 0.459 | 0.962 | 0.934 | 1.136 | 0.846 | 2.271 | 0.363 | 0.964 | 0.961 | 0.400 | 0.322 |
| **NEVER** | 0.645 | 0.121 | 0.240 | 0.070 | 0.663 | 0.316 | 0.471 | 0.228 | 0.404 | 0.124 | 0.279 | 0.074 | 0.167 | 0.015* |
| **POOR** | 0.697 | 0.290 | 0.434 | 0.002** | 0.561 | 0.000 | 0.569 | 0.056 | 0.564 | 0.004* | 0.340 | 0.001** | 0.496 | 0.019* |
| **NR POOR** | 0.581 | 0.073 | 0.529 | 0.063 | 0.704 | 0.061 | 0.952 | 0.896 | 0.673 | 0.106 | 0.857 | 0.735 | 0.944 | 0.871 |
| **LW INC** | 0.510 | 0.016* | 0.458 | 0.005** | 0.741 | 0.027 | 0.477 | 0.011* | 0.638 | 0.026* | 0.417 | 0.010* | 0.534 | 0.032* |
| **MID INC** | 1.255 | 0.432 | 0.844 | 0.533 | 0.775 | 0.019 | 0.644 | 0.089 | 1.091 | 0.638 | 0.486 | 0.025* | 0.723 | 0.204 |
| **NORTHEAST** | 0.909 | 0.730 | 0.746 | 0.225 | 1.206 | 0.163 | 1.162 | 0.553 | 0.680 | 0.105 | 1.821 | 0.048* | 1.144 | 0.646 |
| **MIDWEST** | 1.629 | 0.014* | 1.199 | 0.487 | 1.233 | 0.152 | 0.900 | 0.627 | 1.251 | 0.283 | 1.383 | 0.246 | 1.354 | 0.196 |
| **SOUTH** | 0.884 | 0.646 | 1.434 | 0.123 | 1.348 | 0.014 | 1.125 | 0.557 | 1.028 | 0.892 | 1.339 | 0.149 | 1.290 | 0.255 |
| **medicaid** | 2.264 | 0.124 | 1.013 | 0.970 | 0.827 | 0.255 | 0.915 | 0.737 | 0.721 | 0.204 | 1.022 | 0.936 | 0.907 | 0.787 |
| **medicareonly** | 1.815 | 0.007** | 1.385 | 0.794 | 0.624 | 0.203 | 2.190 | 0.152 | 0.523 | 0.535 | 1.628 | 0.306 | 0.803 | 0.825 |
| **medicaremang** | 1.407 | 0.326 | 1.343 | 0.096 | 1.024 | 0.812 | 2.094 | 0.001** | 1.304 | 0.040* | 1.884 | 0.007** | 1.024 | 0.876 |
| **private** | 1.147 | 0.837 | 1.192 | 0.425 | 1.046 | 0.683 | 1.135 | 0.595 | 1.103 | 0.591 | 1.475 | 0.273 | 0.928 | 0.750 |
| **uninsured** | 0.715 | 0.001** | 0.236 | 0.341 | 0.098 | 0.000 | 0.593 | 0.394 | 0.152 | 0.191 | 0.562 | 0.282 | 0.335 | 0.368 |
| **hs_rthlth53** | 0.463 | 0.005** | 0.970 | 0.691 | 0.877 | 0.001 | 0.880 | 0.214 | 0.917 | 0.180 | 0.912 | 0.430 | 1.006 | 0.935 |
| **usc_haveus42** | 1.269 | 0.213 | 0.517 | 0.035 | 0.330 | 0.000 | 0.284 | 0.000*** | 0.360 | 0.000*** | 0.403 | 0.000*** | 0.451 | 0.005** |
| **gcci2** | 1.191 | 0.504 | 1.409 | 0.084 | 1.275 | 0.011 | 1.280 | 0.130 | 1.651 | 0.006** | 1.159 | 0.437 | 1.679 | 0.012* |
| **2007** | 0.927 | 0.787 | 1.591 | 0.085 | 1.286 | 0.086 | 1.283 | 0.198 | 0.849 | 0.323 | 0.781 | 0.384 | 1.099 | 0.697 |
| **2008** | 1.352 | 0.299 | 1.943 | 0.037* | 1.127 | 0.468 | 1.053 | 0.823 | 1.207 | 0.452 | 0.681 | 0.202 | 1.224 | 0.547 |
| **2009** | 1.569 | 0.261 | 1.019 | 0.947 | 1.351 | 0.043 | 1.894 | 0.014* | 1.171 | 0.504 | 1.111 | 0.738 | 1.009 | 0.974 |
| **2010** | 0.945 | 0.852 | 1.062 | 0.835 | 1.375 | 0.058 | 2.280 | 0.000*** | 1.382 | 0.196 | 1.275 | 0.491 | 1.475 | 0.195 |
| **2011** | 1.514 | 0.378 | 0.977 | 0.939 | 1.311 | 0.105 | 2.235 | 0.002** | 1.681 | 0.020* | 1.109 | 0.774 | 1.224 | 0.482 |
| **2012** | 0.741 | 0.465 | 0.551 | 0.100 | 1.342 | 0.131 | 2.744 | 0.005** | 0.868 | 0.639 | 1.331 | 0.606 | 0.602 | 0.158 |
| **2014** | 0.606 | 0.100 | 0.816 | 0.528 | 1.036 | 0.830 | 1.894 | 0.032* | 1.339 | 0.262 | 0.992 | 0.984 | 1.045 | 0.892 |
| **2016** | 5.562 | 0.133 | 0.716 | 0.270 | 1.215 | 0.246 | 2.149 | 0.015* | 1.116 | 0.679 | 0.957 | 0.899 | 1.055 | 0.862 |
| **_cons** | 1.307 | 0.000*** | 7.510 | 0.244 | 1.462 | 0.544 | 3.421 | 0.220 | 7.414 | 0.170 | 40.857 | 0.002** | 28.921 | 0.024* |

