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Economic Analysis Of Preventive Care Utilization Among Older Adults

Boon Peng Ng
Wayne State University,

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BOON PENG NG

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DEDICATION

To my family, in particular my mother, Lim Sea Moy, she taught me to be respectful, thoughtful and instilled in me the importance of education. She will always be my inspiration; I will always value her wisdom for the rest of my life.

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TABLE OF CONTENTS

LIST OF TABLES

Chapter 1: Introduction

The U.S. Administration on Aging (AOA) estimated by 2030, America will have 72 million adults ages 65 or older. About 70% of older adults will have one chronic condition and 50% will have more than one chronic illness such as heart disease, cancer, stroke, etc. (CDC 2009). The costs associated with chronic diseases are enormous, for example the total cost for coronary heart disease alone is about $109 billion annually (CDC 2012b). As noted, older adults are more likely to have acute and chronic illnesses; some of those illnesses may be preventable if there is more widespread use of preventive care services. Preventive services can be used to maintain a healthy lifestyle or to detect and prevent acute and chronic illnesses that can be costly to treat or even deadly. In addition, the higher life expectancy of adults in the U.S., due to the quality of care and access to advanced treatments makes preventive services even more important to ensure people a productive, independent and healthy life as they age.

The use of preventive services is increasing, but usage varies widely among different interventions and services (Smith, Brooks et al., 2013). The variations depend on many factors, from socioeconomics to Medicare or insurance coverage. The U.S. Preventive Services Task Force (USPSTF) recommends routine use of core preventive services for older adults. Since 2011 those preventive services have been covered in full by Medicare and health insurers (HHS 2011). However, many older adults are still underserved; only 25% of adults ages 50-64, and less than 40% of adults ages 65 or older are up-to-date on the recommended preventive services (CDC 2013).

The argument to encourage the use of preventive services is that they can or will prevent more serious or adverse illnesses that can be costly to treat or even deadly. The topic is controversial, and no clear picture has emerged from the literature as to the cost effectiveness or

cost savings of preventive services (Colby, Quinn et al., 2009). The reasons can be attributed to differing views regarding the effectiveness of the tests or procedures, the side effects of the tests or procedures, the direct and indirect costs of the tests or procedures, and other factors. Everyone agrees, however, that preventive measures and quality health care will improve overall health in general.

This dissertation seeks to examine the economic determinants of use of preventive services among older adults. It consists of two studies that focus on the effects of public health policy and health shocks on the initiation of use of preventive services.

The desire by health professionals and policy makers to encourage the use of preventive services is not new. Improvement and expansion of coverage for preventive services by Medicare had increased steadily throughout the years. The 2010 Patient Protection and Affordable Care Act (also called the Affordable Care Act or ACA), the Medicare Improvements for Patients and Providers Act of 2008, and the Medicare Prescription Drug Improvement and Modernization Act of 2003 (also called the Medicare Modernization Act or MMA), all contained provisions to increase access to affordable preventive services for older adults. Considering the increased implementation of public health policies over the years to encourage the use of preventive services among older adults, the effectiveness of these policies remains an interesting and important question.

The first study examined the effects of the Medicare Modernization Act (MMA) of 2003 of a one-time initial preventive physical examination (IPPE) or a "Welcome to Medicare" visit on the use of six preventive services (both flu immunizations and five disease screening procedures such as mammograms, breast self-exams, Pap smears, prostate cancer screenings and cholesterol tests) among beneficiaries new to Medicare Part B.

As noted previously, older adults are more likely to have onset illnesses; even if they can recover from an adverse health event (a health shock), the cost of treating it can drain their savings or wealth (Lee and Kim 2008). In addition, use of recommended preventive services is still low among older adults. Therefore, the second study investigates whether new information, acquired through the occurrence of unexpected adverse health events, causes an individual to begin using preventive care services.

The dissertation is structured as follows: Chapter Two examines the effects of Medicare's Welcome-to-Medicare visit on the use of preventive services among new Medicare enrollees. Chapter Three studies the effects of health shocks on the initiation of use of preventive services. The final chapter summarizes the conclusions of both studies.

Chapter 2: Effects of Medicare Coverage of a "Welcome-to-Medicare" Visit on the Use of Preventive Services among New Medicare Enrollees

2.1 Introduction

As the first and second leading causes of death in the United States, heart disease and cancer claim many lives each year and account for enormous levels of healthcare spending (CDC 2012a). Heart disease caused 616,000 deaths in 2008 (CDC 2012b). It is projected that by 2030, the total direct medical cost of heart disease (measured in 2008 dollars) will increase to $818.1 billion from $272.5 billion in 2010 (Heidenreich, Trogdon et al. 2011). Individuals can take many steps to lower their risk of heart disease, such as leading a healthy life-style and having routine cholesterol testing for early heart disease detection.

Cancer caused 569,490 deaths in 2010 (ACS 2011). The National Institutes of Health estimated the overall cost of cancer to be $263.8 billion in 2010. Seventy-eight percent of all cancer diagnoses each year occur among adults ages 65 and older (ACS 2011). Survival rates have improved steadily since the 1970s, largely because of improvements in diagnosis and treatment. Depending on the stage of the cancer, costs and treatment options vary. Typically, costs are higher and treatment is more extensive when cancer is diagnosed at a later stage. With cancer screenings and early detection, the need for intrusive and resource intensive treatments is diminished.

Besides cancer screenings and cholesterol testing, there are other recommended preventive services, such as flu vaccines. The Centers for Disease Control and Prevention (CDC) estimated that over the past 31 years, 3,000 to 49,000 deaths a year are associated with the flu in the United States; the wide range of deaths is due in part to the fluctuation of the severity of the flu season. Most people who get the flu require minimal medical attention and only over-the-counter drugs to ease the discomfort and to recover. For older adults and people with chronic diseases, though, flu

complications can be severe, sometimes requiring hospitalization and resulting in death (CDC 2011). The need to receive a flu vaccine is very important, especially for high-risk groups like older adults with weaker immune systems.

In general, the argument to encourage the use of preventive services is that they can or will prevent more serious or adverse illnesses that can be costly to treat or even deadly. The topic is controversial, and no clear picture has emerged from the literature as to the cost effectiveness or cost savings of preventive services (Colby, Quinn et al. 2009). Everyone agrees, however, that preventive measures and quality health care will improve overall health in general.

In 1984, the U.S. Preventive Services Task Force (USPSTF) was established to evaluate and recommend preventive services for the general population based on medical validity. The goal is to help primary physicians or clinicians recommend needed preventive services to their patients, and to inform the public objectively of the benefits and costs of preventive services based on scientific evidence (USPSTF 2012b). The USPSTF has updated the recommendations periodically, but not all of the recommended preventive services are covered fully by Medicare. Some require no copayment or deductible; others do (U.S.GAO 2002; GAO 2004). With the 2010 Patient Protection and Affordable Care Act (also called the Affordable Care Act or ACA) more preventive services are covered by Medicare at no cost to Medicare beneficiaries (CMS 2012).

To increase and encourage the use of recommended preventive services, new benefits for preventive services were included in the Medicare Prescription Drug, Improvement, and Modernization Act (also called the Medicare Modernization Act or MMA) of 2003, such as coverage of a blood screening test for the early detection of cardiovascular disease, and a one-time initial preventive physical examination (IPPE) or a "Welcome to Medicare" visit**.**

I am aware of only one previous study of the effects of covering an IPPE on the use of preventive services among new Medicare enrollees. Using data from the Medicare Current Beneficiary Survey (MCBS) data, linked with Medicare claims from 2001 to 2007, Salloum, Jensen et al. (2013) examined whether Medicare's coverage of an IPPE influenced the use of mammography and Pap tests among women ages 65 and 66 with traditional Medicare (Parts A and B). They found that mammography and Pap smear utilization did not increase after IPPE coverage was introduced. The authors speculated that most new Medicare enrollees were likely unaware of the IPPE benefit, and therefore did not take advantage of it.

This paper also examines the effects of newly covering an IPPE on the use of preventive services, and it adds to the literature in three ways. First, I examine the effects of covering an IPPE on the use of six different preventive services, including both flu immunizations and five disease screening procedures. Salloum, Jensen et al. (2013), examined just mammograms and Pap smears. Second, I analyze data from the ongoing Health and Retirement Survey (HRS), a different data source that can also shed light on the effects of IPPE coverage. Finally, I examine the use of preventive care services among both men and women.

2.2 Legislative Background

In 2002, a Government Accountability Office (GAO) report revealed that older adults were falling behind in their use of preventive services (U.S. GAO 2002). Medicare enrollees were averaging six or more visits to a doctor’s office, yet many were receiving only a few of the recommended preventive services for their age range. Older adults may have been unaware of the need for preventive services. According to the CDC's National Health and Nutrition Examination Survey of 1999-2000, about 2.1 million persons 65 or older had not been told by their physician

that they had high cholesterol; 6.6 million had not been told they had high blood pressure. With the Centers for Medicare and Medicaid Services' (CMS) various projects, demonstrations and studies on preventive services, and the report by GAO, policymakers believed that covering an IPPE might encourage Medicare enrollees to use more preventive services.

The Medicare Modernization Act (MMA) of 2003 was signed into law by President George W. Bush on December 8, 2003. While the key provisions of the MMA introduced and established Medicare Part D for prescription drug coverage, the legislation also expanded Medicare Part B benefits, effective January 1, 2005, to include coverage of a one-time IPPE for Medicare enrollees within their first six months of becoming eligible for Part B. In other words, this new benefit was to be made available only to newly enrolled beneficiaries who elected Part B benefits. Beyond their first six months under Part B, there was no coverage of an IPPE. The IPPE was intended to foster healthy behavior, early disease detection, education and counseling, and referral for preventive services with primary physicians or clinicians played a key role (U.S.GAO 2004). Prior to this, physicians may have had few opportunities to assess their patients' need for preventive services.

In 2005, 2006, and 2007 Medicare coverage of an IPPE was subject to both the Part B annual deductible and coinsurance (20% of the Medicare approved amount), and as noted earlier, beneficiaries could only take advantage of the benefit during their first six months under Part B. This changed on January 1, 2008, when Medicare expanded the IPPE benefit in two ways. First, the window of eligibility for coverage under Part B was expanded from six months to a beneficiary's first 12 months. Second, Medicare waived the annual Part B deductible for an IPPE, although beneficiaries still had to pay coinsurance toward the visit. Medicare's IPPE benefit changed again in 2011 as a result of the 2010 Patient Protection and Affordable Care Act.

Beginning in 2011, neither the Part B deductible nor coinsurance applied to an IPPE when provided within a beneficiary's first 12 months under Part B.

2.3 Recommended Preventive Services over Time

It is important to understand both the costs and benefits of preventive services. From a Medicare beneficiary's perspective, it can be hard to navigate through all the preventive services, let alone know which ones are best suited for their needs. In addition, if certain preventive services require older adults to pay out of pocket, that can be a financial burden for persons on fixed incomes and with chronic illnesses (Rowland and Lyons 1996). Therefore, a recommendation of high value preventive services from a panel of experts, in consultation with primary care physicians, can greatly encourage patients to use more preventive services.

The USPSTF is an independent panel of physicians and experts who perform scientific and medical reviews on the effectiveness of preventive services and publish the recommendations periodically (Moyer, LeFevre et al. 2011). In 1989, the task force published their first "*Guide to Clinical Preventive Services"* to help patients and their primary care physicians make informed decisions on the use of preventive services. Here I briefly review trends in USPSTF recommendations over the period 1996-2008, the time frame for my analysis. Many of their recommendations changed little or remained the same over this period. The following are the recommendation changes made by USPSTF for mammograms, breast self-exams, Pap smears, prostate cancer screenings, cholesterol tests, and flu vaccines.

Mammograms -- The task force recommended from 1996-2001 that women ages 50-69 have routine screening for breast cancer every 1-2 years (USPSTF 2002a). From 2002-2008, no

major changes were made to the 1996 recommendation except to lower the age limit to women 40 and older (USPSTF 2006).

Breast Self-Exams -- From 1996 through 2008, the task force concluded there was insufficient evidence to recommend either for or against breast self-exams.

Pap Smears -- From 1996 through 2003, the task force recommended a Pap smear every 1-3 years for all women, regardless of age. From 2003-2008, it did not recommend routine cervical cancer screening for women ages 65 and older, provided their smears were normal, and they did not have other high risk factors for cervical cancer (USPSTF 2012a).

Prostate Cancer Screenings -- From 1996 through 2001, the task force did not recommend routine screenings. They updated the recommendation in 2002 to say there was insufficient evidence to recommend for or against routine screenings for prostate cancer (USPSTF 2006) and kept that in place until 2007. In 2008, the task force found insufficient evidence to recommend for or against routine screenings for men younger than 75 years old (Moyer 2008).

Cholesterol Tests -- The recommendations for cholesterol testing have differed slightly between men and women over the years. From 1996-2000, only intermittent screenings were recommended for men ages 35-65 and women ages 45-65. This was updated from 2001-2007 to strongly recommend routine cholesterol testing for men ages 35 and older and women ages 45 and older (USPSTF 2002b). In 2008, the updated recommendation remained the same for men, but routine cholesterol testing was recommended for women ages 45 and older at increased risk of heart disease. Otherwise, the recommendation was neither for or against routine testing (USPSTF 2008).

Flu Vaccines -- A flu vaccine is recommended by the CDC every year for adults in high risk groups, such as those ages 65 and older.

In summary, between 1996 and 2008 USPSTF recommendations regarding preventive services remained the same for breast self-exams, Pap smears and flu vaccines, while slightly stronger recommendations evolved over time for mammograms, prostate and cholesterol screenings.