| WITHIN TWO YRS | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| v_allvisits | 1.275 | 0.002** | 1.060 | 0.308 | 1.164 | 0.000*** | 1.229 | 0.001** | 1.122 | 0.023* | 1.128 | 0.092 | 0.994 | 0.924 |
| any_expenditure | 1.493 | 0.218 | 0.656 | 0.390 | 2.363 | 0.000*** | 1.320 | 0.386 | 1.680 | 0.241 | 1.339 | 0.370 | 1.058 | 0.908 |
| exp_self | 1.174 | 0.521 | 0.814 | 0.288 | 1.044 | 0.691 | 0.947 | 0.764 | 0.855 | 0.297 | 1.242 | 0.429 | 0.916 | 0.669 |
| exp_medicare | 0.991 | 0.971 | 2.313 | 0.008** | 1.183 | 0.190 | 1.180 | 0.413 | 1.743 | 0.023* | 1.251 | 0.347 | 1.944 | 0.019* |
| exp_medicaid | 0.449 | 0.012* | 0.603 | 0.151 | 0.633 | 0.042* | 1.096 | 0.769 | 0.790 | 0.373 | 1.220 | 0.524 | 0.750 | 0.407 |
| exp_prv | 1.587 | 0.168 | 0.867 | 0.605 | 1.154 | 0.318 | 2.696 | 0.000*** | 1.010 | 0.966 | 0.974 | 0.941 | 1.467 | 0.196 |
| exp_alloth | 0.993 | 0.981 | 1.085 | 0.720 | 1.414 | 0.008** | 2.579 | 0.000*** | 1.431 | 0.050* | 1.612 | 0.102 | 1.581 | 0.068 |
| LESS HS | 0.878 | 0.783 | 0.623 | 0.285 | 0.653 | 0.039* | 0.434 | 0.060 | 0.431 | 0.078 | 0.155 | 0.011* | 0.324 | 0.035* |
| HS | 1.192 | 0.707 | 0.727 | 0.468 | 0.671 | 0.063 | 0.552 | 0.181 | 0.660 | 0.390 | 0.214 | 0.035* | 0.403 | 0.086 |
| SOME COLLEGE | 1.776 | 0.230 | 0.732 | 0.497 | 0.847 | 0.412 | 0.576 | 0.259 | 0.553 | 0.225 | 0.295 | 0.094 | 0.519 | 0.218 |
| COLLEGE GRAD | 1.389 | 0.603 | 0.758 | 0.534 | 1.233 | 0.361 | 0.701 | 0.539 | 1.007 | 0.990 | 0.266 | 0.128 | 1.013 | 0.982 |
| MARRIED | 0.409 | 0.148 | 0.523 | 0.344 | 1.820 | 0.229 | 0.944 | 0.917 | 0.863 | 0.810 | 0.572 | 0.358 | 0.182 | 0.014* |
| WIDOW | 0.394 | 0.138 | 0.270 | 0.059 | 1.320 | 0.589 | 0.828 | 0.743 | 0.415 | 0.144 | 0.495 | 0.262 | 0.124 | 0.003** |
| DIVORCED | 0.596 | 0.426 | 0.280 | 0.093 | 1.505 | 0.412 | 1.170 | 0.787 | 0.733 | 0.628 | 0.618 | 0.453 | 0.135 | 0.006** |
| SEPARATED | 0.747 | 0.723 | 0.508 | 0.542 | 2.772 | 0.091 | 1.072 | 0.918 | 0.587 | 0.617 | 0.847 | 0.841 | 0.099 | 0.026* |
| NEVER | 0.259 | 0.054 | 0.083 | 0.002** | 1.162 | 0.782 | 0.330 | 0.092 | 0.475 | 0.264 | 0.185 | 0.024** | 0.123 | 0.006** |
| POOR | 0.553 | 0.059 | 0.525 | 0.034* | 0.672 | 0.029** | 0.594 | 0.093 | 0.648 | 0.052 | 0.289 | 0.000*** | 0.636 | 0.166 |
| NR POOR | 0.666 | 0.258 | 0.738 | 0.410 | 0.682 | 0.111 | 0.997 | 0.995 | 0.626 | 0.103 | 0.699 | 0.444 | 1.085 | 0.831 |
| LW INC | 0.615 | 0.132 | 0.654 | 0.124 | 0.725 | 0.045** | 0.546 | 0.052 | 0.699 | 0.097 | 0.483 | 0.031* | 0.580 | 0.079 |
| MID INC | 0.560 | 0.041* | 1.073 | 0.802 | 0.844 | 0.193 | 0.656 | 0.118 | 1.144 | 0.497 | 0.515 | 0.042* | 0.949 | 0.849 |
| NORTHEAST | 1.002 | 0.995 | 0.635 | 0.080 | 0.928 | 0.626 | 0.835 | 0.499 | 0.599 | 0.037** | 1.571 | 0.176 | 0.900 | 0.737 |
| MIDWEST | 1.068 | 0.819 | 1.148 | 0.625 | 1.012 | 0.941 | 0.813 | 0.363 | 1.023 | 0.921 | 1.445 | 0.203 | 0.995 | 0.984 |
| SOUTH | 1.493 | 0.046 | 1.523 | 0.101 | 0.939 | 0.656 | 0.995 | 0.982 | 0.745 | 0.149 | 1.304 | 0.205 | 1.099 | 0.681 |
| medicaid | 1.073 | 0.805 | 0.856 | 0.676 | 0.840 | 0.357 | 0.895 | 0.691 | 0.802 | 0.425 | 1.183 | 0.551 | 0.901 | 0.785 |
| medicareonly | 1.822 | 0.285 | 0.952 | 0.973 | 0.554 | 0.139 | 2.227 | 0.193 | 0.237 | 0.008** | 2.309 | 0.117 | 0.714 | 0.830 |
| medicaremang | 1.572 | 0.043 | 1.296 | 0.171 | 1.050 | 0.665 | 1.742 | 0.014* | 1.273 | 0.115 | 1.612 | 0.049* | 0.996 | 0.980 |
| private | 1.679 | 0.118 | 1.663 | 0.036* | 1.020 | 0.889 | 1.109 | 0.663 | 1.279 | 0.252 | 1.699 | 0.126 | 1.129 | 0.650 |
| uninsured | 0.763 | 0.674 | 1.110 | 0.950 | 0.146 | 0.001** | 0.880 | 0.847 | 0.102 | 0.012* | 0.670 | 0.489 | 0.449 | 0.640 |
| hs_rthlth53 | 0.778 | 0.014* | 1.016 | 0.833 | 0.949 | 0.230 | 1.091 | 0.403 | 1.018 | 0.791 | 1.100 | 0.430 | 1.122 | 0.144 |
| usc_haveus42 | 0.466 | 0.005** | 0.476 | 0.026* | 0.440 | 0.000*** | 0.346 | 0.000*** | 0.425 | 0.001** | 0.465 | 0.002** | 0.527 | 0.034* |
| gcci2 | 1.356 | 0.115 | 1.436 | 0.081 | 1.055 | 0.653 | 1.162 | 0.355 | 1.480 | 0.034* | 1.117 | 0.571 | 1.319 | 0.194 |
| 2007 | 1.186 | 0.521 | 1.685 | 0.105 | 1.244 | 0.263 | 1.533 | 0.058 | 0.801 | 0.270 | 0.810 | 0.490 | 1.022 | 0.941 |
| 2008 | 0.998 | 0.994 | 2.351 | 0.013* | 0.903 | 0.633 | 1.414 | 0.164 | 1.032 | 0.906 | 0.846 | 0.585 | 1.073 | 0.848 |
| 2009 | 1.517 | 0.147 | 1.447 | 0.228 | 1.459 | 0.044* | 2.480 | 0.001** | 1.130 | 0.622 | 1.405 | 0.295 | 0.873 | 0.673 |
| 2010 | 1.983 | 0.093 | 1.572 | 0.137 | 1.368 | 0.113 | 3.353 | 0.000*** | 1.512 | 0.130 | 1.638 | 0.178 | 1.538 | 0.186 |
| 2011 | 1.200 | 0.559 | 1.318 | 0.401 | 1.503 | 0.047 | 2.528 | 0.001** | 1.849 | 0.011* | 1.387 | 0.375 | 1.092 | 0.786 |
| 2012 | 2.621 | 0.036* | 0.923 | 0.832 | 1.563 | 0.055 | 3.538 | 0.000*** | 1.254 | 0.482 | 1.899 | 0.250 | 0.746 | 0.445 |
| 2014 | 1.372 | 0.453 | 1.172 | 0.648 | 1.176 | 0.423 | 2.271 | 0.009** | 1.837 | 0.043* | 1.201 | 0.683 | 1.074 | 0.850 |
| 2016 | 1.205 | 0.544 | 1.306 | 0.385 | 1.342 | 0.168 | 3.291 | 0.000*** | 1.637 | 0.091 | 1.474 | 0.277 | 1.215 | 0.573 |
| _cons | 6.782 | 0.106 | 7.221 | 0.296 | 0.930 | 0.918 | 1.378 | 0.762 | 10.891 | 0.036 | 12.210 | 0.045* | 33.984 | 0.074 |

| WITHIN THREE YRS | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| v_allvisits | 1.294 | 0.001** | 1.098 | 0.111 | 1.166 | 0.000*** | 1.116 | 0.097 | 1.090 | 0.125 | 1.073 | 0.406 | 1.031 | 0.657 |
| any_expenditure | 1.566 | 0.262 | 0.933 | 0.900 | 1.707 | 0.066 | 0.741 | 0.394 | 0.624 | 0.335 | 0.775 | 0.503 | 0.749 | 0.566 |
| exp_self | 0.932 | 0.772 | 0.750 | 0.151 | 0.907 | 0.529 | 0.876 | 0.525 | 0.887 | 0.458 | 0.868 | 0.614 | 1.024 | 0.913 |
| exp_medicare | 0.976 | 0.922 | 1.890 | 0.039* | 0.932 | 0.672 | 1.309 | 0.233 | 1.385 | 0.260 | 1.446 | 0.148 | 1.663 | 0.108 |
| exp_medicaid | 0.417 | 0.012* | 0.535 | 0.096 | 0.648 | 0.237 | 1.029 | 0.936 | 0.786 | 0.428 | 1.235 | 0.556 | 0.403 | 0.015* |
| exp_prv | 0.920 | 0.813 | 0.631 | 0.126 | 1.039 | 0.850 | 1.585 | 0.146 | 0.810 | 0.365 | 0.900 | 0.785 | 1.069 | 0.846 |
| exp_alloth | 0.956 | 0.884 | 1.459 | 0.113 | 1.152 | 0.407 | 2.412 | 0.005* | 1.116 | 0.608 | 1.722 | 0.087 | 1.855 | 0.025* |
| LESS HS | 0.961 | 0.931 | 0.668 | 0.365 | 0.902 | 0.705 | 0.546 | 0.239 | 0.547 | 0.238 | 0.172 | 0.026** | 0.437 | 0.144 |
| HS | 1.547 | 0.362 | 0.685 | 0.418 | 1.039 | 0.885 | 0.666 | 0.417 | 0.934 | 0.894 | 0.278 | 0.105 | 0.562 | 0.326 |
| SOME COLLEGE | 2.361 | 0.077 | 0.818 | 0.669 | 1.473 | 0.150 | 0.751 | 0.590 | 0.826 | 0.723 | 0.381 | 0.215 | 0.441 | 0.158 |
| COLLEGE GRAD | 2.107 | 0.247 | 0.629 | 0.335 | 2.316 | 0.006 | 0.920 | 0.891 | 0.872 | 0.820 | 0.465 | 0.393 | 0.703 | 0.588 |
| MARRIED | 0.487 | 0.353 | 0.547 | 0.390 | 2.760 | 0.198 | 2.288 | 0.325 | 1.292 | 0.750 | 0.406 | 0.249 | 0.222 | 0.059 |
| WIDOW | 0.470 | 0.339 | 0.375 | 0.169 | 2.481 | 0.250 | 2.443 | 0.301 | 1.073 | 0.928 | 0.427 | 0.290 | 0.220 | 0.060 |
| DIVORCED | 0.767 | 0.745 | 0.292 | 0.109 | 2.007 | 0.392 | 3.062 | 0.194 | 1.223 | 0.806 | 0.511 | 0.385 | 0.196 | 0.053 |
| SEPARATED | 0.786 | 0.800 | 0.627 | 0.675 | 4.098 | 0.074 | 2.001 | 0.472 | 1.389 | 0.779 | 0.503 | 0.518 | 0.112 | 0.092 |
| NEVER | 0.221 | 0.065 | 0.201 | 0.054 | 1.048 | 0.956 | 1.072 | 0.940 | 1.049 | 0.957 | 0.123 | 0.021* | 0.175 | 0.055 |
| POOR | 0.786 | 0.445 | 0.520 | 0.022* | 0.611 | 0.028* | 0.746 | 0.354 | 0.586 | 0.044* | 0.467 | 0.033* | 0.604 | 0.146 |
| NR POOR | 0.801 | 0.527 | 0.584 | 0.141 | 0.645 | 0.111 | 1.511 | 0.338 | 0.683 | 0.258 | 1.156 | 0.750 | 1.191 | 0.687 |
| LW INC | 0.650 | 0.184 | 0.563 | 0.040* | 0.697 | 0.081 | 0.632 | 0.147 | 0.888 | 0.634 | 0.585 | 0.155 | 0.706 | 0.271 |
| MID INC | 0.643 | 0.150 | 0.932 | 0.799 | 0.815 | 0.175 | 0.841 | 0.551 | 1.032 | 0.888 | 0.639 | 0.176 | 0.812 | 0.480 |
| NORTHEAST | 1.048 | 0.875 | 0.635 | 0.080 | 1.017 | 0.934 | 1.150 | 0.613 | 0.889 | 0.640 | 1.329 | 0.337 | 1.041 | 0.900 |
| MIDWEST | 0.867 | 0.635 | 1.474 | 0.162 | 0.876 | 0.481 | 0.891 | 0.652 | 1.060 | 0.790 | 1.093 | 0.766 | 0.818 | 0.445 |
| SOUTH | 1.433 | 0.111 | 1.453 | 0.121 | 1.074 | 0.654 | 1.099 | 0.665 | 1.052 | 0.817 | 1.213 | 0.349 | 1.165 | 0.537 |
| medicaid | 1.050 | 0.867 | 1.126 | 0.746 | 0.839 | 0.577 | 1.004 | 0.989 | 0.869 | 0.636 | 1.223 | 0.517 | 0.972 | 0.938 |
| medicareonly | 2.253 | 0.271 | 1.142 | 0.909 | 1.547 | 0.514 | 1.613 | 0.500 | 3.807 | 0.277 | 1.217 | 0.769 | 4.042 | 0.382 |
| medicaremang | 1.692 | 0.032* | 1.420 | 0.084 | 1.001 | 0.994 | 1.828 | 0.017* | 1.129 | 0.490 | 1.756 | 0.036* | 1.043 | 0.831 |
| private | 2.162 | 0.039* | 2.077 | 0.004** | 1.031 | 0.872 | 1.820 | 0.046* | 1.316 | 0.227 | 2.018 | 0.059 | 1.336 | 0.311 |
| uninsured | 1.870 | 0.464 | 0.000 | 0.000*** | 0.256 | 0.235 | 0.915 | 0.910 | 0.961 | 0.978 | 0.794 | 0.765 | 0.244 | 0.446 |
| hs_rthlth53 | 0.897 | 0.290 | 0.989 | 0.896 | 1.034 | 0.535 | 1.225 | 0.072 | 1.120 | 0.115 | 1.221 | 0.106 | 1.105 | 0.284 |
| usc_haveus42 | 0.498 | 0.037* | 0.582 | 0.114 | 0.530 | 0.002* | 0.345 | 0.000*** | 0.463 | 0.010* | 0.539 | 0.045* | 0.535 | 0.086 |
| gcci2 | 1.274 | 0.249 | 1.426 | 0.080 | 1.270 | 0.123 | 1.105 | 0.591 | 1.655 | 0.021* | 1.193 | 0.432 | 1.383 | 0.196 |
| 2007 | 1.035 | 0.910 | 1.971 | 0.039* | 1.375 | 0.223 | 1.245 | 0.454 | 0.966 | 0.876 | 0.843 | 0.609 | 1.175 | 0.598 |
| 2008 | 0.944 | 0.859 | 2.761 | 0.006** | 1.038 | 0.902 | 1.058 | 0.858 | 0.751 | 0.386 | 0.650 | 0.239 | 0.996 | 0.993 |
| 2009 | 1.680 | 0.122 | 1.475 | 0.252 | 1.687 | 0.041* | 2.211 | 0.016* | 1.251 | 0.445 | 1.439 | 0.326 | 0.807 | 0.547 |
| 2010 | 2.303 | 0.048* | 1.937 | 0.039* | 1.465 | 0.164 | 2.774 | 0.001** | 1.319 | 0.349 | 1.597 | 0.234 | 1.327 | 0.422 |
| 2011 | 1.151 | 0.697 | 2.443 | 0.011* | 1.928 | 0.013* | 2.674 | 0.002** | 1.704 | 0.039* | 1.153 | 0.723 | 1.436 | 0.257 |
| 2012 | 2.347 | 0.096 | 1.623 | 0.212 | 1.868 | 0.057 | 3.197 | 0.002** | 1.091 | 0.823 | 1.602 | 0.428 | 1.074 | 0.871 |
| 2014 | 1.682 | 0.237 | 1.676 | 0.153 | 1.305 | 0.350 | 3.159 | 0.002** | 2.112 | 0.027* | 1.365 | 0.501 | 1.466 | 0.380 |
| 2016 | 1.479 | 0.250 | 2.503 | 0.005** | 1.621 | 0.072 | 2.037 | 0.045* | 1.774 | 0.081 | 1.106 | 0.801 | 1.429 | 0.346 |
| _cons | 1.553 | 0.757 | 2.067 | 0.668 | 0.045 | 0.007** | 0.378 | 0.474 | 0.253 | 0.419 | 10.164 | 0.109 | 2.133 | 0.688 |