2.4 Data and Measures

I analyze data from the Health and Retirement Study (HRS) and the RAND HRS. The HRS is a nationally representative sample survey of older adults in the U.S. that has been conducted every two years since 1992. The survey contains copious self-reported information on health, health care use, insurance coverage, and socio-demographic information, etc. (HRS 2012). The HRS first surveyed a sample of adults ages 51-61 in 1992, and this sample is called the "original HRS cohort." The HRS also surveyed the spouse of each married individual in this cohort, regardless of age.

A second survey, conducted in 1993 and called the Study of Assets and Health Dynamics among the Oldest Old (AHEAD), was a survey of individuals ages 70 and older. As with the HRS, spouses were also surveyed in AHEAD (Juster, Willis et al. 2012). Participants in both surveys were re-interviewed every two years, and in 1998 these two surveys were combined and have since been referred to simply as the HRS. Also in 1998 two new cohorts were added to the survey: individuals born in 1924-1930 (Children of the Depression), and individuals born in 1942-1947 (War Babies) (Hauser and Willis 2005). Every six years since 1998, the HRS has added new additional cohorts of individuals in their early 50s to the sample. In 2004, individuals born in 1948-1953 (Early Boomers) were added, and in 2010, individuals born in 1954-1959 (Mid Boomers)

were added. These additional cohorts serve to replenish HRS's sample as older participants die or leave the study for other reasons.

The RAND HRS is derived from the HRS, and contains many (but not all) key variables from the HRS. RAND HRS files are constructed for ease of use, and variables in the file are named and formatted to be consistent across HRS waves (RAND 2011). The RAND HRS is funded by the National Institute on Aging and the Social Security Administration.

This study is based entirely on the unrestricted, public-use HRS and RAND HRS data files that are downloadable from their websites, and qualifies for exempt IRB status under 45 CFR 46.101(b).

Sampling criteria

Data are drawn from the 1996, 2000, 2004, and 2008 waves of the HRS and RAND HRS. Information on the use of preventive services is available for the full sample of HRS participants only in these years (Jenkins, Ofstedal et al. 2008). Specifically, the HRS asked about the use of mammograms, breast self-exams, Pap smears, prostate cancer screenings, cholesterol tests, and flu vaccines. In general, the response rates for questions on the use of these services were very high; only about 0.1 % of respondents are missing data (Jenkins, Ofstedal et al. 2008). The HRS asked about these preventive services through the following question: "Since we talked to you last, or in the last two years, have you had any of the following medical tests or procedures: A flu shot? A blood test for cholesterol?" For women it also asked, "Do you check your breasts for lumps monthly? A mammogram or x-ray of the breast, to search for cancer? A Pap smear?" and for men it asked, "An examination of your prostate to screen for cancer?"

Effective January 1, 2005, Medicare began covering an IPPE for Medicare beneficiaries only during their first six months under Part B. Since most beneficiaries enter Medicare when they

turn age 65, their eligibility for a covered IPPE would have occurred during six months when they were 65 years old. I restrict the study sample to Medicare beneficiaries who were ages 66-69 at the time of an HRS interview, who were insured under both Medicare Parts A and B, who did not have Medicaid, and who were not enrolled in Medicare HMOs. I exclude beneficiaries who had Medicaid because in most states Medicaid already covered similar visits, and I exclude beneficiaries with HMO coverage, because coverage of an IPPE did not apply to them.

For purposes of analysis I divide this sample into two groups: a "treatment group" of Medicare beneficiaries ages 66 or 67 at the time of an HRS interview, and a "comparison group" of Medicare beneficiaries ages 68 or 69 at the time of an HRS interview. The treatment group consists of beneficiaries ages 66 or 67 because for these individuals, at least from 2005 forward, HRS questions regarding preventive service use likely captured their six-month eligibility window for IPPE coverage. The comparison group consists of beneficiaries ages 68 or 69 because for these individuals, HRS questions likely covered a two-year period well past their eligibility window for IPPE coverage.

Given the sampling criteria, each observation in the analytic sample is a distinct HRS participant and no individual contributes multiple observations across waves. The final sample sizes by type of services are as follows:

- Mammograms: treatment group 325, comparison group 1,036.
- Breast self-exams: treatment group 326, comparison group 1,037.
- Pap smears: treatment group 327, comparison group 1,030.
- Prostate cancer screenings: treatment group 249, comparison group 783.

For cholesterol tests and flu vaccines, models are estimated separately for men and women, given that gender may play a role in determining uses of preventive services (Cleary, Mechanic et al. 1982; Meissner, Breen et al. 2006; Deeks, Lombard et al. 2009).

- Cholesterol testing women: treatment group 326, comparison group 1,029.
- Cholesterol testing men: treatment group 254, comparison group 784.
- Flu vaccine women: treatment group 323, comparison group 1,031.
- Flu vaccine men: treatment group 254, comparison group 786.

Model specification

For each preventive service I estimate a multivariate logit model with the pooled cross-sectional data to model the effects of covering an IPPE on the use of that preventive service. The general form of the model is:

$$Logit\{pr(Y_i = 1|X)\} = \beta_0 + \beta_1 Post2005 + \beta_2 Treatment + \beta_3 Post2005 \cdot Treatment + \beta_4 X_i + \varepsilon_i$$

where Y_i is a binary indicator for the occurrence of screening (1 if yes, 0 if no), *Post2005* indicates whether the individual was interviewed in 2005 or later (1 if after, 0 if before), *Treatment* is a binary variable indicating membership in the treatment group (1 if yes, 0 if no), *Post2005·Treatment* is the interaction term between *Post2005* and *Treatment*, X_i is a vector of other covariates in the model and ε_i is a random error term. The coefficient on the interaction term, *Post2005·Treatment,* (β_3) quantifies the effect of eligibility for IPPE coverage on use of the preventive service. This estimation strategy essentially computes a difference-in-differences estimate of the effect of IPPE coverage (Wooldridge 2006).

Variables in X_i include predisposing, enabling, and need related variables suggested by Andersen's Behavioral model (Andersen 1995). Predisposing factors include demographic

characteristics, social structure, and health beliefs (Andersen 1995; Lo and Fulda 2008). In the HRS I measure these using gender, marital status, race, education and whether the individual previously used that particular preventive service. Enabling factors affect accessibility and the availability of resources and services (Yu, Bellamy et al. 2002; Inkelas, Newacheck et al. 2008). Enabling-related variables in each model include access to additional insurance beyond Medicare, such as an employer-sponsored policy or a Medigap plan, income, region of residence, urban/rural area, employment, and whether the individual was able to drive. Need factors affect an individual's belief about their need for health care based on their perception of their own health (Bradley, McGraw et al. 2002). Need-related variables in each model include smoking status, drinking status, whether the individual is overweight, the presence of chronic disease, self-rated health, eyesight, physical activity, performance on activities of daily living (ADL), and mental health status as measured by the Center for Epidemiologic Studies Depression Scale (CES-D).

2.5 Results

Table 1 reports definitions and descriptive statistics for variables used in this analysis. During the pre-period, i.e., before Medicare introduced IPPE coverage:

- 76% of women in the treatment group and 80% in the comparison group received a mammogram.
- 65% of women in the treatment group and 61% in the comparison group checked for breast lumps monthly.
- 64% of women in the treatment group and 63% in the comparison group had a Pap smear.
- 78% of men in the treatment group and 81% in the comparison group had a prostate exam.

- 68% of men in the treatment group and 67% in the comparison group received a flu vaccine.
- 67% of women in the treatment group and 70% in the comparison group received a flu vaccine.
- 87% of men in the treatment group and 84% in the comparison group received a cholesterol test.
- 82% of women in the treatment group and 84% in the comparison group received a cholesterol test.

Tables 2, 3, 4 and 5 report the estimated logit regressions. For all six preventive services, the estimated coefficient for the policy effect indicator is statistically insignificant. This indicates that having a six-month window of Medicare coverage for a one-time IPPE had no effects on the use of mammograms, breast self-exams, Pap smears, prostate cancer screenings, cholesterol tests, or flu vaccines among new Medicare enrollees.

A number of other factors were predictive of preventive services utilization, and I briefly discuss them here. Among women, those who previously received a mammogram were 10.81 times more likely to have one again (Table 2). Having employer-provided insurance (in addition to Medicare) increased a woman's likelihood of having a mammogram by 1.56 times. Full-time employment, non-drinkers, and the absence of any chronic diseases reduced the likelihood of having a mammogram by 0.48, 0.68, and 0.55 times, respectively. Women with good eyesight were 1.47 times more likely to receive a mammogram, while non-smokers were 2.15 times more likely to receive one.

For breast self-exams (Table 2), women who had previously checked their breasts for lumps were 13.88 times more likely to check them again. Women living in a rural area, who were

employed or who were married were more likely to check for breast lumps; and those with only a high school education or GED were less likely to perform a breast self-exam.

Women who previously received a Pap smear (Table 3) were 7.50 times more likely to receive another one. Living in the Northeast was associated with a higher likelihood of getting a Pap smear, compared to living in the West. Having employer-provided insurance (in addition to Medicare) and having better-than-good eyesight also improved the odds of receiving a Pap smear.

Men who previously received a prostate exam (Table 3) were 4.75 times more likely to receive another one. Men who were more highly educated were also more likely to be screened. Non-smokers, men with better-than-good eyesight, and who scored zero on the Center for Epidemiologic Studies Depression scale (CES-D) were also more likely to be screened. Having no chronic diseases and having no ADL limitations had negative effects on receiving a prostate exam.

For cholesterol tests (Table 4), women who previously had a cholesterol test were 5.11 times more likely to have another one, whereas men who previously had the test were 7.73 times more likely to have another one. Both women and men who do not smoke and who exercised regularly were more likely to have their cholesterol checked. In contrast, women and men without chronic diseases were less likely to be tested for cholesterol levels. Men with less-than-good health, with some college education and beyond, who were currently married, able to drive, who do not drink, and who scored zero on the CES-D were more likely to take a cholesterol test. Men with less-than-good eyesight, living in a rural area, living in the Midwest and South, and having no ADL limitations were less likely to take a cholesterol test. Finally, higher income had a positive effect on the use of cholesterol tests, but only among women.

Women and men who previously received a flu vaccine (Table 5) were respectively 17.57 and 16.55 times more likely to receive another one. Women and men who were non-smokers, and who had at least some college education were more also likely to receive a flu vaccine. However, among both women and men, those with no chronic diseases were less likely to receive one. Hispanic women were less likely to be vaccinated against flu, compared to both (non-Hispanic) White or Black women; living in the Northeast was associated with less likelihood of getting a flu vaccine, compared to living in the West. Women who were married, with less-than-good health were more likely to be vaccinated. Finally, men with better-than-good eyesight were more likely to receive a flu vaccine.

2.6 Discussion

This analysis of data from the 1996-2008 HRS reveals that covering a one-time IPPE had no effects on the use of mammograms, breast self-exams, Pap smears, prostate cancer screenings, cholesterol tests, or flu vaccines among new Medicare enrollees. Neither men nor women changed their use of preventive services in response to the availability of IPPE coverage.

For all six preventive care services, the single strongest predictor of use was previous utilization of that service. Other factors such as having better-than-good eyesight, having no chronic diseases, having no ADL limitations, not smoking, having supplemental health insurance, being married, being more educated, and being able to drive also affected the use of preventive services.

To ensure the robustness of these findings, a number of sensitivity analyses were conducted, yet in each case the same finding of no effects emerged. Specifically, I first re-estimated the models using different specifications, excluding and including key variables (Gertler, Martinez

et al. 2010). I also re-estimated the models without the "previous use of preventive care" as an independent variable, and then excluded variables that were not statistically significant. In each case, the results remained the same; the policy indicator was still statistically insignificant. I then estimated the model only using data from wave 7 (year 2004) and wave 9 (year 2008), to provide more balanced sample counts across the pre- and post- periods. Yet, in this case too, the policy indicator remained insignificant, except for prostate cancer screenings, where it showed a positive effect on receiving a prostate cancer screening (See Tables A1-A4 in Appendix A). Models were also re-estimated using an alternative comparison group of individuals ages 72 and 73 (not affected by the policy change), but the coefficient on the policy indicator remained insignificant (See Tables B1-B4 in Appendix B).

The results therefore suggest that the use of preventive services by new Medicare enrollees was not affected by coverage of an IPPE. Perhaps this is no surprise, as many Medicare enrollees were unaware of the IPPE benefit. According to Petroski and Regan (2009), only about 2.8% of the eligible individuals took advantage of the new benefit. Of those in the study who did not receive the benefit, 63% were unaware of it (Petroski and Regan 2009). Given the opportunity, about 78% of those who did not receive the benefit said they would have used the benefit if they had been aware of it (Petroski and Regan 2009). In addition, the CMS's own demonstrations in which similar or better benefits were provided, showed only marginal improvement in the use of some preventive services (U.S. GAO 2004). Indeed the 2009 policy change to increase the eligibility period to a year, reflected Medicare's commitment to addressing the issue. It will be interesting to see how the longer eligibility period affects the use of the IPPE and its follow-on impact on the use of preventive services.

This study has a number of limitations which should be noted. First, the HRS asked participants about their use of preventive services over the past two years. I would have preferred that it had asked "over the last year," as this would have allowed the data to capture the effects of IPPE coverage more accurately. Second, some might question the validity of using self-reported health care utilization data, especially in a sample of older adults. Yet, that is what was available to me in the HRS. Finally, this study was unable to determine whether the lack of an effect of coverage for an IPPE on receipt of disease screening was due to the low uptake of IPPE visits, as documented by Petroski and Reagan (2009), or to an ineffectiveness of IPPE visits when they occurred. Since the HRS did not ask explicitly about IPPE visits, I was unable to identify which beneficiaries actually had them. Although IPPE coverage had no effects on the overall use of preventive services, actually having an IPPE might have increased the use of preventive services among those beneficiaries who had it. This issue remains to be addressed, hopefully by future researchers using data other than the HRS.

The debate about the effectiveness of a one-time initial preventive physical examination or a "Welcome to Medicare" visit will continue from opponents and proponents alike. Efforts to improve the use of preventive services are important as the aging population increases in the U.S., and as quality health care, including preventive care, becomes imperative. Despite this need, the findings presented here strongly suggest that coverage of an IPPE had no significant impact on the use of preventive services, suggesting that policy-makers should consider other approaches to increase patient requests for recommended preventive services.

Table 1. Variable Definitions and Descriptive Statistics of the Comparison Group and Treatment Group before Medicare Introduced IPPE Coverage

Variable	Definition	Treatment group				Comparison group			
Dependent Variables		Mean		SE		Mean		SE	
Mammogram*	1 if reported use of a mammogram or x-ray; 0 otherwise	0.76		0.42		0.80		0.39	
Check for breast lumps*	1 if reported monthly self-exam for breast lumps; 0 otherwise	0.65		0.47		0.61		0.48	
Pap smear*	1 if reported use of a Pap smear; 0 otherwise	0.64		0.47		0.63		0.48	
Prostate exam*	1 if reported an examination of prostate; 0 otherwise	0.78		0.41		0.81		0.38	
Cholesterol test*	1 if reported blood test for cholesterol; 0 otherwise	Men		Women		Men		Women	
		Mean	SE	Mean	SE	Mean	SE	Mean	SE
		0.87	0.33	0.82	0.38	0.84	0.36	0.84	0.36
Flu vaccine*	1 if reported receiving a flu vaccine; 0 otherwise	Men		Women		Men		Women	
		Mean	SE	Mean	SE	Mean	SE	Mean	SE
		0.68	0.46	0.67	0.47	0.67	0.46	0.70	0.45
Control variables									
Previous use of mammogram*	1 if reported use of a mammogram or x-ray before; 0 otherwise	0.74		0.43		0.77		0.41	
Previous breast self-exam*	1 if reported monthly self-exam for breast lumps before; 0 otherwise	0.62		0.48		0.63		0.48	
Previous use of Pap smear*	1 if reported use of a Pap smear before; 0 otherwise	0.67		0.47		0.70		0.45	
Previous use of prostate exam*	1 if reported an examination of prostate before; 0 otherwise	0.76		0.42		0.75		0.43	
Previous use of cholesterol test*	1 if reported blood test for cholesterol before; 0 otherwise	Men		Women		Men		Women	
		Mean	SE	Mean	SE	Mean	SE	Mean	SE
		0.74	0.43	0.74	0.43	0.77	0.41	0.79	0.40
Previous use of flu vaccine*	1 if reported receiving a flu vaccine before; 0 otherwise	Men		Women		Men		Women	
		Mean	SE	Mean	SE	Mean	SE	Mean	SE
		0.51	0.50	0.53	0.49	0.49	0.50	0.54	0.49

Continued

Table 1 Continued

		Treatment group		Comparison group	
		Mean	SE	Mean	SE
Race:					
White	1 if White/Caucasian; 0 otherwise	0.76	0.42	0.83	0.37
Black	1 if Black/African American; 0 otherwise	0.14	0.35	0.11	0.32
Hispanic	1 if Hispanic/Latino; 0 otherwise	0.06	0.25	0.03	0.18
Other	1 if other races other than White, Black or Hispanic; 0 otherwise	0.08	0.28	0.05	0.22
Education:					
Less than high school	1 if less than 12 years of education; 0 otherwise	0.22	0.41	0.17	0.37
High school/GED	1 if 12 years of education; 0 otherwise	0.41	0.49	0.41	0.49
Some college and beyond	1 if more than 12 years of education; otherwise	0.36	0.48	0.41	0.49
Total household real income (in year 2007 dollars):					
Income1	1 if total household income less than $25000; 0 otherwise	0.28	0.45	0.23	0.42
Income2	1 if total household income between $25,000 and $50,000; 0 otherwise	0.32	0.46	0.34	0.47
Income3	1 if total household income more than $50,000, 0 otherwise	0.39	0.48	0.42	0.49
Married	1 if married; 0 otherwise	0.71	0.45	0.73	0.44
Census regions:					
Northeast	1 if census region of respondent live is Northeast; 0 otherwise	0.13	0.34	0.11	0.32
Midwest	1 if census region of respondent live is Midwest; 0 otherwise	0.28	0.45	0.32	0.46
South	1 if census region of respondent live is South; 0 otherwise	0.44	0.49	0.44	0.49
West	1 if census region of respondent live is West; 0 otherwise	0.13	0.34	0.11	0.32

Continued

Table 1 Continued

		Treatment group		Comparison group	
		Mean	SE	Mean	SE
Rural	1 if less than 250,000 population; 0 otherwise	0.39	0.48	0.38	0.48
CES-D score[a]	1 if scored 0 in CES-D; 0 otherwise	0.42	0.49	0.51	0.50
Employment	1 if employed full time; 0 otherwise	0.09	0.28	0.08	0.28
Chronic diseases	1 if reported 0 chronic diseases; 0 otherwise	0.13	0.34	0.13	0.34
Exercise	1 if reported perform physical activity; 0 otherwise	0.74	0.43	0.75	0.42
Not drinking	1 if reported not drinking; 0 otherwise	0.71	0.45	0.67	0.46
Not smoking	1 if reported not smoking; 0 otherwise	0.82	0.37	0.87	0.32
Driving	1 if able to drive; 0 otherwise	0.90	0.29	0.94	0.23
Employer provided insurance	1 if covered by employer insurance; 0 otherwise	0.43	0.49	0.44	0.49
Self-reported health:					
Better than good	1 if reported better than good health; 0 otherwise	0.36	0.48	0.48	0.50
Good	1 if reported good health; 0 otherwise	0.30	0.46	0.31	0.46
Less than good	1 if reported less than good health; 0 otherwise	0.32	0.46	0.20	0.40
Rate eyesight:					
Better than good	1 if reported better than good eyesight; 0 otherwise	0.32	0.47	0.39	0.48
Good	1 if reported good eyesight; 0 otherwise	0.45	0.49	0.44	0.49
Less than Good	1 if reported less than good eyesight; 0 otherwise	0.22	0.41	0.15	0.36
ADL[b]	1 if reported 0 ADL limitations; 0 otherwise	0.86	0.34	0.90	0.29
Overweight	1 if BMI is equal and greater than 25; 0 otherwise	0.70	0.45	0.68	0.46

[a] The activities of daily living (ADL) index covers: walking across a room, dressing, bathing, eating, getting in and out of bed, and using the toilet (Clair, Blake et al. 2011).

[b] Center for Epidemiologic Studies Depression Scale (CES-D) is the sum of negative indicators: felt depressed, everything an effort, sleep was restless, felt unhappy (1- felt happy), felt lonely, felt sad, could not get going, and not enjoyed life (1-enjoyed life) (Clair, Blake et al. 2011).

* Among a specific preventive care group only.

SE, standard error

Table 2. Logit Results. Effects of Medicare Policy Change, Predisposing Factors, Enabling Factors and Need Factors on the Use of Mammogram and Breast Self-Exam

	Mammogram		Breast Self-exam	
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Policy indicator				
Post 2005	0.94 (0.62-1.41)	0.770	0.97 (0.69-1.36)	0.898
Treatment	0.87 (0.55-1.37)	0.560	1.33 (0.89-1.99)	0.162
Post 2005* Treatment	0.89 (0.42-1.88)	0.772	0.85 (0.43-1.65)	0.633
Predisposing factors				
Previous mammogram/breast self-exam	10.81*** (7.80-14.99)	0.000	13.88*** (10.52-18.32)	0.000
Married	1.13 (0.78-1.65)	0.505	1.50** (1.08-2.09)	0.015
White	0.36 (0.09-1.40)	0.143	0.88 (0.29-2.64)	0.833
Black	0.65 (0.15-2.75)	0.567	0.75 (0.24-2.39)	0.634
Hispanic	0.34 (0.07-1.50)	0.155	0.45 (0.13-1.53)	0.204
High school/GED	0.99 (0.64-1.53)	0.978	0.64** (0.43-0.96)	0.032
Some college and beyond	1.12 (0.69-1.80)	0.639	0.81 (0.53-1.24)	0.342
Enabling factors				
Employer provided insurance	1.56** (1.10-2.22)	0.012	0.89 (0.67-1.18)	0.427
Employment	0.48** (0.27-0.86)	0.015	1.82** (1.03-3.23)	0.038
Driving	1.53 (0.91-2.57)	0.101	0.95 (0.58-1.58)	0.867
Income2	1.30 (0.85-1.99)	0.224	1.08 (0.73-1.57)	0.691
Income3	1.25 (0.77-2.02)	0.356	0.95 (0.62-1.44)	0.822
Northeast	1.02 (0.54-1.92)	0.950	1.21 (0.70-2.10)	0.476
Midwest	0.79 (0.46-1.35)	0.395	0.71 (0.45-1.12)	0.147
South	1.20 (0.72-2.02)	0.474	0.86 (0.56-1.34)	0.521
Rural	1.18 (0.84-1.67)	0.324	1.33* (0.99-1.78)	0.056
Need factors				
Not smoking	2.15*** (1.40-3.30)	0.000	1.24 (0.82-1.86)	0.296
Not drinking	0.68* (0.45-1.03)	0.074	1.05 (0.75-1.46)	0.764
Overweight	0.84 (0.59-1.21)	0.363	1.03 (0.76-1.39)	0.848
Exercise	1.19 (0.79-1.79)	0.397	0.86 (0.60-1.25)	0.459
No chronic diseases	0.55**(0.34-0.89)	0.017	1.17 (0.75-1.81)	0.472
No ADL	1.38 (0.85-2.24)	0.180	0.79 (0.50-1.26)	0.340
Zero CES-D	1.30 (0.91-1.84)	0.138	0.88 (0.65-1.18)	0.401
Better than good health	0.73 (0.48-1.10)	0.134	0.85 (0.60-1.19)	0.349
Less than good health	0.84 (0.54-1.32)	0.467	0.90 (0.60-1.34)	0.608
Better than good eyesight	1.47** (1.01-2.14)	0.041	0.80 (0.59-1.10)	0.178
Less than good eyesight	1.12 (0.71-1.76)	0.605	0.97 (0.65-1.46)	0.908
Pseudo R-squared	0.25		0.26	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Table 3. Logit Results. Effects of Medicare Policy Change, Predisposing Factors, Enabling Factors and Need Factors on the Use of Pap Smear and Prostate Cancer Screening

	Pap Smear		Prostate Cancer Screening	
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Policy indicator				
Post 2005	0.75* (0.55-1.03)	0.083	0.64** (0.42-0.97)	0.037
Treatment	1.23 (0.84-1.80)	0.268	0.85 (0.51-1.40)	0.530
Post 2005* Treatment	1.19 (0.64-2.21)	0.573	1.70 (0.74-3.89)	0.204
Predisposing factors				
Previous Pap smear/prostate	7.50*** (5.70-9.88)	0.000	4.75*** (3.29-6.86)	0.000
Married	1.19 (0.88-1.62)	0.250	1.13 (0.71-1.81)	0.584
White	0.55 (0.20-1.46)	0.233	0.64 (0.15-2.67)	0.547
Black	0.87 (0.30- 2.44)	0.792	0.92 (0.20-4.12)	0.915
Hispanic	0.62 (0.20-1.90)	0.411	0.67 (0.13-3.31)	0.630
High school/GED	1.10 (0.77-1.59)	0.581	1.58* (0.98-2.55)	0.060
Some college and beyond	1.16 (0.79-1.70)	0.448	1.65* (0.98-2.76)	0.055
Enabling factors				
Employer provided insurance	1.34** (1.02-1.76)	0.030	1.12 (0.77-1.62)	0.536
Employment	0.94 (0.57-1.54)	0.812	1.30 (0.76-2.24)	0.332
Driving	0.71 (0.45-1.12)	0.145	2.27 (0.72-7.09)	0.157
Income2	1.24 (0.87-1.76)	0.216	1.00 (0.61-1.63)	0.998
Income3	1.34 (0.90-1.98)	0.140	1.27 (0.74-2.19)	0.378
Northeast	1.65* (0.99-2.76)	0.052	0.61 (0.30-1.25)	0.183
Midwest	1.06 (0.69-1.62)	0.788	0.74 (0.40-1.36)	0.336
South	1.12 (0.74-1.68)	0.578	0.83 (0.46-1.47)	0.528
Rural	0.97 (0.74-1.28)	0.875	1.07 (0.74-1.55)	0.685
Need factors				
Not smoking	1.11 (0.76-1.63)	0.570	2.17*** (1.37-3.43)	0.001
Not drinking	0.79 (0.57-1.09)	0.156	1.09 (0.76-1.56)	0.623
Overweight	0.97 (0.72-1.29)	0.832	1.03 (0.69-1.53)	0.855
Exercise	1.17 (0.83-1.66)	0.353	1.25 (0.76-2.04)	0.365
No chronic diseases	0.88 (0.58-1.33)	0.551	0.46*** (0.28-0.76)	0.003
No ADL	1.25 (0.82-1.89)	0.289	0.55* (0.30-1.02)	0.060
Zero CES-D	1.11 (0.84-1.47)	0.445	1.64*** (1.13-2.39)	0.009
Better than good health	1.03 (0.75-1.42)	0.819	0.93 (0.61-1.43)	0.759
Less than good health	0.91 (0.63-1.31)	0.616	1.49 (0.91-2.44)	0.108
Better than good eyesight	1.29* (0.96-1.73)	0.085	1.42* (0.94-2.15)	0.087
Less than good eyesight	1.02 (0.70-1.48)	0.887	0.90 (0.55-1.45)	0.674
Pseudo R-squared	0.17		0.16	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Table 4. Logit Results. Effects of Medicare Policy Change, Predisposing Factors, Enabling Factors and Need Factors on the Use of Cholesterol Testing