| WITHIN FIVE YEARS | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| v_allvisits | 1.203 | 0.033* | 1.038 | 0.507 | 1.180 | 0.001** | 1.079 | 0.344 | 1.071 | 0.186 | 1.033 | 0.731 | 1.010 | 0.885 |
| any_expenditure | 1.057 | 0.894 | 0.899 | 0.839 | 0.978 | 0.938 | 1.124 | 0.750 | 0.963 | 0.943 | 0.853 | 0.712 | 0.712 | 0.471 |
| exp_self | 1.110 | 0.679 | 0.881 | 0.502 | 1.072 | 0.656 | 0.931 | 0.751 | 0.929 | 0.691 | 1.174 | 0.594 | 1.337 | 0.214 |
| exp_medicare | 0.971 | 0.915 | 1.702 | 0.074 | 0.957 | 0.809 | 0.775 | 0.333 | 1.085 | 0.762 | 1.089 | 0.777 | 1.107 | 0.754 |
| exp_medicaid | 0.426 | 0.021* | 0.572 | 0.130 | 0.645 | 0.157 | 1.221 | 0.621 | 0.974 | 0.938 | 1.754 | 0.138 | 0.529 | 0.148 |
| exp_prv | 1.553 | 0.197 | 1.068 | 0.799 | 1.086 | 0.690 | 2.303 | 0.018* | 1.039 | 0.892 | 1.275 | 0.567 | 1.214 | 0.584 |
| exp_alloth | 1.097 | 0.749 | 1.254 | 0.361 | 1.157 | 0.487 | 1.839 | 0.085 | 1.031 | 0.900 | 1.859 | 0.055 | 1.876 | 0.037* |
| LESS HS | 1.133 | 0.803 | 0.745 | 0.514 | 0.828 | 0.497 | 0.564 | 0.297 | 0.605 | 0.359 | 0.180 | 0.028* | 0.311 | 0.030* |
| HS | 1.326 | 0.557 | 0.821 | 0.658 | 0.839 | 0.557 | 0.653 | 0.429 | 0.823 | 0.721 | 0.186 | 0.028* | 0.390 | 0.085 |
| SOME COLLEGE | 2.269 | 0.097 | 0.964 | 0.938 | 0.870 | 0.631 | 0.766 | 0.633 | 0.791 | 0.673 | 0.253 | 0.077 | 0.605 | 0.367 |
| COLLEGE GRAD | 2.156 | 0.222 | 0.772 | 0.597 | 1.511 | 0.171 | 1.523 | 0.523 | 1.088 | 0.884 | 0.397 | 0.305 | 0.646 | 0.497 |
| MARRIED | 0.516 | 0.360 | 0.535 | 0.411 | 0.549 | 0.287 | 0.735 | 0.723 | 1.871 | 0.470 | 0.341 | 0.146 | 0.207 | 0.040* |
| WIDOW | 0.607 | 0.494 | 0.385 | 0.208 | 0.473 | 0.214 | 1.083 | 0.927 | 1.096 | 0.911 | 0.447 | 0.280 | 0.166 | 0.019* |
| DIVORCED | 0.757 | 0.711 | 0.330 | 0.166 | 0.378 | 0.094 | 1.059 | 0.948 | 1.188 | 0.848 | 0.447 | 0.285 | 0.188 | 0.049* |
| SEPARATED | 0.414 | 0.354 | 0.242 | 0.231 | 1.052 | 0.942 | 0.670 | 0.710 | 1.857 | 0.592 | 0.368 | 0.315 | 0.106 | 0.065 |
| NEVER | 0.249 | 0.074 | 0.248 | 0.111 | 0.341 | 0.092 | 0.529 | 0.493 | 0.961 | 0.966 | 0.220 | 0.084 | 0.211 | 0.101 |
| POOR | 0.657 | 0.170 | 0.578 | 0.062 | 0.678 | 0.090 | 0.953 | 0.890 | 0.824 | 0.464 | 0.441 | 0.034* | 0.721 | 0.368 |
| NR POOR | 0.684 | 0.309 | 0.828 | 0.600 | 0.471 | 0.018* | 1.797 | 0.174 | 1.340 | 0.356 | 0.977 | 0.962 | 1.686 | 0.206 |
| LW INC | 0.537 | 0.056 | 0.728 | 0.293 | 0.780 | 0.276 | 0.544 | 0.094 | 0.803 | 0.412 | 0.426 | 0.030* | 0.703 | 0.303 |
| MID INC | 0.537 | 0.045 | 1.064 | 0.828 | 0.763 | 0.112 | 0.890 | 0.715 | 1.757 | 0.020* | 0.599 | 0.156 | 1.097 | 0.765 |
| NORTHEAST | 0.973 | 0.927 | 0.786 | 0.357 | 0.858 | 0.453 | 0.889 | 0.712 | 0.597 | 0.051 | 1.034 | 0.931 | 1.239 | 0.486 |
| MIDWEST | 0.863 | 0.616 | 1.040 | 0.886 | 0.785 | 0.228 | 0.861 | 0.589 | 0.686 | 0.106 | 1.334 | 0.410 | 0.758 | 0.305 |
| SOUTH | 1.303 | 0.239 | 0.979 | 0.932 | 0.948 | 0.778 | 0.920 | 0.750 | 0.727 | 0.163 | 1.177 | 0.551 | 1.126 | 0.655 |
| medicaid | 0.991 | 0.979 | 1.037 | 0.924 | 0.539 | 0.024* | 0.647 | 0.222 | 0.528 | 0.061 | 0.864 | 0.676 | 1.016 | 0.970 |
| medicareonly | 3.758 | 0.029 | 6.690 | 0.091 | 1.282 | 0.700 | 5.596 | 0.010* | 6.840 | 0.158 | 2.383 | 0.194 | 4.856 | 0.256 |
| medicaremang | 1.858 | 0.017* | 1.263 | 0.255 | 1.091 | 0.591 | 1.532 | 0.105 | 1.178 | 0.405 | 1.684 | 0.080 | 0.968 | 0.881 |
| private | 1.589 | 0.211 | 1.458 | 0.093 | 1.044 | 0.827 | 1.051 | 0.883 | 1.173 | 0.495 | 1.560 | 0.287 | 1.395 | 0.226 |
| uninsured | 2.267 | 0.251 | 7.725 | 0.121 | 0.413 | 0.363 | 2.615 | 0.197 | 6.327 | 0.199 | 1.068 | 0.932 | 4.333 | 0.325 |
| hs_rthlth53 | 0.870 | 0.205 | 1.051 | 0.558 | 1.013 | 0.833 | 1.413 | 0.002** | 1.173 | 0.053 | 1.218 | 0.163 | 1.145 | 0.123 |
| usc_haveus42 | 0.552 | 0.043* | 0.696 | 0.292 | 0.799 | 0.278 | 0.653 | 0.133 | 0.516 | 0.048* | 0.822 | 0.523 | 0.774 | 0.503 |
| gcci2 | 1.302 | 0.250 | 1.592 | 0.018* | 1.004 | 0.977 | 1.012 | 0.956 | 1.329 | 0.178 | 1.179 | 0.497 | 1.603 | 0.044* |
| 2007 | 1.225 | 0.510 | 1.761 | 0.069 | 1.073 | 0.819 | 1.563 | 0.195 | 1.080 | 0.795 | 0.796 | 0.564 | 1.446 | 0.260 |
| 2008 | 1.132 | 0.723 | 2.841 | 0.007** | 0.766 | 0.414 | 1.378 | 0.366 | 1.462 | 0.257 | 1.053 | 0.897 | 1.452 | 0.344 |
| 2009 | 1.802 | 0.091 | 1.983 | 0.050* | 1.535 | 0.191 | 2.708 | 0.005** | 1.822 | 0.043* | 1.282 | 0.530 | 1.623 | 0.166 |
| 2010 | 2.913 | 0.014* | 1.825 | 0.071 | 1.325 | 0.374 | 3.217 | 0.001** | 1.867 | 0.048* | 2.270 | 0.076 | 1.804 | 0.126 |
| 2011 | 1.566 | 0.207 | 1.657 | 0.162 | 1.863 | 0.030* | 2.219 | 0.041* | 2.574 | 0.002** | 1.425 | 0.417 | 1.623 | 0.186 |
| 2012 | 3.801 | 0.008** | 1.714 | 0.180 | 1.775 | 0.096 | 3.667 | 0.007** | 2.071 | 0.064 | 2.366 | 0.167 | 1.260 | 0.608 |
| 2014 | 1.952 | 0.150 | 2.016 | 0.060 | 2.464 | 0.003** | 3.148 | 0.007** | 2.929 | 0.001** | 1.681 | 0.298 | 2.045 | 0.082 |
| 2016 | 2.416 | 0.011* | 3.082 | 0.000*** | 2.804 | 0.000*** | 4.170 | 0.001** | 3.687 | 0.000*** | 2.619 | 0.021 | 2.828 | 0.005** |
| _cons | 0.915 | 0.943 | 0.185 | 0.245 | 0.316 | 0.292 | 0.044 | 0.019* | 0.050 | 0.073 | 1.844 | 0.673 | 0.793 | 0.896 |