	Cholesterol Testing			
	Women		Men	
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Policy indicator				
Post 2005	1.40 (0.88-2.25)	0.152	1.06 (0.62-1.80)	0.812
Treatment	0.97 (0.60-1.55)	0.912	2.11** (1.09-4.08)	0.025
Post 2005* Treatment	1.19 (0.48-2.91)	0.700	0.83 (0.26-2.60)	0.754
Predisposing factors				
Previous cholesterol	5.11*** (3.57-7.32)	0.000	7.73*** (4.94-12.10)	0.000
Married	1.29 (0.84-1.95)	0.233	1.63* (0.94-2.83)	0.080
White	0.27 (0.05-1.55)	0.145	0.96 (0.19-4.92)	0.968
Black	0.24 (0.04-1.42)	0.116	0.84 (0.15-4.67)	0.843
Hispanic	0.26 (0.04-1.72)	0.165	0.85 (0.13-5.44)	0.869
High school/GED	0.99 (0.61-1.60)	0.983	1.63 (0.90-2.94)	0.105
Some college and beyond	1.40 (0.83-2.39)	0.204	2.12** (1.11-4.03)	0.021
Enabling factors				
Employer provided insurance	1.20 (0.82-1.76)	0.322	0.88 (0.55-1.40)	0.598
Employment	0.78 (0.41-1.47)	0.449	1.14 (0.60-2.17)	0.677
Driving	0.83 (0.45-1.54)	0.572	9.28*** (2.57-33.43)	0.001
Income2	1.56* (0.97-2.51)	0.062	0.68 (0.36-1.28)	0.238
Income3	1.32 (0.78-2.25)	0.294	0.65 (0.32-1.30)	0.226
Northeast	1.42 (0.66-3.04)	0.363	0.51 (0.18-1.43)	0.204
Midwest	0.91 (0.49-1.69)	0.781	0.42* (0.17-1.02)	0.057
South	0.79 (0.44-1.41)	0.432	0.45* (0.19-1.04)	0.063
Rural	0.88 (0.61-1.27)	0.514	0.66* (0.42-1.04)	0.075
Need factors				
Not smoking	1.44 (0.90-2.28)	0.121	1.98** (1.12-3.50)	0.017
Not drinking	0.88 (0.57-1.36)	0.585	1.64** (1.05-2.56)	0.029
Overweight	1.02 (0.69-1.49)	0.918	1.43 (0.90-2.29)	0.126
Exercise	1.76*** (1.14-2.69)	0.009	1.69* (0.96-2.96)	0.065
No chronic diseases	0.36*** (0.23-0.57)	0.000	0.30*** (0.17-0.53)	0.000
No ADL	1.22 (0.68-2.20)	0.496	0.45* (0.18-1.09)	0.077
Zero CES-D	0.86 (0.58-1.25)	0.435	2.01*** (1.25-3.22)	0.003
Better than good health	0.69 (0.44-1.07)	0.101	0.94 (0.55-1.60)	0.832
Less than good health	0.97 (0.57-1.64)	0.933	2.46*** (1.28-4.70)	0.006
Better than good eyesight	0.95 (0.64-1.42)	0.832	1.22 (0.73-2.03)	0.440
Less than good eyesight	0.98 (0.58-1.64)	0.949	0.59* (0.32-1.07)	0.088
Pseudo R-squared	0.16		0.26	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Table 5. Logit Results. Effects of Medicare Policy Change, Predisposing Factors, Enabling Factors and Need Factors on the Use of Flu Vaccine

	Flu Vaccine			
	Women		Men	
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Policy indicator				
Post 2005	0.76 (0.52-1.12)	0.174	0.63** (0.42-0.96)	0.031
Treatment	0.87 (0.56-1.35)	0.541	1.08 (0.67-1.73)	0.743
Post 2005* Treatment	0.85 (0.41-1.77)	0.680	0.79 (0.36-1.73)	0.560
Predisposing factors				
Previous flu vaccine	17.57*** (12.55-24.59)	0.000	16.55*** (11.41-23.99)	0.000
Married	1.39* (0.96-2.01)	0.074	1.38 (0.87-2.20)	0.165
White	1.51 (0.50-4.55)	0.461	0.56 (0.14-2.24)	0.414
Black	0.65 (0.20-2.07)	0.465	0.39 (0.09-1.69)	0.214
Hispanic	0.32* (0.09-1.16)	0.085	0.54 (0.11-2.53)	0.439
High school/GED	1.27 (0.83-1.94)	0.261	1.63** (1.01-2.64)	0.043
Some college and beyond	1.55* (0.98-2.45)	0.059	1.79** (1.07-2.98)	0.025
Enabling factors				
Employer provided insurance	1.09 (0.79-1.50)	0.584	1.05 (0.75-1.49)	0.744
Employment	0.76 (0.42-1.35)	0.351	0.88 (0.54-1.43)	0.617
Driving	0.87 (0.49-1.52)	0.628	1.28 (0.32-5.09)	0.723
Income2	0.81 (0.53-1.24)	0.338	1.14 (0.70-1.87)	0.579
Income3	0.72 (0.45-1.15)	0.179	0.84 (0.50-1.41)	0.523
Northeast	1.28 (0.67-2.41)	0.445	0.85 (0.42-1.69)	0.648
Midwest	0.62* (0.36-1.04)	0.075	0.70 (0.39-1.25)	0.233
South	0.67 (0.40-1.11)	0.124	0.68 (0.40-1.17)	0.172
Rural	1.11 (0.80-1.54)	0.509	1.06 (0.75-1.51)	0.713
Need factors				
Not smoking	1.90*** (1.22-2.96)	0.004	1.62* (0.99-2.64)	0.051
Not drinking	0.94 (0.65-1.36)	0.756	0.92 (0.65-1.29)	0.644
Overweight	1.31 (0.93-1.83)	0.111	1.22 (0.82-1.80)	0.310
Exercise	1.20 (0.80-1.81)	0.359	0.98 (0.61-1.58)	0.965
No chronic diseases	0.63** (0.40-0.99)	0.047	0.64* (0.39-1.03)	0.072
No ADL	0.93 (0.55-1.54)	0.777	1.01 (0.55-1.88)	0.951
Zero CES-D	1.07 (0.77-1.48)	0.667	1.00 (0.70-1.43)	0.962
Better than good health	1.17 (0.80-1.70)	0.480	0.81 (0.54-1.21)	0.320
Less than good health	1.99*** (1.26-3.14)	0.003	1.42 (0.87-2.29)	0.152
Better than good eyesight	1.06 (0.75-1.50)	0.709	1.43* (0.98-2.10)	0.063
Less than good eyesight	1.01 (0.66-1.57)	0.929	1.00 (0.62-1.60)	0.995
Pseudo R-squared	0.32		0.28	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Chapter 3: Effects of Health Shocks on the Initiation of Use of Preventive Services

3.1 Introduction

Interest in encouraging older adults' utilization of preventive healthcare among health professionals and policy makers is not new. The Medicare Modernization Act of 2003, the Medicare Improvements for Patients and Providers Act of 2008, and most recently, the Affordable Care Act of 2010 all contained provisions to increase older adults' access to affordable preventive healthcare services. The U.S. Preventive Services Task Force (USPSTF) recommends routine use of core preventive services for older adults and, since 2011, all health insurers have been required to cover such services in full. However, only 25% of adults ages 50-64, and fewer than 40% of adults ages 65 or older are up-to-date on recommended preventive healthcare services (CDC 2013).

The argument for encouraging the use of preventive services is that they may prevent more serious illnesses that can be deadly and/or very costly to treat from occurring. The topic is controversial, especially when the focus is solely on cost savings. No clear picture has emerged from the literature as to the savings or cost effectiveness of preventive health care services, due to the different criteria and models used in different studies (Eisenberg 1994; Colby, Quinn et al. 2009; Maciosek, Coffield et al. 2010). Controversy surrounding the issue can be attributed to differing views regarding the effectiveness of various preventive care services, the optimal timing of services (e.g., recommended time between mammograms), the direct and indirect costs of using recommended services, and other factors.

There are, however, a few preventive care services where a consensus opinion on their value has been achieved. For example, it is generally agreed that the use of low dose aspirin among older adults has net positive health and cost outcomes (Colby, Quinn et al. 2009). Even though not

all preventive services yield cost savings, most experts agree that using preventive care services can improve overall health (Colby, Quinn et al. 2009).

With the aging of the U.S. population, the burden of financing health care for older adults has grown larger. According to the U.S. Administration on Aging (AOA), 13% of the total population was 65 years or older in 2000, and that percentage is expected to increase to 19% by 2030 (AOA 2013). Older adults are at high risk of acute and chronic illnesses, yet some illnesses may be preventable if use of preventive care services is more widespread. Epidemiologists estimate that 70% of deaths in the U.S. are attributed to preventable diseases such as high blood pressure, heart disease, and cancer, yet only 3% of health care spending goes towards prevention, and 75% of spending goes towards treatment (IOM 2012; CMS 2013). Given the relatively low usage rate for many preventive services (based on the U.S. Government Accountability Office (GAO) report), and their potential to improve health and alleviate health care spending (Maciosek, Coffield et al. 2010), it is important to encourage older adults to use recommended preventive services (GAO 2012). Increasing life expectancies, as a result of improved health care treatments, make preventive services even more important to ensure people's lives remain productive and healthy.

This paper examines the effects of unexpected health shocks among older adults on their initiation of use of preventive health care services. By initiation I mean starting to use a particular preventive care service, whereas previously the person did not use it. Using panel data from the ongoing Health and Retirement Study, this paper examines how the acquisition of new information, acquired through an unanticipated health shock, affects an older adult's decisions to begin using preventive care services.

3.2 Background

Only a few past studies have analyzed the effects of health shocks on the use of preventive health care services, either empirically or theoretically. Most studies related to health shocks have investigated their effects on health care spending, employment, earnings, the timing of retirement, the decision to smoke, and household wealth. Conceptually, a health shock is defined as an exogenous or a sudden event, caused by an accident or disease, that affects the well-being of an individual (Riphahn 1999).

Studies have used a variety of methods to measure "health shocks." Some commonly used indicators have been: a decline in self-rated health, the onset of health limitations affecting one's ability to work, the emergence of a disability, increased difficulty with activities of daily living (ADL limitations), the onset of a doctor-diagnosed illness, and occurrence of a hospital stay.

Following Siegel (2006), the present study uses four health shock measures: the onset of a work-limiting health condition, the occurrence of a new doctor-diagnosed illness, an increase in ADL limitations, and the occurrence of a hospitalization. The onset of a work-limiting health condition essentially measures the functional condition of one's health (Dwyer and Mitchell 1999; Siegel 2006). This measure is considered more subjective, since it is based on a self-assessment of the seriousness of one's condition. The individual judges it to be serious enough to limit his or her ability to work. On the other hand, an increase in ADL limitations, the emergence of a doctor-diagnosed illness, and a hospitalization are considered more objective measures of changes in health (Siegel 2006). This is because individual survey questions often ask specifically about these events, and unlike self-rated health, their occurrence typically will not vary depending on the person's subjective perceptions of health at the time of interview.

Arguments abound regarding measurement error and the potential endogeneity of health shock measures. They will not be discussed here because no paper has yet been published with a satisfactory solution (Bound 1991; Dwyer and Mitchell 1999; Siegel 2006; Gupta, McDade et al. 2010). Yet some economists have argued that these measures can be considered exogenous because, although individuals may anticipate new negative health events, the timing of these events is typically unanticipated (Bound 1991; Dwyer and Mitchell 1999; Smith 1999).

A health shock can influence the use of preventive services through various mechanisms. Theoretically, a health shock's effects are ambiguous as individuals use different coping methods to mitigate the shock (Dasgupta and Ajwad 2011). Only a few key channels of the effects will be explained. The question must be answered empirically.

One way a health shock can affect behavior is by changing an individual's perceptions and beliefs (Falba 2005) so they realize the need for and benefits of using preventive services. In effect, it is learning through experience that they are more vulnerable to illness or disability than they previously thought. Unfortunately, in some cases the individual learns they now have a condition that might have been detectable sooner had they regularly used preventive care services. Thus heightened perceptions of risk may lead an individual to increase their demand for preventive services.

Another way a health shock can affect demand for preventive care services is through education from health care providers that occurs in conjunction with their treatment for the health shock. When the patient receives treatment, he or she may be told about the benefits and need to use preventive services. This can be accredited to the interaction between the patient and nurses or physicians during counseling sessions (Lane, Zapka et al. 2000). In addition, after falling ill, pressure or support from families and friends can also increase an individual's willingness to

accept and acknowledge their need to use preventive services. Pain and suffering associated with a health shock may also provide the incentive to be proactive and to participate in the use of preventive measures.

A health shock can also force an individual to reallocate the household's resources to pay for treatment of an unanticipated illness, therefore diverting resources that could have been used for preventive care. Chronic diseases can constrain the resources of older adults to be able to use preventive services (Rowland and Lyons 1996), especially those with fixed and limited income. A health shock may also force individuals out of the labor market temporarily or permanently (early retirement, disability) which can reduce the household's income and reduce the consumption of preventive services (Gallo, Bradley et al. 2000).

Most previous empirical studies have focused on the socio-economic determinants of use of preventive services, such as education, age, race, gender, income, and health insurance coverage (Jepson, Clegg et al. 2000; Margaret and Peter 2001; Lairson, Chan et al. 2005). One study that focused on health status (not a health change or health shock) using both the HRS and the Medical Expenditures Panel Survey (MEPS) data found that individuals in worse health are more likely to get flu vaccines and cholesterol testing, but less likely to have mammograms, Pap smears, breast exams and prostate checks (Wu 2003a). According to the author, these results may stem from the differences in preventive service procedures. For example, a flu vaccine does not provide information about present and future health status, whereas a cancer screening provides information about having a particular disease. Fear and anxiety may be associated with learning whether one has cancer, whereas the flu vaccine simply prevents a routine illness (Wu 2003a).

Only one empirical study, to my knowledge, has examined the effects of health shocks on the use of preventive services. Using data from the Medicare Current Beneficiary Survey (MCBS-

from the 1992-2003 Cost and Use files and 1996-1999 Access to Care files), Ayyagari (2007) studied individual perceptions about the risk of contracting pneumonia and examined whether individuals update these perceptions in response to a health shock. He found that individuals update their risk perceptions and change their demand for the pneumococcal vaccine following a health shock. Individuals who experience a health shock are more likely to get vaccinated than those who do not.

A few studies have examined the effects of health shocks on changes in health behaviors, such as quitting smoking. Falba (2005) used HRS data from 1992 through 1998 and found that serious new health events have huge impacts on cessation rates among older smokers. Further, the effects persist for as long as six years after a health shock. Another study based on HRS data from 1992 through 2000 found that individuals update their subjective survival expectations in response to information from their own health shocks, and they also quit smoking in response to major health shocks (Khwaja, Sloan et al. 2006). Studies of the effects of health shocks on health behaviors generally show positive behavioral changes after the occurrence of negative health events.

The present paper examines the effects of health shocks on the initial use of preventive services, and it contributes to existing literature in three ways. First, I examine the effects of health shocks on the use of six different preventive services, including both flu immunizations and five disease screening procedures. (Ayyagari (2007) examined only pneumococcal vaccines.) Second, I analyze data from the ongoing Health and Retirement Survey (HRS), a data source that has not yet been used to analyze the effects of health shocks on preventive care utilization. Finally, I examine the effects of four different health shock measures on the use of preventive care services.

3.3 Data and Empirical Strategy

Data from the Health and Retirement Study (HRS) and the RAND HRS are used for the analysis. The HRS is a nationally representative sample survey of older adults in the U.S. that has been conducted every two years since 1992. The survey contains copious self-reported information on health, health care use, insurance coverage, and socio-demographic information, etc. (HRS 2012). The HRS first surveyed a sample of adults ages 51-61 in 1992, and this sample is called the "original HRS cohort." The HRS also surveyed the spouse of each married individual in this cohort, regardless of age. A second survey, conducted in 1993 and called the Study of Assets and Health Dynamics among the Oldest Old (AHEAD), was a survey of individuals ages 70 and older. As with the HRS, spouses were also surveyed in AHEAD (Juster, Willis et al. 2012). Participants in both surveys were re-interviewed every two years, and in 1998 these two surveys were combined and have since been referred to simply as the HRS. (More information is available on the HRS website.)

The RAND HRS is derived from the HRS, and contains many (but not all) key variables from the HRS. RAND HRS files are constructed for ease of use, and variables in the file are named and formatted to be consistent across HRS waves (RAND 2011).

This study is based entirely on the unrestricted, public-use HRS and RAND HRS data files that are downloadable from their websites, and qualifies for exempt IRB status under 45 CFR 46.101(b).

Sampling Criteria

Data are drawn from the 1998, 2000, 2002, 2004, 2006 and 2008 waves of the HRS. To study the initiation of the use of preventive services after health shocks, two waves of data are compared (e.g. between wave 1998 and 2000) to show behavior change. For example, the sample

contains individuals who did not use mammograms (previous non-users) in the previous wave but remain in the current wave to observe whether they schedule a mammogram after a health shock. The study sample is limited to individuals ages 40 or older because the preventive services studied are normally recommended for adults in this age group, and they are more prone to health shocks. The combined sample size for all six preventive services is 3,260 observations.

Given the sampling criteria, some samples contain a few individuals who are observed multiple times (repeated measures data). However, since there were so few instances where this occurred, it has not been addressed econometrically. For example, the worst case is that 33 individuals were observed twice for the mammogram sample over total observations of 557. In addition, the breast self-exam and flu vaccine samples both have one individual observed twice. For the remaining samples, all observations are distinct individuals; no individual has multiple observations across waves. The final sample sizes by type of services are as follows:

- Mammograms -- 557 previous non-users out of 2,472 total observations (previous users and previous non-users combined).
- Breast self-exams -- 949 previous non-users out of 2,585.
- Pap smears -- 742 previous non-users out of 2,575.
- Prostate cancer screenings -- 608 previous non-users out of 2,063.

For flu vaccines and cholesterol tests, the models are estimated separately for men and women, given that gender may play a role in determining the different uses of preventive services (Cleary, Mechanic et al. 1982; Meissner, Breen et al. 2006; Deeks, Lombard et al. 2009).

- Flu vaccines -- Women's sample has 1,178 previous non-users out of 2,595 total observations; men's sample has 995 previous non-users out of 2,076.

- Cholesterol tests -- Women's sample has 581 previous non-users out of 2,585; men's sample has 527 previous non-users out of 2,065.

Dependent Variables

The HRS asked about preventive services through the following question: "Since we talked to you last, or in the last two years, have you had any of the following medical tests or procedures: A flu shot? A blood test for cholesterol?" For women it also asked, "Do you check your breasts for lumps monthly? A mammogram or x-ray of the breast, to search for cancer? A Pap smear?" and for men it asked, "An examination of your prostate to screen for cancer?" For each of these six services, if the individual received the service over the period in question, then the dependent variable for that service equals one; if they did not receive it over the period, the dependent variable equals zero.

Health Shock Variables

The HRS asked about health shocks measures through the following question: "Do you have any impairment or health problem that limits the kind or amount of paid work you can do?," "Please tell me if you have any difficulty with these activities because of a physical, mental, emotional or memory problem: Dressing, including putting on shoes and socks? Walking across a room? Bathing or showering? Eating, such as cutting up your food? Getting in or out of bed?" The survey also asked, "Since we last talked to you (or since the previous wave), has a doctor told you that you have: High blood pressure or hypertension? Diabetes or high blood sugar? Cancer or a malignant tumor, excluding minor skin cancer? Chronic lung disease, such as chronic bronchitis or emphysema? Coronary heart disease, angina, congestive heart failure, or other heart problems? A stroke? Any emotional, nervous, or psychiatric problems? Arthritis or rheumatism?" Finally,

it also asked "Altogether how many nights were you a patient in the hospital in the last two years (or since the previous wave)?"

I define a health shock as an adverse health event that occurred between the current and previous wave. For example, if an individual reported no heart attack in the previous wave and then has a heart attack in the current wave, without any previous history of heart attack, this is considered a health shock (Smith, Taylor et al. 2001).

Following Smith (1999), Ward-Batts (2001), and Wu (2003b), our health shock variables distinguish between the onset of a major illness and the onset of a minor illness. Smith (1999) used and defined major and minor onset illnesses, with the former consisting of cancer, heart condition, stroke, and lung disease, and the latter consisting of high blood pressure, diabetes, and arthritis. Thus, any onset of cancer diagnosis, lung disease, heart condition, or stroke is considered a major health shock binary variable (1 if yes, 0 if no). The minor health shock binary variable is created when any of the new doctor-diagnosed illnesses of high blood pressure, diabetes, arthritis or psychiatric problems are reported (1 if yes, 0 if no).

The new ADL limitations is an aggregated binary variable (1 if yes, 0 if no) for the onset of any these difficulties: walking across a room, getting in and out of bed, dressing, bathing, or eating. This aggregated strategy for new ADL limitations is used by Khwaja, Sloan et al. (2006) as well. The "new work-limiting health condition" variable (1 if yes, 0 if no) represents the health shock when individuals reported a health limitation that affected their ability to work.

Overnight hospitalizations that occurred between HRS waves are categorized into two groups/variables. The first group consists of stays of one to two nights in the hospital (1 if reported hospitalized for one to two nights, 0 otherwise). The second group consists of stays of three or more nights in the hospital (1 if reported hospitalized for three or more nights, 0 otherwise). The

reference group consists of individuals who had no overnight stay in the hospital (1 if reported no hospitalization, 0 otherwise). Stays of three or more nights in the hospital are generally considered more serious (Khwaja, Sloan et al. 2006).

Finally, any new work-limiting health condition, new doctor-diagnosed illness, new ADL limitation, or overnight hospitalization is indexed into a single aggregated binary variable (called "any health shocks variable").

Other Independent Variables

Other independent variables in each model include ones widely used in previous studies of preventive services utilization. They are based on the Andersen Behavioral Model which has been studied and reported on extensively (Andersen 1995; Lo and Fulda 2008). These variables include age, marital status, race, years of education, having employer-provided insurance, employment status, household income, region of residence, urban/rural area, smoking status, drinking status, exercise status, and overweight status.

Econometric Model

For each preventive service, I estimate a multivariate logit model with the pooled cross-sectional data to model the effects of health shocks on the initiation of these six preventive health care tests or procedures: (1) mammogram, (2) breast self-exam, (3) Pap smear, (4) prostate cancer screening, (5) cholesterol test, and (6) flu vaccine. For each test or procedure the general form of the model estimated is:

$$Logit\{pr(Y_{it} = 1 | Y_{i,t-1} = 0)\} = f(HS_{i,t-1}, X_{it})$$

where Y_{it} and $Y_{i,t\text{-}1}$ are binary indicators for individual i reporting use of the procedure in period t and $t\text{-}1$, respectively, and where each is a simply binary variable defined as 1 if yes and 0 if no. The function, $f(\,)$ is the cumulative density function of a standard logit random variable, $HS_{i,t\text{-}1}$ is

a vector that describes the occurrence of various health shocks for individual *i* in period *t-1*, and X_{it} is a vector of other covariates in the model.

For each preventive test or procedure, four versions of the model above are estimated that differ in terms of how health shocks are entered into the model. First, the aggregated binary variable of "any health shock" is entered as the sole measure of a health shock occurrence. The second and third models are estimated with both functional and disease condition health shock variables included in a single model, similar to the approach used in Siegel (2006). The second model includes the new work-limiting health condition (a more subjective health shock measure), and new major and minor illness variables as explanatory variables for the study, whereas the third model includes the new ADL limitations (a more objective health shock measure) and new major and minor illness variables to estimate the effects of health shocks. This takes into account that functional and disease conditions are not mutually exclusive measures of a health shock, rather they are complementary (Dwyer and Mitchell 1999). Finally, the fourth model accounts explicitly for all four health shocks measures/variables simultaneously, i.e., new work-limiting health condition, new ADL limitations, new doctor-diagnosed illnesses, and overnight hospitalization. For each model, the interest centers on the odds ratios (ORs) of the health shock variables. The analytical strategy used in this paper is similar to the Falba and Sindelar (2008) study.

3.4 Results

Table 6 lists descriptive statistics for variables used in this analysis. The study is focused on adults ages 40 or older, with 59 as the average age for the sample and the oldest participant at 93 years old. Separate models are estimated for men and for women. In the overall sample, 55% are women and 45% are men. Only 20.7% of men and 21.3% of women started getting flu vaccines. Larger percentages of 41.5% of men and 43.3% of women started cholesterol testing.

Percentages of gender specific, non-users who started the screenings are as follows: mammograms (39.8 %), breast self-exams (29.6%), Pap smears (31.1%), and prostate cancer screenings (35.1%).

Table 7 shows the percentage of initiators (new users) who experienced specific health shocks within the past two years for each preventive service, based on the aggregated new doctor-diagnosed illnesses:

- Mammograms – 26.1 %
- Breast self-exams – 19.5 %
- Pap smears – 24.6 %
- Prostate cancer screenings – 23.8%
- Flu vaccines – 25.1% of men, 21.4% of women
- Cholesterol testing – 22.8% of men, 25.5% of women

See Table 7 for the results of additional health shock measures.

Tables 8a to 8h report the odds ratios (ORs) of the health shock effects, derived from the estimated logit regressions. For all six preventive services, the estimated odds ratios of the five health shock variables are different in values and varied in statistical significance, as discussed below. Taken together, however, these results indicate the onset of negative health events has significant and positive effects on the initiation of use of mammograms, Pap smears, prostate cancer screenings, cholesterol tests, and flu vaccines among adults ages 40 or older. The exception is breast self-exams. The odds ratios of all the health shock variables are statistically insignificant for breast self-exams. Tables C1 through C16 in Appendix C contain the full regression results for each model estimated.

For mammogram screenings (Table 8a), the first model reveals that women who experience a health shock of any kind are 1.87 times more likely to begin mammogram screenings, compared

to women who have not experienced a health shock. For the second, third and fourth models' estimations, women who experience a health shock either from major illnesses or a stay of three or more nights in the hospital are 2.03, 2.11 and 2.30 times more likely to begin mammogram screenings, compared to women who have not. Other health shock measures have no effect on the use of mammograms.

For Pap smears (Table 8c), women who experience a health shock of any kind are 1.48 times more likely to initiate screening for cervical cancer, compared to women who have not had a health shock. Only women with one to two and/or three or more nights' stay in the hospital increase the likelihood of beginning Pap smear screenings by 1.23 and 1.16 times, respectively, compared to women who have not had a health shock.

With regard to prostate cancer screening, for all the health shock measures/variables, except new work-limiting health condition for the second model and new work-limiting health condition and new major illnesses for the fourth model, men who experienced health shocks are more likely to initiate prostate cancer screenings (Table 8d).

For cholesterol tests, all of the health shock measures' odds ratios are statistically significant for the men's sample (Table 8e), except new work-limiting health condition for the second model and new work-limiting condition and new major illnesses for the fourth model's estimation. For women (Table 8f), the first model shows that those who experience a health shock of any kind are more likely to start getting cholesterol tests. In addition, the odds ratios of all health shock variables are statistically significant for the women's sample, except new work-limiting health condition and new minor illness measures for the second and third model's estimations respectively. However, the fourth model's estimation shows that only measures of new major illness and one to two nights' stay in the hospital are statistically significant.