| FIVE YEARS OR MORE | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t | RRR | P>t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| v_allvisits | 1.229 | 0.005** | 1.057 | 0.262 | 1.093 | 0.034* | 1.079 | 0.288 | 0.976 | 0.606 | 1.052 | 0.503 | 0.925 | 0.190 |
| any_expenditure | 1.265 | 0.480 | 0.524 | 0.087 | 0.903 | 0.684 | 1.199 | 0.602 | 0.795 | 0.464 | 0.981 | 0.954 | 0.636 | 0.248 |
| exp_self | 1.028 | 0.905 | 0.846 | 0.331 | 0.918 | 0.569 | 0.834 | 0.335 | 0.871 | 0.372 | 0.966 | 0.903 | 0.900 | 0.595 |
| exp_medicare | 0.997 | 0.990 | 1.782 | 0.025* | 1.021 | 0.909 | 1.056 | 0.820 | 1.470 | 0.080 | 1.226 | 0.403 | 1.994 | 0.006** |
| exp_medicaid | 0.455 | 0.009** | 0.431 | 0.008 | 0.986 | 0.964 | 1.126 | 0.706 | 0.638 | 0.084 | 0.981 | 0.953 | 0.542 | 0.094 |
| exp_prv | 1.284 | 0.445 | 0.992 | 0.972 | 1.289 | 0.171 | 1.773 | 0.054 | 1.156 | 0.499 | 0.656 | 0.266 | 1.543 | 0.134 |
| exp_alloth | 0.991 | 0.974 | 1.057 | 0.795 | 0.997 | 0.984 | 1.992 | 0.027* | 1.114 | 0.567 | 1.302 | 0.384 | 1.616 | 0.063 |
| LESS HS | 1.224 | 0.666 | 1.173 | 0.692 | 0.916 | 0.751 | 0.451 | 0.091 | 0.652 | 0.372 | 0.145 | 0.008** | 0.554 | 0.251 |
| HS | 1.668 | 0.263 | 1.303 | 0.527 | 0.944 | 0.836 | 0.520 | 0.151 | 0.838 | 0.721 | 0.162 | 0.012* | 0.627 | 0.372 |
| SOME COLLEGE | 2.146 | 0.098 | 1.291 | 0.557 | 1.039 | 0.889 | 0.508 | 0.165 | 0.797 | 0.649 | 0.200 | 0.028* | 0.745 | 0.572 |
| COLLEGE GRAD | 1.552 | 0.467 | 0.855 | 0.723 | 1.399 | 0.267 | 0.991 | 0.987 | 0.672 | 0.466 | 0.220 | 0.074 | 0.781 | 0.678 |
| MARRIED | 0.578 | 0.363 | 0.748 | 0.669 | 0.743 | 0.573 | 0.751 | 0.630 | 1.595 | 0.484 | 0.562 | 0.372 | 0.376 | 0.207 |
| WIDOW | 0.702 | 0.564 | 0.557 | 0.393 | 0.974 | 0.962 | 0.906 | 0.871 | 1.115 | 0.868 | 0.625 | 0.474 | 0.380 | 0.211 |
| DIVORCED | 1.168 | 0.807 | 0.478 | 0.310 | 0.677 | 0.474 | 1.358 | 0.614 | 1.439 | 0.594 | 0.880 | 0.850 | 0.348 | 0.178 |
| SEPARATED | 0.782 | 0.748 | 0.538 | 0.557 | 0.734 | 0.648 | 0.646 | 0.546 | 1.431 | 0.726 | 0.689 | 0.659 | 0.147 | 0.074 |
| NEVER | 0.435 | 0.203 | 0.328 | 0.141 | 0.682 | 0.518 | 0.503 | 0.323 | 1.304 | 0.708 | 0.271 | 0.096 | 0.437 | 0.332 |
| POOR | 0.715 | 0.234 | 0.582 | 0.035* | 0.968 | 0.875 | 0.934 | 0.812 | 0.738 | 0.150 | 0.483 | 0.024* | 0.752 | 0.357 |
| NR POOR | 0.794 | 0.485 | 0.968 | 0.923 | 1.024 | 0.934 | 1.971 | 0.080 | 0.866 | 0.601 | 1.501 | 0.355 | 1.378 | 0.383 |
| LW INC | 0.758 | 0.359 | 0.720 | 0.201 | 0.975 | 0.901 | 0.917 | 0.778 | 0.839 | 0.402 | 0.643 | 0.218 | 0.713 | 0.241 |
| MID INC | 0.633 | 0.112 | 1.081 | 0.754 | 1.442 | 0.039* | 0.988 | 0.965 | 1.132 | 0.540 | 0.744 | 0.376 | 0.872 | 0.601 |
| NORTHEAST | 0.800 | 0.390 | 0.596 | 0.022 | 0.805 | 0.228 | 0.703 | 0.268 | 0.486 | 0.003** | 1.071 | 0.848 | 0.664 | 0.170 |
| MIDWEST | 0.942 | 0.816 | 1.272 | 0.322 | 1.019 | 0.907 | 0.641 | 0.083 | 0.807 | 0.325 | 1.138 | 0.667 | 0.796 | 0.361 |
| SOUTH | 1.289 | 0.174 | 1.046 | 0.827 | 0.725 | 0.042* | 0.962 | 0.860 | 0.562 | 0.007** | 1.136 | 0.579 | 0.728 | 0.167 |
| medicaid | 0.834 | 0.471 | 1.186 | 0.608 | 0.483 | 0.003** | 0.674 | 0.174 | 0.908 | 0.731 | 0.877 | 0.646 | 1.052 | 0.892 |
| medicareonly | 1.227 | 0.702 | 0.864 | 0.836 | 1.092 | 0.875 | 2.301 | 0.214 | 0.318 | 0.203 | 1.197 | 0.760 | 0.472 | 0.525 |
| medicaremang | 1.564 | 0.042 | 1.180 | 0.308 | 1.036 | 0.813 | 1.626 | 0.063 | 0.885 | 0.416 | 1.441 | 0.154 | 0.788 | 0.151 |
| private | 1.488 | 0.239 | 1.228 | 0.309 | 0.947 | 0.764 | 1.113 | 0.664 | 0.844 | 0.383 | 1.433 | 0.334 | 0.848 | 0.473 |
| uninsured | 0.524 | 0.304 | 0.828 | 0.833 | 0.030 | 0.001** | 1.340 | 0.674 | 0.438 | 0.427 | 0.455 | 0.232 | 0.347 | 0.391 |
| hs_rthlth53 | 0.891 | 0.233 | 1.093 | 0.205 | 1.036 | 0.590 | 1.259 | 0.035* | 1.174 | 0.015* | 1.220 | 0.098 | 1.207 | 0.010* |
| usc_haveus42 | 0.850 | 0.526 | 0.658 | 0.111 | 0.833 | 0.313 | 1.068 | 0.781 | 0.651 | 0.060 | 1.243 | 0.397 | 0.802 | 0.404 |
| gcci2 | 1.613 | 0.016* | 1.749 | 0.001** | 1.078 | 0.612 | 1.278 | 0.240 | 1.590 | 0.009** | 1.257 | 0.266 | 1.711 | 0.007** |
| 2007 | 1.180 | 0.534 | 1.653 | 0.067 | 1.191 | 0.475 | 1.209 | 0.450 | 0.915 | 0.659 | 0.682 | 0.223 | 1.320 | 0.285 |
| 2008 | 0.903 | 0.718 | 2.321 | 0.008** | 0.796 | 0.382 | 0.723 | 0.267 | 1.158 | 0.589 | 0.588 | 0.110 | 1.220 | 0.569 |
| 2009 | 1.356 | 0.317 | 1.295 | 0.382 | 1.176 | 0.515 | 1.525 | 0.150 | 1.490 | 0.118 | 0.879 | 0.709 | 1.095 | 0.767 |
| 2010 | 2.050 | 0.070 | 1.529 | 0.128 | 1.486 | 0.096 | 2.088 | 0.006** | 1.653 | 0.069 | 1.120 | 0.760 | 1.602 | 0.135 |
| 2011 | 1.221 | 0.518 | 1.688 | 0.084 | 1.283 | 0.316 | 2.014 | 0.024* | 2.556 | 0.000*** | 0.970 | 0.937 | 1.783 | 0.057 |
| 2012 | 2.931 | 0.021* | 1.685 | 0.119 | 1.485 | 0.185 | 2.979 | 0.003** | 2.267 | 0.015 | 1.698 | 0.356 | 1.197 | 0.623 |
| 2014 | 1.922 | 0.110 | 2.678 | 0.001** | 1.451 | 0.149 | 2.216 | 0.018* | 3.638 | 0.000** | 1.586 | 0.304 | 2.082 | 0.035 |
| 2016 | 1.807 | 0.051 | 3.401 | 0.000*** | 1.726 | 0.045* | 2.453 | 0.009** | 4.453 | 0.000*** | 1.479 | 0.289 | 3.161 | 0.000*** |
| _cons | 2.228 | 0.475 | 3.883 | 0.272 | 0.316 | 0.174 | 0.162 | 0.115 | 2.974 | 0.381 | 6.480 | 0.157 | 10.447 | 0.143 |