For flu vaccines in the men's sample, any new health shocks, new ADL limitations, new major illnesses and three nights or more in the hospital's odds ratios are statistically significant based on those four models' estimations (Table 8g); for the women's sample (Table 8h), only those who experience a health shock of any kind, new minor illnesses and three or more nights' stay in the hospital are more likely to start getting flu vaccines.

3.5 Discussion

This analysis of HRS and RAND HRS data covering 1998 through 2008 reveals that among adults ages 40 and older, the occurrence of health shocks has significant positive effects on the initiation of use of mammograms, Pap smears, prostate cancer screenings, cholesterol tests, and flu vaccines. This study has shown that the onset of acute illness or disability can change the health behavior of individuals and encourage them to start using certain types of preventive health care services. This finding parallels the findings from previous studies focused on other types of health behavior. Broadly speaking, people tend to change their health behaviors or learn from their negative health experiences by adopting more positive health habits, such as quitting smoking, using preventive services, etc. (Sundmacher 2011).

Regarding breast self-exams, the USPSTF's guidelines report there is insufficient evidence to recommend either for or against breast self-exams. In addition, both public and private medical organizations generally do not encourage or recommend breast self-exams as a method to screen for breast cancer. Mammograms are recommended instead. Given this guideline and the focus on mammograms as the preventive tool, the fact that no effects of health shocks on the use of breast self-exams is perhaps to be expected.

It is worth noting that three or more nights in the hospital has a positive effect on the initiation of the use of preventive services. This is consistent with the conceptual framework. Patients who have more serious health shocks spend more days in the hospital, therefore increasing the opportunity for education and information about the need to use preventive services. Finally the pain and suffering, and support from the family, can provide the incentive to use preventive services.

Another key observation from the results is that compared to more subjective health shock measures (the onset of a work-limiting health condition), the more objective health shock measures (an increase in ADL limitations, the emergence of a doctor-diagnosed illness, and the number of nights spent in the hospital) consistently have positive effects on the use of preventive services, even though the odds ratios are different in values (some have marginal effects). The more objective measures are less likely to be endogenous than subjective measures, with less likelihood of a measurement error due to the specifics of the questions asked in the survey (Siegel 2006). Given that different health shock variables are used, the odds ratios of covariates did not change much in the models. The results seem to be robust and consistent with the hypothesis and theoretical framework.

Other factors such as age, marital status, race, years of education, employer-provided insurance, employment status, region of residence, urban/rural area, smoking status, drinking status, exercise status, and overweight status affect the use of preventive services as well.

To ensure the robustness of the findings, a number of sensitivity analyses were conducted. The models were re-estimated in various ways and the same finding of a positive effect emerged each time. Different model specifications were re-estimated with each of the health shock variables included in a single model (Siegel 2006). For example, new work-limiting health condition, new

major and minor illness variables, new ADL limitations and hospitalization are each used and estimated in four separate models. In general, the results show that the odds ratios of health shock variables have similar results with varying positive statistical significance on the use of preventive services (See Tables D1-D16 in Appendix D). With these results, the hypothesis that health shocks have a positive effect on the use of preventive services remains the same.

Other model specifications, such as using eight individual variables for each of the new doctor-diagnosed illnesses, yield similar positive effects of health shocks on the use of preventive services (See Tables E1-E16 in Appendix E). Although not all doctor-diagnosed illnesses' odds ratios are statistically significant, the key observation from this analysis is that cancer onset diagnosis, lung disease, heart disease and high blood pressure consistently estimated the positive effects on the initiation of use of preventive services.

Despite the efforts to take into account the various potential estimation issues, this study has limitations. First, an argument can be made against the validity of the self-reported survey, especially for older adults. Also there can be a delay between the health shock and its effect on the use of preventive services. Finally, some preventive services may not require annual screenings, so individuals would not have needed the screening between investigated waves. All these can bias the estimations.

According to the GAO (2012), the use of certain preventive services is still low among older adults. This raises a question about whether there are opportunities to help older adults start using preventive services. The accessibility and interaction between patients and health care professionals while hospitalized due to health shocks provides an opportunity for a teachable moment (Falba 2005). Public information campaigns may be a good strategy to educate and inform older adults about the need to use preventive services. Nurses and doctors also need to be re-

educated and prompted to encourage patients to consider preventive services and bring them up-to-date about the new recommendations (Balas, Weingarten et al. 2000). One interesting issue is whether the occurrence of spousal concordance in terms of spousal health shocks affects an individual's use of preventive services. The decision to use preventive services might be a family decision rather than an individual one. Clearly, further research is warranted.

Table 6. Variable Definitions and Descriptive Statistics for all Combined Samples

Variables	Definition	Mean	SE
Dependent variables			
Mammogram*	1 if reported use of a mammogram or x-ray; 0 otherwise	0.39	0.49
Check for breast lumps*	1 if reported monthly self-exam for breast lumps; 0 otherwise	0.29	0.45
Pap smear*	1 if reported use of a Pap smear; 0 otherwise	0.31	0.46
Prostate exam*	1 if reported an examination of prostate; 0 otherwise	0.35	0.47
Cholesterol test*	1 if reported blood test for cholesterol; 0 otherwise	Men: Mean 0.41, SE 0.49	Women: Mean 0.43, SE 0.49
Flu vaccine*	1 if reported receiving a flu vaccine; 0 otherwise	Men: Mean 0.20, SE 0.40	Women: Mean 0.21, SE 0.41
Control variables			
Married	1 if married; 0 otherwise	0.72	0.44
Employer provided insurance	1 if covered by employer insurance; 0 otherwise	0.59	0.49
Employment	1 if employed full time; 0 otherwise	0.42	0.49
Race:			
White	1 if White/Caucasian; 0 otherwise	0.76	0.42
Black	1 if Black/African American; 0 otherwise	0.12	0.33
Other	1 if other races other than White or Black; 0 otherwise	0.10	0.30
Education:			
Less than high school	1 if less than 12 years of education; 0 otherwise	0.20	0.40
High school/GED	1 if 12 years of education; 0 otherwise	0.37	0.48
Some college and beyond	1 if more than 12 years of education; otherwise	0.42	0.49
Total household real income (in 2005 dollars):			
Income1	1 if total household income less than $25000; 0 otherwise	0.26	0.44
Income2	1 if total household income between $25,000 and $50,000; 0 otherwise	0.25	0.43
Income3	1 if total household income more than $50,000, 0 otherwise	0.48	0.49
Census regions:			
Northeast	1 if census region of respondent live is Northeast; 0 otherwise	0.15	0.36
Midwest	1 if census region of respondent live is Midwest; 0 otherwise	0.17	0.37
South	1 if census region of respondent live is South; 0 otherwise	0.42	0.49
West	1 if census region of respondent live is West; 0 otherwise	0.25	0.43

Continued

Table 6 Continued

		Mean	SE
Rural	1 if less than 250,000 population; 0 otherwise	0.30	0.46
Exercise	1 if reported perform physical activity; 0 otherwise	0.47	0.50
Not drinking	1 if reported not drinking; 0 otherwise	0.67	0.46
Not smoking	1 if reported not smoking; 0 otherwise	0.77	0.41
Male[a]	1 if male; 0 otherwise	0.45	0.49
Age	Age, in years	59.5	9.7

* Among a specific preventive care group only.
[a] Only applied to flu vaccines and cholesterol checks' samples.
SE, standard error

Table 7. Percentage of Initiators (New Users) who Experienced Specific Health Shocks Within the Past Two Years for Each Preventive Service

	Mammogram	Brest self-exam	Pap smear	Prostate	Cholesterol		Flu vaccine	
					Male	Female	Male	Female
Any health shocks[1]	50.4%	44.6%	50.8%	43.9%	42.2%	42.9%	44.8%	45.8%
Work-limiting health condition	11.2%	7.9%	14.4%	11.3%	10.1%	9.3%	10.8%	6.8%
ADL limitations	11.7%	11.7%	10.8%	8.4%	9.5%	12.7%	11.1%	9.5%
Major illnesses	9.9%	8.5%	10.3%	7.9%	9.1%	8.7%	11.1%	6.7%
Minor illnesses	18.9%	13.1%	17.3%	18.7%	19.1%	15.8%	14.5%	20.3%
Doctor diagnosed illnesses	26.1%	19.5%	24.6%	23.8%	25.1%	21.4%	22.8%	25.5%
1 to 2 overnight stays	4.9%	7.8%	6.9%	7.5%	7.8%	7.1%	8.3%	7.1%
3 or more overnight stays	19.8%	15.3%	20.7%	15.5%	13.8%	13.1%	19.1%	15.9%

[1] Any health shocks is referred to the aggregated health shocks variable/measure from the four health shock measures used in the study. For example, for mammograms, 50.4% of new users experienced health shocks in the past two years; 11.2% and 11.7% of new users had a new work-limiting health condition and new ADL limitations, respectively; 9.9% and 18.9% of new users had new major and minor illnesses, respectively; 26.1% of new users had aggregated new doctor diagnosed illnesses; and 4.9% and 19.8% of new users had spent one to two nights and three or more nights in the hospital.

Table 8a. Logit Results. Probability of Individuals Starting Mammogram Screening in Response to Four Different Health Shock Measures

	Mammogram			
	Model 1	Model 2	Model 3	Model 4
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Any health shocks	1.87*** (1.27-2.73)			
New work limiting condition		1.50 (0.83-2.73)		1.46 (0.79-2.69)
New ADL			0.86 (0.48-1.51)	0.80 (0.45-1.43)
New major illnesses		2.03** (1.03-4.01)	2.11** (1.06-4.18)	1.64 (0.80-3.36)
New minor illnesses		1.39 (0.86-2.25)	1.42 (0.88-2.31)	1.37 (0.84-2.24)
Hospitalization1				1.11 (0.48-2.60)
Hospitalization2				2.30*** (1.34-3.97)

* Significant at 10%;
** Significant at 5%;
*** Significant at 1%.
OR (odds ratio), and CI (confidence interval)

Table 8b. Logit Results. Probability of Individuals Starting Breast Self-Exam in Response to Four Different Health Shock Measures

	Breast self-exam			
	Model 1	Model 2	Model 3	Model 4
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Any health shocks	1.16 (0.85-1.56)			
New work limiting condition		0.88 (0.51-1.49)		0.83 (0.48-1.43)
New ADL			1.07 (0.67-1.70)	1.12 (0.69-1.81)
New major illnesses		1.22 (0.71-2.09)	1.22 (0.71-2.10)	1.18 (0.68-2.07)
New minor illnesses		1.02 (0.66-1.57)	1.00 (0.65-1.54)	1.03 (0.66-1.59)
Hospitalization1				1.23 (0.70-2.14)
Hospitalization2				1.16 (0.74-1.79)

* Significant at 10%;
** Significant at 5%;
*** Significant at 1%.
OR (odds ratio), and CI (confidence interval)

Table 8c. Logit Results. Probability of Individuals Starting Pap Smear in Response to Four Different Health Shock Measures

	Pap smear			
	Model 1	Model 2	Model 3	Model 4
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Any health shocks	1.48** (1.06-2.08)			
New work limiting condition		1.35 (0.83-2.19)		1.33 (0.81-2.18)
New ADL			0.81 (0.47-1.37)	0.73 (0.42-1.26)
New major illnesses		1.44 (0.82-2.53)	1.49 (0.85-2.63)	1.32 (0.73-2.39)
New minor illnesses		1.22 (0.78-1.90)	1.28 (0.82-1.99)	1.23 (0.78-1.93)
Hospitalization1				1.94* (0.96-3.91)
Hospitalization2				1.95*** (1.24-3.07)

* Significant at 10%;
** Significant at 5%;
*** Significant at 1%.
OR (odds ratio), and CI (confidence interval)

Table 8d. Logit Results. Probability of Individuals Starting Prostate Cancer Screening in Response to Four Different Health Shock Measures

	Prostate Cancer Screening			
	Model 1	Model 2	Model 3	Model 4
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Any health shocks	2.24*** (1.53-3.29)			
New work limiting condition		1.38 (0.71-2.68)		1.23 (0.62-2.43)
New ADL			2.80** (1.21-6.45)	2.35* (0.95-5.79)
New major illnesses		2.09* (0.9-4.61)	1.96* (0.90-4.24)	1.83 (0.80-4.14)
New minor illnesses		2.06*** (1.20-3.52)	2.10*** (1.25-3.52)	2.05*** (1.19-3.52)
Hospitalization1				1.43* (0.67-3.07)
Hospitalization2				1.38*** (0.74-2.57)

* Significant at 10%;
** Significant at 5%;
*** Significant at 1%.
OR (odds ratio), and CI (confidence interval)

Table 8e. Logit Results. Probability of Men Starting Cholesterol Testing in Response to Four Different Health Shock Measures

	Cholesterol Testing			
	Model 1	Model 2	Model 3	Model 4
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Any health shocks	2.75*** (1.80-4.19)			
New work limiting condition		1.62 (0.79-3.30)		1.31 (0.62-2.77)
New ADL			2.78*** (1.30-5.94)	2.17* (0.98-4.83)
New major illnesses		2.00* (0.90-4.41)	2.46** (1.12-5.40)	1.68 (0.72-3.90)
New minor illnesses		2.44*** (1.36-4.38)	2.64*** (1.48-4.69)	2.28*** (1.25-4.15)
Hospitalization1				2.07* (0.91-4.70)
Hospitalization2				2.85*** (1.32-6.14)

* Significant at 10%;
** Significant at 5%;
*** Significant at 1%.
OR (odds ratio), and CI (confidence interval)

Table 8f. Logit Results. Probability of Women Starting Cholesterol Testing in Response to Four Different Health Shock Measures