# Table 19: Logistic Regression Odds Ratio for All Cancer

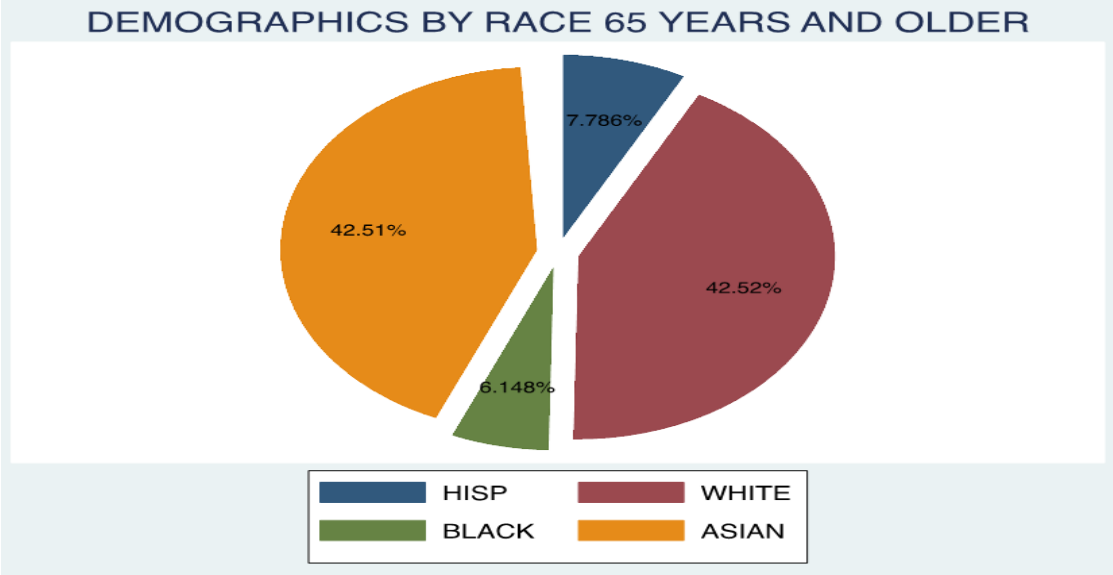
| SCREENING INTERVAL | chk_clntst53 = ADULTS **65-74** n = 14,983,398.5 | | | | chk_clntst53 = **ADULTS AGED 75 YEARS AND OLDER** n = 11,510,824 | | | | chk_sgmtst53= **ADULTS AGED 65-74** n = 11,533,366 | | | | chk_sgmtst53= ADULTS **AGED 75 YEARS AND OLDER** n = 8,441,223.9 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PAST YEAR** | Coef | P>t | | | Coef | P>t | | | Coef. | P>t | | | Coef. | P>t | | |
| **FEMALE** | 0.156 | 0.000*** | | | 0.212 | 0.000*** | | | 0.113 | 0.080 | | | 0.128 | 0.170 | | |
| **v_allvisits** | -0.146 | 0.000*** | | | -0.143 | 0.000*** | | | -0.102 | 0.000*** | | | -0.127 | 0.000*** | | |
| **any_expenditure** | -0.868 | 0.000*** | | | -0.737 | 0.000*** | | | -0.927 | 0.003** | | | -0.375 | 0.316 | | |
| **exp_self** | -0.042 | 0.327 | | | 0.004 | 0.935 | | | -0.014 | 0.856 | | | -0.017 | 0.841 | | |
| **exp_medicare** | -0.204 | 0.000*** | | | -0.188 | 0.018* | | | -0.053 | 0.631 | | | 0.104 | 0.416 | | |
| **exp_medicaid** | -0.043 | 0.702 | | | 0.076 | 0.513 | | | -0.039 | 0.839 | | | 0.487 | 0.011** | | |
| **exp_prv** | -0.157 | 0.017* | | | -0.157 | 0.043* | | | -0.055 | 0.584 | | | 0.033 | 0.774 | | |
| **exp_alloth** | -0.153 | 0.005** | | | -0.078 | 0.136 | | | -0.086 | 0.317 | | | 0.082 | 0.388 | | |
| **LESS HS** | 0.191 | 0.014* | | | 0.112 | 0.220 | | | 0.465 | 0.006** | | | 0.274 | 0.095 | | |
| **HS** | 0.137 | 0.045* | | | 0.160 | 0.076 | | | 0.460 | 0.000*** | | | 0.150 | 0.327 | | |
| **SOME COLLEGE** | 0.084 | 0.180 | | | -0.099 | 0.259 | | | 0.171 | 0.172 | | | -0.017 | 0.916 | | |
| **COLLEGE GRAD** | 0.058 | 0.415 | | | -0.051 | 0.604 | | | 0.051 | 0.678 | | | -0.223 | 0.154 | | |
| **MARRIED** | -0.141 | 0.511 | | | 0.291 | 0.071 | | | 0.633 | 0.172 | | | 0.423 | 0.243 | | |
| **WIDOW** | -0.026 | 0.905 | | | 0.547 | 0.001** | | | 0.408 | 0.373 | | | 0.404 | 0.246 | | |
| **DIVORCED** | -0.058 | 0.795 | | | 0.329 | 0.064 | | | 0.484 | 0.300 | | | 0.116 | 0.741 | | |
| **SEPARATED** | -0.042 | 0.875 | | | -0.011 | 0.978 | | | 0.474 | 0.373 | | | 1.341 | 0.024* | | |
| **NEVER** | 0.160 | 0.480 | | | 0.397 | 0.060 | | | 0.680 | 0.154 | | | 0.150 | 0.709 | | |
| **POOR** | 0.073 | 0.344 | | | 0.185 | 0.026* | | | 0.299 | 0.022* | | | 0.236 | 0.081 | | |
| **NR POOR** | 0.134 | 0.186 | | | 0.266 | 0.001** | | | 0.485 | 0.006** | | | 0.494 | 0.003** | | |
| **LW INC** | 0.009 | 0.890 | | | 0.179 | 0.007** | | | 0.427 | 0.001** | | | 0.124 | 0.240 | | |
| **MID INC** | 0.055 | 0.290 | | | 0.066 | 0.205 | | | 0.319 | 0.000*** | | | 0.203 | 0.053 | | |
| **NORTHEAST** | -0.142 | 0.069 | | | -0.079 | 0.356 | | | 0.093 | 0.488 | | | 0.280 | 0.023* | | |
| **MIDWEST** | -0.069 | 0.395 | | | -0.131 | 0.120 | | | 0.414 | 0.000*** | | | 0.289 | 0.029* | | |
| **SOUTH** | -0.097 | 0.193 | | | -0.048 | 0.535 | | | 0.504 | 0.000*** | | | 0.474 | 0.000*** | | |
| **medicaid** | 0.055 | 0.636 | | | 0.128 | 0.320 | | | -0.010 | 0.955 | | | -0.236 | 0.215 | | |
| **medicareonly** | -0.032 | 0.810 | | | -0.148 | 0.753 | | | -0.325 | 0.195 | | | -0.338 | 0.771 | | |
| **medicaremang** | -0.014 | 0.774 | | | -0.097 | 0.051 | | | -0.294 | 0.001** | | | -0.192 | 0.031* | | |
| **private** | -0.072 | 0.194 | | | 0.009 | 0.892 | | | -0.131 | 0.182 | | | -0.085 | 0.491 | | |
| **uninsured** | 0.674 | 0.039* | | | 0.209 | 0.695 | | | 0.690 | 0.195 | | | 20.655 | 0.000*** | | |
| **hs_rthlth53** | 0.025 | 0.254 | | | 0.016 | 0.471 | | | 0.024 | 0.529 | | | 0.098 | 0.007** | | |
| **usc_haveus42** | 0.527 | 0.000*** | | | 0.661 | 0.000*** | | | 0.239 | 0.142 | | | 0.599 | 0.003** | | |
| **gcci2** | -0.093 | 0.042* | | | -0.178 | 0.006** | | | -0.081 | 0.365 | | | -0.427 | 0.002** | | |
| **2007** | 0.049 | 0.495 | | | -0.005 | 0.949 | | | | | | | | | | |
| **2008** | 0.045 | 0.566 | | | 0.141 | 0.095 | | | | | | | | | | |
| **2009** | 0.967 | 0.000*** | | | 1.150 | 0.000*** | | | | | | | | | | |
| **2010** | 0.934 | 0.000*** | | | 1.255 | 0.000*** | | | 0.121 | 0.264 | | | 0.164 | 0.209 | | |
| **2011** | 0.980 | 0.000*** | | | 1.182 | 0.000*** | | | 0.205 | 0.105 | | | 0.229 | 0.081 | | |
| **2012** | 1.224 | 0.000*** | | | 1.588 | 0.000*** | | | 0.337 | 0.043* | | | 0.256 | 0.194 | | |
| **2014** | 1.274 | 0.000 | | | 1.533 | 0.000** | | | 0.343 | 0.025* | | | 0.178 | 0.326 | | |
| **2016** | 1.056 | 0.000 | | | 1.509 | 0.000*** | | | 0.391 | 0.006** | | | 0.289 | 0.122 | | |
| **CUT///** | **Coef.** | **Std err** | **CI** | | **Coef.** | **Std. err** | **CI** | | **Coef.** | **Std. err** | **CI** | | **Coef.** | **Std. err** | **CI** | |
| **PAST YR VS NEVER** | -2.024 | 0.348 | -2.708 | -1.341 | -1.707 | 0.553 | -2.795 | -0.619 | -3.884 | 0.698 | -5.260 | -2.509 | -3.875 | 1.316 | -6.469 | -1.280 |
| **TWO YRS VS NEVER** | -1.121 | 0.345 | -1.799 | -0.443 | -0.817 | 0.554 | -1.907 | 0.273 | -3.353 | 0.695 | -4.724 | -1.983 | -3.309 | 1.313 | -5.898 | -0.719 |
| **THREE YRS VS NEVER** | -0.495 | 0.343 | -1.170 | 0.179 | -0.175 | 0.554 | -1.264 | 0.914 | -3.019 | 0.694 | -4.388 | -1.651 | -2.973 | 1.315 | -5.566 | -0.381 |
| **FIVE YEARS VS NEVER** | 0.349 | 0.343 | -0.325 | 1.023 | 0.692 | 0.555 | -0.399 | 1.782 | -2.617 | 0.695 | -3.988 | -1.246 | -2.513 | 1.313 | -5.101 | 0.076 |
| **TEN YRS VS** | | 0.343 | | | | 0.556 | | | - | 0.697 | - | - | - | 1.310 | - | |

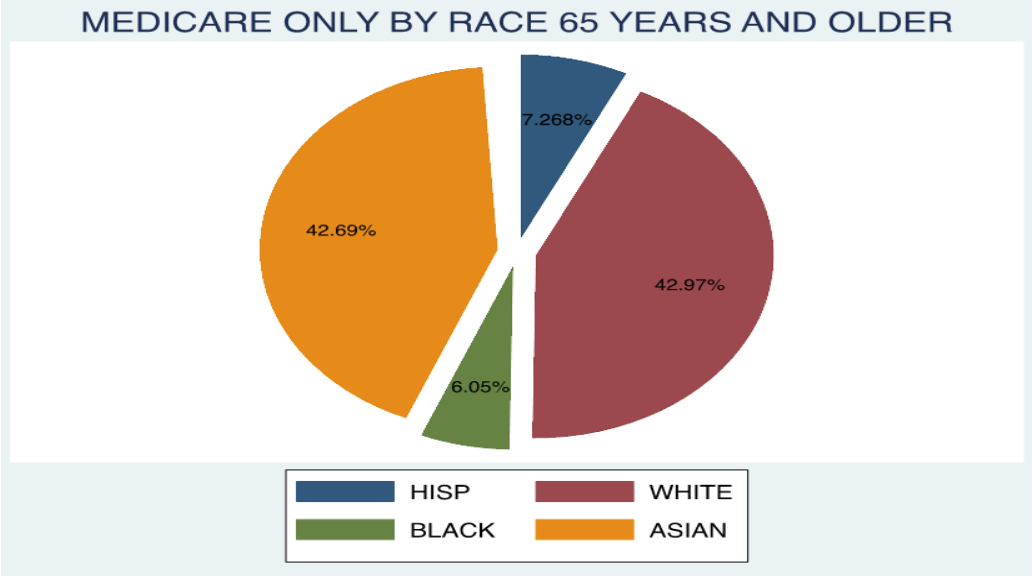
**Ordinal regression equation:**

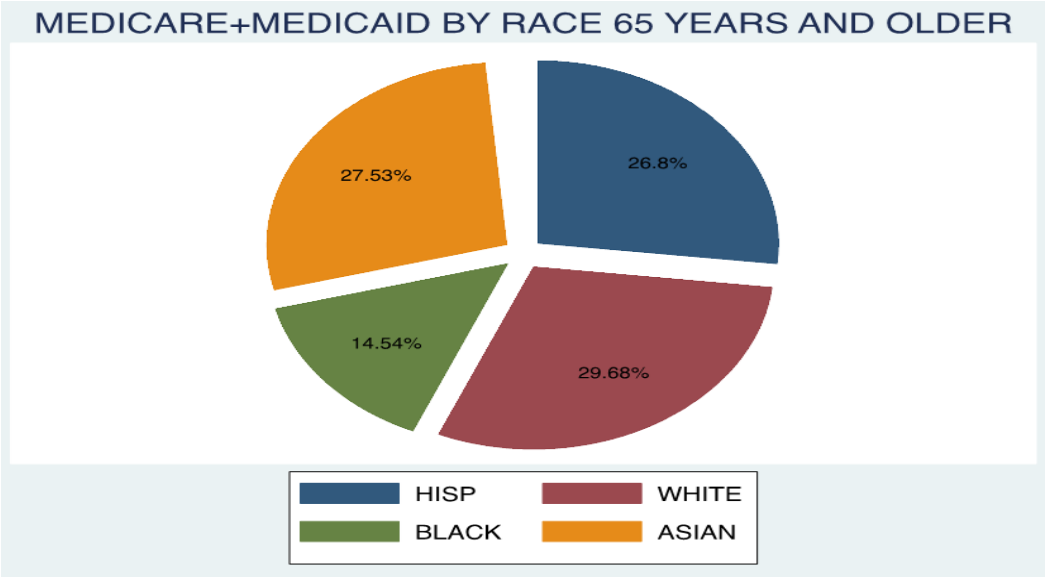
$$\ln\left(\frac{\text{prob(event)}}{1 - \text{prob(event)}}\right) = \beta 0 + \beta 1X1 + \beta 2X2 + \ldots + \beta kXk$$

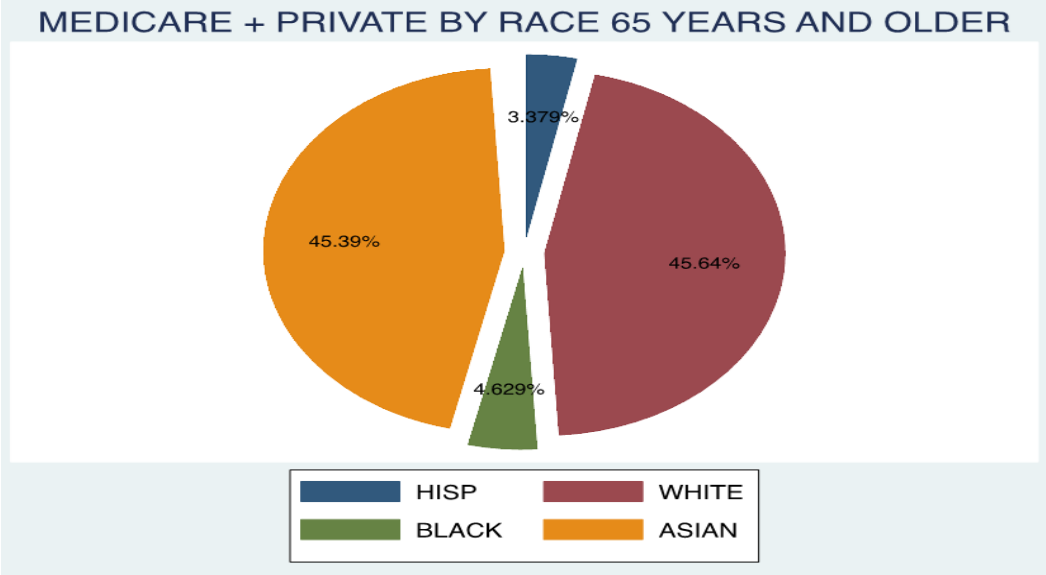
**$\hat{y}$ (binary outcome variable) = $\beta_0$ + $\beta_1$(dem_sex) + $\beta_2$(dem_racethnx) + $\beta_3$(education) + $\beta_4$(marital status) +$\beta_5$(education)+ $\beta_6$(poverty status) $\beta_7$(Region)+ $\beta_8$(v_allvisits) )+ $\beta_9$(any_expenditure) + $\beta_{10}$(exp_self)+ $\beta_{11}$(exp_medicare )+ $\beta_{12}$(exp_medicaid )+ $\beta_{13}$(exp_prv)+ $\beta_{14}$(exp_alloth )+ $\beta_{15}$(ins_mcare53x)+ $\beta_{16}$(ins_triat53x)+ $\beta_{17}$(ins_mcrpho42 )+ $\beta_{18}$(ins_mcdhmo42 )+ $\beta_{19}$(ins_prvhmo42)+$\beta_{20}$(ins_unins )+ $\beta_{21}$(hs_rthlth53)+ $\beta_{22}$(usc_haveus42 )+ $\beta_{23}$(preaca1) + $\beta_{23}$ (postaca1)**