	Cholesterol Testing			
	Model 1	Model 2	Model 3	Model 4
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Any health shocks	1.79*** (1.24-2.59)			
New work limiting condition		1.10 (0.58-2.08)		0.98 (0.51-1.89)
New ADL			1.79* (0.97-3.32)	1.66 (0.87-3.15)
New major illnesses		4.58*** (1.83-11.45)	4.07*** (1.61-10.26)	3.38** (1.31-8.76)
New minor illnesses		1.57* (0.93-2.66)	1.45 (0.86-2.44)	1.49 (0.87-2.53)
Hospitalization1				2.19** (1.00-4.81)
Hospitalization2				1.59 (0.84-3.04)

* Significant at 10%;
** Significant at 5%;
*** Significant at 1%.
OR (odds ratio), and CI (confidence interval)

Table 8g. Logit Results. Probability of Men Starting Flu Vaccine in Response to Four Different Health Shock Measures

	Flu vaccine			
	Model 1	Model 2	Model 3	Model 4
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Any health shocks	1.64*** (1.21-2.29)			
New work limiting condition		1.11 (0.63-1.97)		0.97 (0.53-1.74)
New ADL			2.03** (1.13-3.65)	1.59 (0.85-2.98)
New major illnesses		1.83** (1.01-3.34)	2.03** (1.14-3.61)	1.44 (0.76-2.74)
New minor illnesses		1.12 (0.70-1.79)	1.03 (0.65-1.64)	1.04 (0.65-1.68)
Hospitalization1				1.50 (0.80-2.81)
Hospitalization2				1.81** (1.09-2.99)

* Significant at 10%;
** Significant at 5%;
*** Significant at 1%.
OR (odds ratio), and CI (confidence interval)

Table 8h. Logit Results. Probability of Women Starting Flu Vaccine in Response to Four Different Health Shock Measures

	Flu vaccine			
	Model 1	Model 2	Model 3	Model 4
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Any health shocks	1.46** (1.08-1.98)			
New work limiting condition		0.66 (0.38-1.17)		0.63 (0.35-1.12)
New ADL			1.03 (0.62-1.73)	1.02 (0.60-1.73)
New major illnesses		1.36 (0.74-2.49)	1.34 (0.73-2.47)	1.15 (0.61-2.17)
New minor illnesses		1.63** (1.12-2.37)	1.62*** (1.12-2.35)	1.60** (1.10-2.33)
Hospitalization1				1.33 (0.75-2.37)
Hospitalization2				1.47* (0.93-2.31)

* Significant at 10%;
** Significant at 5%;
*** Significant at 1%.
OR (odds ratio), and CI (confidence interval)

Chapter 4: Conclusion

As discussed in Chapter 1, with the low usage rates of preventive services among older adults and the passage of the Affordable Care Act, Medicare has placed emphasis on the use of preventive services among older adults. Therefore, the need to understand the economic determinants of the use of preventive services among older adults is essential. Chapter 2 examined the effects of an IPPE or a "Welcome-to-Medicare" visit on the use of preventive services among new Medicare enrollees. The Health and Retirement Study (HRS) and the RAND HRS data from 1996-2008 were used to evaluate the before- and after-effects of the policy. I estimated a multivariate logit model with the pooled cross-sectional data to model the effects of covering an IPPE on the utilization of six preventive services: mammogram, breast self-exam, Pap smear, prostate cancer screening, cholesterol test, and flu vaccine. For all six preventive services, the estimated coefficient (or odds ratio) for the policy effect indicator is statistically insignificant.

The results suggest that the use of preventive services by new Medicare enrollees was not affected by the IPPE. One possible reason is that Medicare enrollees were unaware of the IPPE benefit. According to Petroski and Regan (2009), only about 2.8% of the eligible individuals took advantage of the new benefit. Indeed, the 2008 changes of the policy to increase the eligibility period to a year and to reduce the cost by waiving the annual Part B deductible, reflected Medicare's commitment to address the issue (CMS 2009). In 2011, Medicare created and will cover (due to ACA) an Annual Wellness visit to develop prevention plans. Those who missed the IPPE benefit can now take advantage of this benefit (CMS 2011). See Table 9 for more information about the Medicare coverage of Welcome-to-Medicare and Annual Wellness visits.

In Chapter 3, I examined the effects of health shocks on the initiation of use of preventive service among adults ages 40 or older. Using the same dataset as discussed in Chapter 2, I

estimated a multivariate logit model with the pooled cross-sectional data to model the effects of health shocks on the initiation of the use of six preventive services: mammogram, breast self-exam, Pap smear, prostate cancer screening, cholesterol test, and flu vaccine. The results indicated that unexpected health shocks prompt many non-users to begin using mammogram screenings, Pap smears, prostate cancer screenings, cholesterol tests, and flu vaccines. Overall, it appears that many older adults change their health behaviors in positive ways following the occurrence of a negative health event. As expected, the analysis yielded no effects of health shocks on the use of breast self-exams since public and private medical organizations generally do not recommend breast self-exams to screen for breast cancer rather than mammograms.

In conclusion, the use of recommended preventive services among older adults can be encouraged through various public health policies such as subsidizing costs and conducting an information campaign, as witnessed in the 2011 ACA's new, generous Medicare benefits that support the use of preventive services. The topic is complex, however, especially for older adults with geriatric conditions and syndromes that can make it harder to determine the appropriate preventive services needed. More research is needed to provide evidence-based preventive guidelines. The implications of my studies reveal that public health policies regarding preventive care need to be adaptive and less bureaucratic so changes can be made and communicated more quickly. Thorough follow-up study after policy implementation is essential to ensure the effectiveness of the policy. Finally, as discussed, many factors can affect the demand for and initiation of preventive services. In addition to supply and demand factors, and traditional health care models, other factors such as cooperation, partnerships and the efforts of local, state and federal governments can promote greater use of core preventive services among underserved older adults.

Table 9. Medicare Coverage of Welcome-to-Medicare and Annual Wellness Visits

Service	Year first covered by Medicare	Effective Year	Medicare Reform	Medicare Coverage
Welcome to Medicare[a]	January 1, 2005	2005-2008	Medicare Modernization Act	Coinsurance (20% copayment) and subject to deductible ($100)
Welcome to Medicare[b]	January 1, 2009	2009-2010	Medicare Improvements for Patients and Providers Act	Coinsurance with deductible waived
Welcome to Medicare[c]	January 1, 2011	2011-present	Affordable Care Act	No cost
Annual Wellness Visit[d]	January 1, 2011	2011-present	Affordable Care Act	No cost

Source: Medicare and You 2005-2012

[a] One-time initial preventive physical examination (IPPE) was available only in a beneficiary's first six months after enrolling in Part B, enrollees were subject to both the Part B annual deductible and coinsurance.
[b] One-time initial preventive physical examination was available only in a beneficiary's first 12 months after enrolling in Part B, enrollees were still subject to coinsurance, and Medicare waived the annual Part B deductible.
[c] One-time initial preventive physical examination is available only in a beneficiary's first 12 months after enrolling in Part B, no cost to enrollees.
[d] If enrollees have Medicare Part B longer that 12 months or have missed an IPPE, the new yearly Wellness visit also helps enrollees to develop prevention plans.

APPENDIX A

Appendix A1. Logit Results. Effects of Medicare Policy Change, Predisposing Factors, Enabling Factors and Need Factors on the Use of Mammogram and Breast Self-Exam Using Only Data from Wave 7 (year 2004) and Wave 9 (year 2008)

	Mammogram		Breast Self-exam	
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Policy indicator				
Post 2005	0.84 (0.57-1.24)	0.391	1.06 (0.72-1.55)	0.753
Treatment	0.79 (0.46-1.33)	0.378	1.15 (0.65-1.98)	0.617
Post 2005* Treatment	1.23 (0.59-2.57)	0.569	0.91 (0.42-1.98)	0.822
Predisposing factors				
Previous mammogram/breast self-exam	1.03*** (1.02-1.03)	0.000	15.58*** (11.06-21.95)	0.000
Married	1.54** (1.04-2.28)	0.028	1.69*** (1.13-2.54)	0.010
White	0.54 (0.13-2.16)	0.387	1.00 (0.27-3.66)	1.000
Black	0.80 (0.18-3.46)	0.765	1.18 (0.29-4.72)	0.807
Hispanic	0.45 (0.10-2.03)	0.305	0.42 (0.09-1.78)	0.239
High school/GED	1.30 (0.83-2.04)	0.240	0.55** (0.33-0.90)	0.020
Some college and beyond	1.43 (0.89-2.30)	0.138	0.67 (0.40-1.13)	0.138
Enabling factors				
Employer provided insurance	1.66*** (1.14-2.42)	0.008	0.87 (0.61-1.24)	0.462
Employment	0.92 (0.50-1.71)	0.805	2.06** (1.04-4.07)	0.036
Driving	1.21 (0.69-2.10)	0.495	1.05 (0.56-1.96)	0.861
Income2	1.50* (0.95-2.36)	0.078	1.12 (0.70-1.80)	0.619
Income3	1.38 (0.84-2.29)	0.200	0.91 (0.54-1.52)	0.727
Northeast	0.88 (0.47-1.64)	0.695	1.05 (0.54-2.03)	0.874
Midwest	0.86 (0.50-1.48)	0.605	0.59* (0.34-1.02)	0.062
South	1.39 (0.83-2.33)	0.198	0.66 (0.39-1.10)	0.116
Rural	1.09 (0.77-1.56)	0.608	1.41* (0.98-2.02)	0.062
Need factors				
Not smoking	2.48*** (1.61-3.81)	0.000	1.12 (0.68-1.85)	0.651
Not drinking	1.00 (0.94-1.07)	0.812	1.15 (0.77-1.72)	0.478
Overweight	1.01 (0.70-1.46)	0.928	1.12 (0.78-1.62)	0.515
Exercise	1.92 (0.85-4.36)	0.115	0.56 (0.20-1.57)	0.273
No chronic diseases	0.37***(0.22-0.63)	0.000	1.39 (0.77-2.52)	0.267
No ADL	1.30 (0.78-2.17)	0.303	0.68 (0.38-1.22)	0.205
Zero CES-D	1.18 (0.82-1.71)	0.358	0.83 (0.58-1.19)	0.322
Better than good health	0.95 (0.62-1.45)	0.820	0.94 (0.62-1.41)	0.768
Less than good health	1.02 (0.64-1.64)	0.911	0.85 (0.51-1.40)	0.533
Better than good eyesight	1.54** (1.08-2.21)	0.017	0.78 (0.53-1.15)	0.224
Less than good eyesight	1.06 (0.70-1.61)	0.776	0.94 (0.56-1.59)	0.845
Pseudo R-squared	0.22		0.28	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix A2. Logit Results. Effects of Medicare Policy Change, Predisposing Factors, Enabling Factors and Need Factors on the Use of Pap Smear and Prostate Cancer Screening Using Only Data from Wave 7 (year 2004) and Wave 9 (year 2008)

	Pap Smear		Prostate	
	Odds ratio(95% CI)	P value	Odds ratio(95% CI)	P value
Policy indicator				
Post 2005	0.80 (0.56-1.14)	0.220	0.67 (0.41-1.10)	0.115
Treatment	1.08 (0.65-1.79)	0.744	0.59 (0.31-1.14)	0.122
Post 2005* Treatment	1.32 (0.65-2.68)	0.428	2.34* (0.92-5.95)	0.074
Predisposing factors				
Previous Pap smear/prostate	7.56*** (5.38-10.62)	0.000	4.45*** (2.85-6.94)	0.000
Married	1.26 (0.87-1.81)	0.213	1.05 (0.60-1.83)	0.859
White	0.50 (0.15-1.64)	0.259	0.67 (0.14-3.28)	0.628
Black	0.86 (0.24- 3.04)	0.821	0.85 (0.16-4.57)	0.854
Hispanic	0.45 (0.12-1.70)	0.244	0.53 (0.09-3.08)	0.484
High school/GED	0.94 (0.61-1.46)	0.806	1.36 (0.76-2.45)	0.292
Some college and beyond	0.83 (0.52-1.31)	0.435	1.32 (0.70-2.48)	0.389
Enabling factors				
Employer provided insurance	1.17 (0.84-1.62)	0.345	1.58** (1.00-2.50)	0.047
Employment	1.20 (0.67-2.16)	0.533	1.43 (0.75-2.74)	0.268
Driving	0.66 (0.37-1.16)	0.154	1.92 (0.50-7.35)	0.338
Income2	1.20 (0.79-1.83)	0.387	0.85 (0.48-1.52)	0.600
Income3	1.43 (0.90-2.29)	0.128	1.31 (0.68-2.50)	0.412
Northeast	1.67 (0.90-3.09)	0.101	0.46* (0.19-1.07)	0.074
Midwest	0.81 (0.49-1.34)	0.424	0.65 (0.32-1.34)	0.251
South	0.97 (0.61-1.54)	0.914	0.80 (0.41-1.56)	0.527
Rural	1.00 (0.73-1.39)	0.955	1.32 (0.84-2.07)	0.222
Need factors				
Not smoking	1.26 (0.80-1.98)	0.317	2.63*** (1.50-4.60)	0.001
Not drinking	0.82 (0.56-1.19)	0.304	1.07 (0.69-1.66)	0.738
Overweight	1.00 (0.71-1.40)	0.999	0.86 (0.52-1.42)	0.561
Exercise	2.91** (1.20-7.08)	0.018	1.60 (0.57-4.47)	0.367
No chronic diseases	0.88 (0.51-1.52)	0.662	0.35*** (0.18-0.65)	0.001
No ADL	1.36 (0.82-2.26)	0.220	0.47** (0.23-0.96)	0.039
Zero CES-D	1.24 (0.89-1.73)	0.190	2.17*** (1.39-3.40)	0.001
Better than good health	1.09 (0.75-1.59)	0.635	1.33 (0.80-2.23)	0.263
Less than good health	0.95 (0.61-1.49)	0.855	2.21*** (1.23-3.98)	0.008
Better than good eyesight	1.31 (0.92-1.87)	0.128	1.37 (0.84-2.25)	0.200
Less than good eyesight	1.02 (0.64-1.62)	0.914	0.82 (0.47-1.43)	0.487
Pseudo R-squared	0.17		0.18	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix A3. Logit Results. Effects of Medicare Policy Change, Predisposing Factors, Enabling Factors and Need Factors on the Use of Cholesterol Testing Using Only Data from Wave 7 (year 2004) and Wave 9 (year 2008)