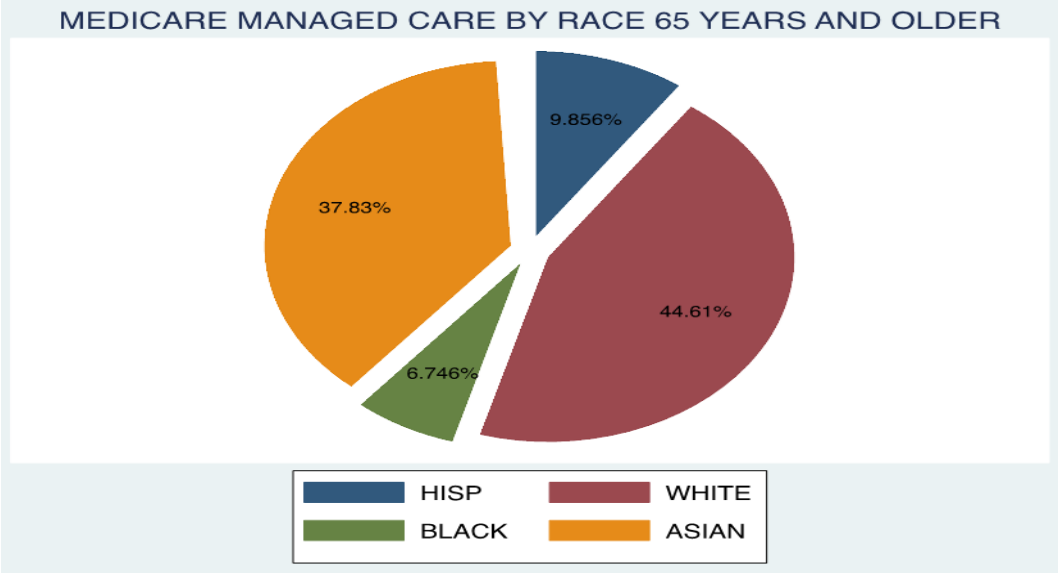
Chapter IV: PAPER 3 DEMOGRAHICS

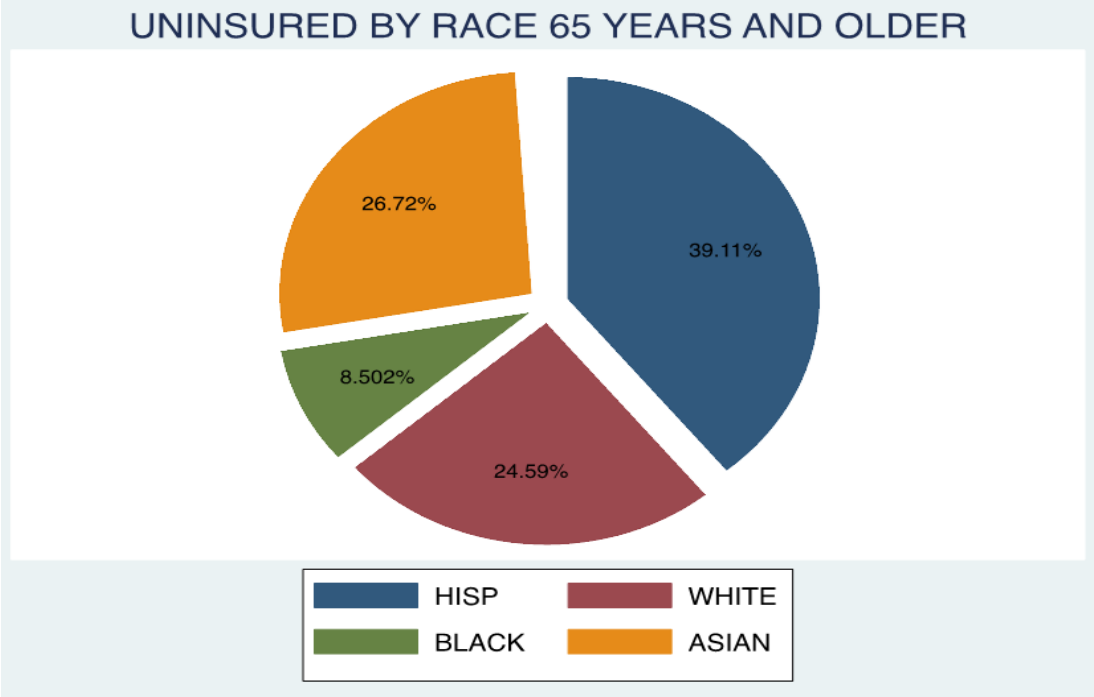


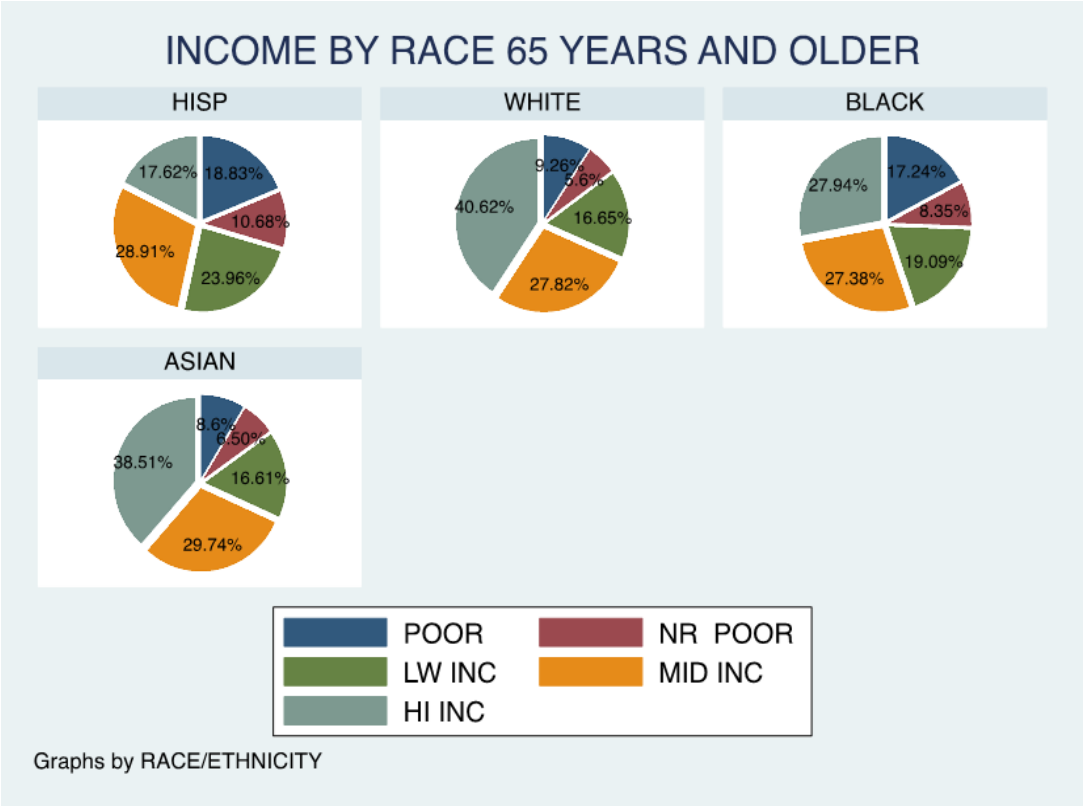

MEDICARE ONLY BY RACE 65 YEARS AND OLDER
7.268%
42.97%
6.05%
42.69%
HISP
WHITE
BLACK
ASIAN

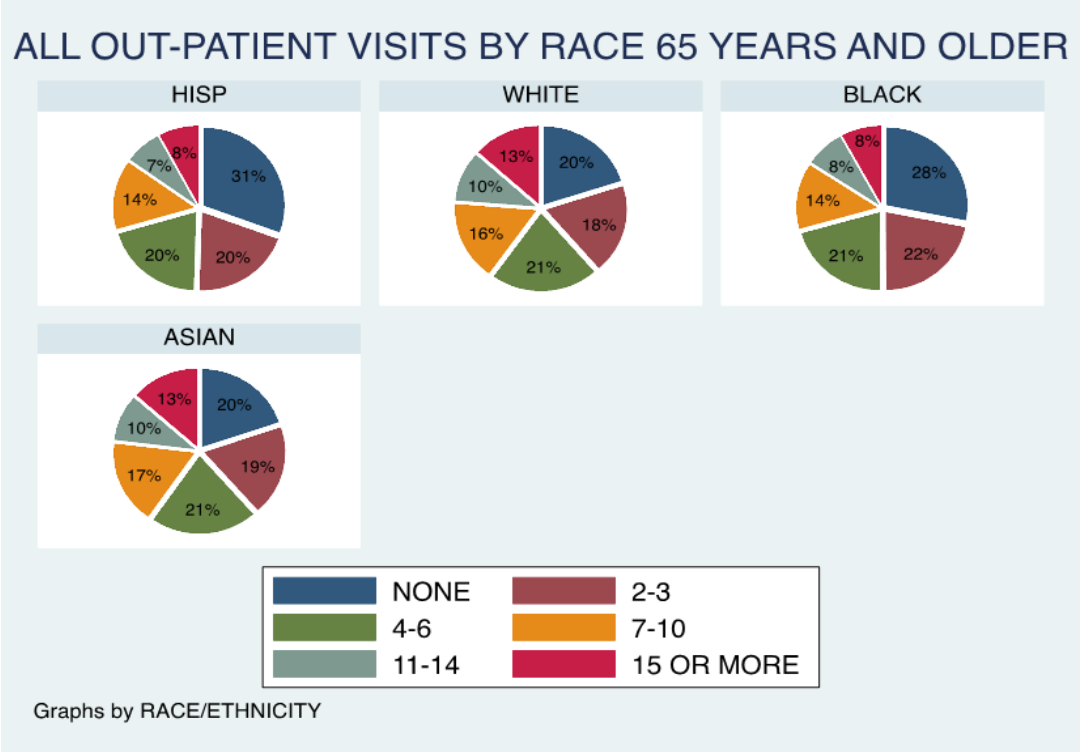

MEDICARE+MEDICAID BY RACE 65 YEARS AND OLDER
26.8%
29.68%
14.54%
27.53%
HISP
WHITE
BLACK
ASIAN

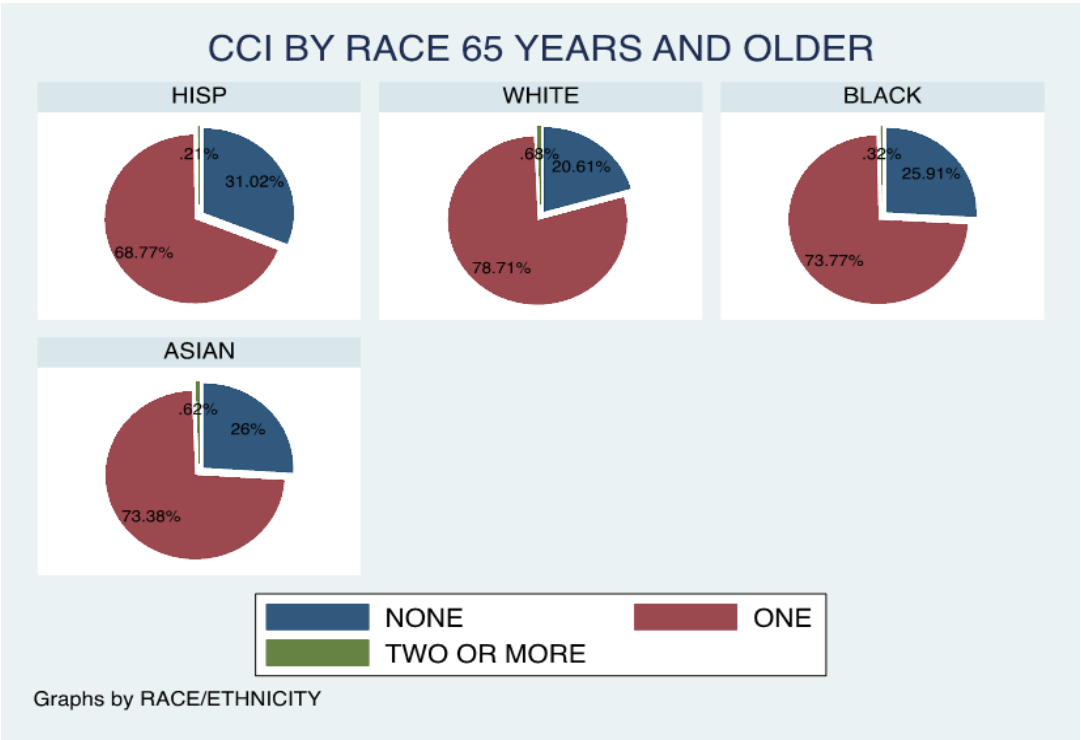

MEDICARE + PRIVATE BY RACE 65 YEARS AND OLDER
3.379%
45.64%
4.629%
45.39%
HISP
WHITE
BLACK
ASIAN

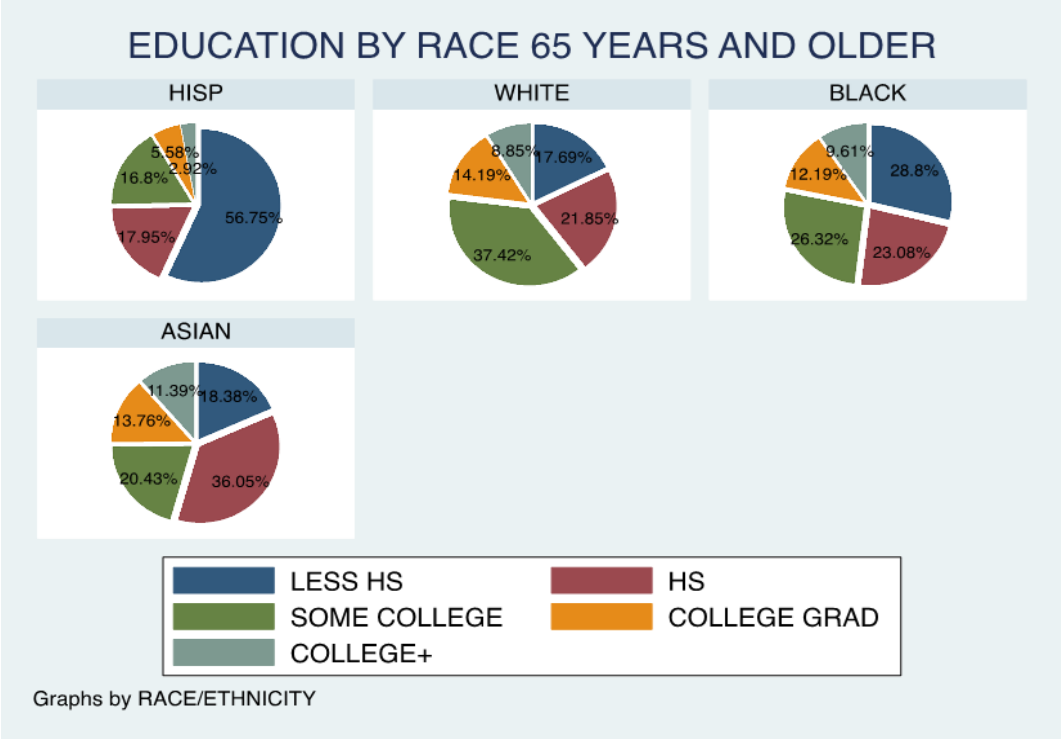

MEDICARE MANAGED CARE BY RACE 65 YEARS AND OLDER
9.856%
44.61%
6.746%
37.83%
HISP
WHITE
BLACK
ASIAN

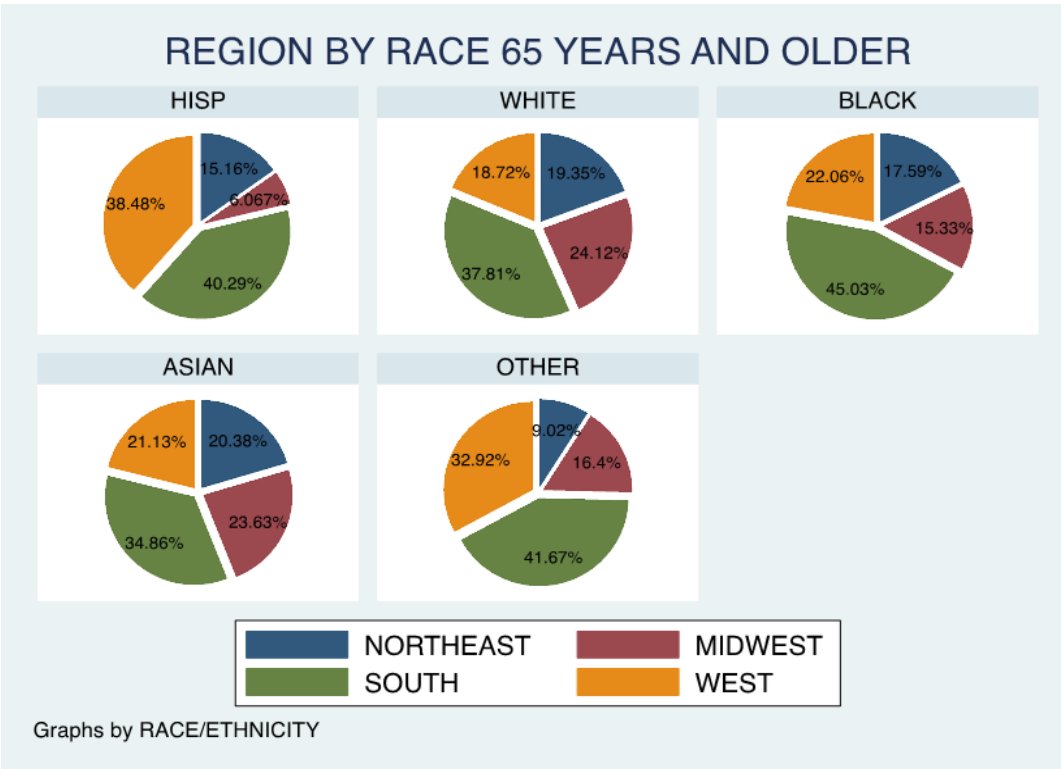

UNINSURED BY RACE 65 YEARS AND OLDER
26.72%
39.11%
8.502%
24.59%
HISP
WHITE
BLACK
ASIAN


INCOME BY RACE 65 YEARS AND OLDER
HISP
17.62%
18.83%
10.68%
28.91%
23.96%
WHITE
9.26%
6.6%
40.62%
16.65%
27.82%
BLACK
17.24%
27.94%
8.35%
19.09%
27.38%
ASIAN
8.6%
6.50%
38.51%
16.61%
29.74%
POOR
NR POOR
LW INC
MID INC
HI INC
Graphs by RACE/ETHNICITY


ALL OUT-PATIENT VISITS BY RACE 65 YEARS AND OLDER
HISP
31%
20%
20%
14%
7%
8%
WHITE
20%
18%
21%
16%
10%
13%
BLACK
28%
22%
21%
14%
8%
8%
ASIAN
20%
19%
21%
17%
10%
13%
NONE
2-3
4-6
7-10
11-14
15 OR MORE
Graphs by RACE/ETHNICITY


CCI BY RACE 65 YEARS AND OLDER
HISP
31.02%
68.77%
.21%
WHITE
20.61%
78.71%
.68%
BLACK
25.91%
73.77%
.32%
ASIAN
26%
73.38%
.62%
NONE
ONE
TWO OR MORE
Graphs by RACE/ETHNICITY


EDUCATION BY RACE 65 YEARS AND OLDER
HISP
5.58%
2.92%
16.8%
56.75%
17.95%
WHITE
8.85%
17.69%
14.19%
21.85%
37.42%
BLACK
9.61%
28.8%
12.19%
26.32%
23.08%
ASIAN
11.39%
18.38%
13.76%
20.43%
36.05%
LESS HS
HS
SOME COLLEGE
COLLEGE GRAD
COLLEGE+
Graphs by RACE/ETHNICITY


REGION BY RACE 65 YEARS AND OLDER
HISP
15.16%
6.067%
38.48%
40.29%
WHITE
18.72%
19.35%
24.12%
37.81%
BLACK
22.06%
17.59%
15.33%
45.03%
ASIAN
21.13%
20.38%
23.63%
34.86%
OTHER
9.02%
32.92%
16.4%
41.67%
NORTHEAST
MIDWEST
SOUTH
WEST
Graphs by RACE/ETHNICITY

CURRICULUM VITAE

MICHELLE E FIELDS

Born, London, England

ACADMIC DEGREES:

| | |
|---|---|
| 1986-1992<br>St. Francis College<br>Brooklyn, New York | B.S., Health Sciences Administration |
| 2013-2015<br>Florida International University<br>Miami, Florida | MBA., Finance and Business Administration |
| 2017-2022 | Doctoral Candidate |

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