	Cholesterol Testing			
	Women		Men	
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Policy indicator				
Post 2005	1.37 (0.79-2.38)	0.252	0.97 (0.51-1.84)	0.934
Treatment	1.42 (0.67-3.01)	0.350	2.57* (0.92-7.17)	0.071
Post 2005* Treatment	0.84 (0.28-2.52)	0.767	0.75 (0.18-3.07)	0.699
Predisposing factors				
Previous cholesterol	6.37*** (3.91-10.36)	0.000	9.32*** (5.12-16.97)	0.000
Married	1.72* (0.98-3.03)	0.057	1.57 (0.77-3.21)	0.215
White	0.20 (0.01-2.15)	0.185	1.44 (0.24-8.46)	0.683
Black	0.16 (0.01-1.88)	0.146	1.71 (0.25-11.62)	0.581
Hispanic	0.12* (0.01-1.46)	0.097	2.01 (0.24-16.60)	0.515
High school/GED	1.07 (0.56-2.06)	0.821	2.08* (0.94-4.60)	0.069
Some college and beyond	1.44 (0.71-2.89)	0.306	1.70 (0.73-3.96)	0.219
Enabling factors				
Employer provided insurance	1.28 (0.75-2.19)	0.357	1.34 (0.71-2.55)	0.357
Employment	1.03 (0.43-2.45)	0.944	0.96 (0.43-2.15)	0.935
Driving	0.74 (0.30-1.81)	0.519	12.81*** (3.01-54.44)	0.001
Income2	1.35 (0.70-2.60)	0.360	0.85 (0.39-1.84)	0.683
Income3	1.31 (0.63-2.72)	0.461	0.78 (0.33-1.84)	0.572
Northeast	1.78 (0.67-4.71)	0.241	0.40 (0.09-1.73)	0.223
Midwest	1.19 (0.56-2.51)	0.649	0.29** (0.09-0.95)	0.042
South	1.35 (0.67-2.71)	0.387	0.41 (0.13-1.24)	0.114
Rural	0.70 (0.42-1.16)	0.171	0.70 (0.39-1.27)	0.250
Need factors				
Not smoking	1.69* (0.92-3.12)	0.089	1.60 (0.73-3.50)	0.236
Not drinking	0.77 (0.42-1.42)	0.414	1.86** (1.03-3.37)	0.040
Overweight	1.02 (0.61-1.72)	0.918	1.34 (0.71-2.51)	0.355
Exercise	0.91 (0.23-3.56)	0.895	1.66 (0.46-6.04)	0.437
No chronic diseases	0.21*** (0.11-0.40)	0.000	0.22*** (0.10-0.46)	0.000
No ADL	2.10* (0.98-4.50)	0.055	0.50 (0.18-1.41)	0.194
Zero CES-D	0.74 (0.44-1.24)	0.262	2.14** (1.14-4.01)	0.018
Better than good health	0.86 (0.47-1.57)	0.638	1.06 (0.51-2.17)	0.876
Less than good health	1.02 (0.49-2.09)	0.956	1.70* (0.72-3.94)	0.224
Better than good eyesight	0.88 (0.51-1.51)	0.649	1.12 (0.57-2.22)	0.728
Less than good eyesight	1.42 (0.66-3.06)	0.359	0.53* (0.25-1.11)	0.096
Pseudo R-squared	0.20		0.30	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix A4. Logit Results. Effects of Medicare Policy Change, Predisposing Factors, Enabling Factors and Need Factors on the Use of Flu Vaccine Using Only Data from Wave 7 (year 2004) and Wave 9 (year 2008)

	Flu Vaccine			
	Women		Men	
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Policy indicator				
Post 2005	0.90 (0.58-1.41)	0.667	0.79 (0.50-1.26)	0.335
Treatment	0.83 (0.45-1.55)	0.574	1.12 (0.61-2.07)	0.699
Post 2005* Treatment	0.89 (0.37-2.15)	0.805	0.69 (0.29-1.66)	0.413
Predisposing factors				
Previous flu shot	25.10*** (16.52-38.16)	0.000	18.04*** (11.69-27.84)	0.000
Married	1.41 (0.88-2.25)	0.143	1.51 (0.87-2.61)	0.139
White	1.29 (0.34-4.89)	0.698	1.03 (0.23-4.59)	0.962
Black	0.43 (0.10-1.77)	0.246	0.59 (0.12-2.88)	0.516
Hispanic	0.30 (0.06-1.36)	0.121	0.85 (0.16-4.56)	0.853
High school/GED	1.11 (0.65-1.89)	0.701	1.67* (0.94-2.98)	0.078
Some college and beyond	1.23 (0.69-2.19)	0.471	1.40 (0.76-2.60)	0.278
Enabling factors				
Employer provided insurance	1.16 (0.77-1.76)	0.472	0.92 (0.61-1.40)	0.726
Employment	0.63 (0.31-1.27)	0.198	0.94 (0.54-1.65)	0.856
Driving	1.04 (0.51-2.15)	0.895	0.79 (0.16-3.77)	0.773
Income2	0.74 (0.43-1.27)	0.287	0.95 (0.53-1.68)	0.862
Income3	0.67 (0.37-1.21)	0.190	0.81 (0.44-1.48)	0.501
Northeast	1.62 (0.73-3.57)	0.230	0.80 (0.34-1.84)	0.609
Midwest	0.62 (0.33-1.18)	0.150	0.64 (0.32-1.25)	0.198
South	0.71 (0.38-1.31)	0.279	0.64 (0.34-1.21)	0.173
Rural	0.95 (0.63-1.44)	0.840	1.07 (0.70-1.64)	0.724
Need factors				
Not smoking	1.76** (1.00-3.09)	0.049	1.19 (0.65-2.16)	0.560
Not drinking	0.94 (0.59-1.51)	0.824	0.93 (0.62-1.40)	0.747
Overweight	1.31 (0.86-2.00)	0.200	0.99 (0.61-1.62)	0.991
Exercise	0.63 (0.19-2.11)	0.459	2.92* (0.93-9.15)	0.066
No chronic diseases	0.76 (0.41-1.42)	0.406	0.88 (0.48-1.60)	0.677
No ADL	0.77 (0.39-1.50)	0.446	1.23 (0.61-2.48)	0.551
Zero CES-D	1.33 (0.88-2.02)	0.166	1.16 (0.76-1.77)	0.471
Better than good health	1.10 (0.69-1.77)	0.666	0.92 (0.57-1.49)	0.752
Less than good health	1.76* (0.99-3.13)	0.053	1.36 (0.77-2.41)	0.285
Better than good eyesight	1.04 (0.67-1.63)	0.837	1.07 (0.68-1.69)	0.748
Less than good eyesight	1.13 (0.64-2.00)	0.663	0.96 (0.55-1.67)	0.891
Pseudo R-squared	0.38		0.28	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

APPENDIX B

Appendix B1. Logit Results. Effects of Medicare Policy Change, Predisposing Factors, Enabling Factors and Need Factors on the Use of Mammogram and Breast Self-Exam Using an Alternative Comparison Group of Individuals Ages 72 and 73

	Mammogram		Breast Self-exam	
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Policy indicator				
Post 2005	1.07 (0.69-1.65)	0.746	0.85 (0.59-1.22)	0.394
Treatment	1.24 (0.75-2.03)	0.396	1.51* (0.97-2.35)	0.064
Post 2005* Treatment	0.79 (0.36-1.72)	0.564	1.08 (0.54-2.13)	0.819
Predisposing factors				
Previous mammogram/breast self-exam	12.69*** (8.73-18.44)	0.000	13.93*** (10.23-18.96)	0.000
Married	1.33 (0.88-2.01)	0.174	1.20 (0.84-1.73)	0.303
White	1.50 (0.47-4.75)	0.483	1.04 (0.33-3.30)	0.939
Black	3.82** (1.08-13.50)	0.037	1.33 (0.39-4.51)	0.646
Hispanic	1.23 (0.30-5.06)	0.769	0.85 (0.21-3.41)	0.825
High school/GED	0.96 (0.59-1.53)	0.863	0.97 (0.63-1.50)	0.917
Some college and beyond	1.16 (0.68-1.98)	0.564	0.87 (0.54-1.38)	0.554
Enabling factors				
Employer provided insurance	1.64** (1.12-2.42)	0.011	0.96 (0.70-1.31)	0.800
Employment	0.26*** (0.13-0.50)	0.000	1.47 (0.72-2.97)	0.282
Driving	1.25 (0.72-2.17)	0.412	0.84 (0.50-1.40)	0.515
Income2	1.16 (0.74-1.83)	0.507	1.06 (0.70-1.59)	0.779
Income3	1.04 (0.61-1.80)	0.865	1.05 (0.66-1.67)	0.827
Northeast	0.87 (0.44-1.74)	0.706	0.93 (0.51-1.70)	0.833
Midwest	1.18 (0.64-2.18)	0.581	0.98 (0.58-1.64)	0.954
South	1.04 (0.58-1.87)	0.873	1.01 (0.62-1.66)	0.943
Rural	1.11 (0.76-1.62)	0.575	0.87 (0.63-1.21)	0.428
Need factors				
Not smoking	2.06*** (1.24-3.41)	0.005	0.77 (0.48-1.25)	0.305
Not drinking	0.77 (0.48-1.22)	0.271	0.85 (0.58-1.23)	0.407
Overweight	1.00 (0.68-1.48)	0.984	1.11 (0.80-1.54)	0.519
Exercise	1.20 (0.70-2.05)	0.492	0.96 (0.58-1.59)	0.897
No chronic diseases	0.66 (0.37-1.18)	0.167	0.84 (0.50-1.41)	0.514
No ADL	1.12 (0.66-1.90)	0.670	1.14 (0.70-1.86)	0.580
Zero CES-D	1.12 (0.77-1.65)	0.535	1.39** (1.00-1.92)	0.044
Better than good health	1.19 (0.76-1.88)	0.434	0.81 (0.55-1.18)	0.273
Less than good health	0.88 (0.55-1.39)	0.588	1.17 (0.77-1.78)	0.461
Better than good eyesight	1.54** (1.01-2.34)	0.041	1.16 (0.82-1.64)	0.375
Less than good eyesight	1.09 (0.66-1.80)	0.716	0.82 (0.52-1.28)	0.395
Pseudo R-squared	0.26		0.25	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix B2. Logit Results. Effects of Medicare Policy Change, Predisposing Factors, Enabling Factors and Need Factors on the Use of Pap Smear and Prostate Cancer Screening Using an Alternative Comparison Group of Individuals Ages 72 and 73

	Pap Smear		Prostate	
	Odds ratio(95% CI)	P value	Odds ratio(95% CI)	P value
Policy indicator				
Post 2005	0.83 (0.60-1.17)	0.302	0.92 (0.58-1.46)	0.728
Treatment	1.98*** (1.32-2.96)	0.001	1.04 (0.61-1.75)	0.879
Post 2005* Treatment	1.00 (0.53-1.89)	0.978	1.43 (0.60-3.40)	0.411
Predisposing factors				
Previous Pap smear/prostate	6.49*** (4.84-8.69)	0.000	5.76*** (3.78-8.75)	0.000
Married	0.90 (0.64-1.26)	0.557	1.38 (0.81-2.33)	0.229
White	1.64 (0.59-4.53)	0.340	2.31 (0.68-7.86)	0.179
Black	2.00 (0.68-5.89)	0.204	2.32 (0.61-8.77)	0.215
Hispanic	1.07 (0.31-3.67)	0.902	1.42 (0.32-6.18)	0.640
High school/GED	0.92 (0.62-1.37)	0.693	1.20 (0.72-1.98)	0.479
Some college and beyond	0.95 (0.62-1.47)	0.835	1.92** (1.10-3.34)	0.020
Enabling factors				
Employer provided insurance	1.27 (0.95-1.69)	0.104	1.41* (0.94-2.10)	0.093
Employment	0.62 (0.33-1.16)	0.137	0.76 (0.38-1.49)	0.426
Driving	0.69 (0.43-1.10)	0.124	1.32 (0.45-3.86)	0.605
Income2	1.45* (0.99-2.11)	0.053	1.40 (0.81-2.43)	0.225
Income3	1.66** (1.08-2.56)	0.021	1.09 (0.61-1.95)	0.763
Northeast	1.14 (0.65-1.98)	0.640	2.01* (0.93-4.34)	0.075
Midwest	0.94 (0.58-1.53)	0.829	0.95 (0.50-1.78)	0.879
South	1.09 (0.69-1.73)	0.706	1.76* (0.96-3.23)	0.065
Rural	0.94 (0.70-1.27)	0.718	0.98 (0.65-1.47)	0.933
Need factors				
Not smoking	1.44 (0.91-2.25)	0.111	1.32 (0.76-2.29)	0.321
Not drinking	0.87 (0.61-1.23)	0.436	0.95 (0.63-1.41)	0.799
Overweight	0.91 (0.67-1.23)	0.553	1.38 (0.90-2.11)	0.136
Exercise	1.42 (0.90-2.24)	0.130	1.02 (0.57-1.80)	0.943
No chronic diseases	0.84 (0.52-1.37)	0.501	0.58* (0.32-1.04)	0.069
No ADL	1.45* (0.93-2.27)	0.097	1.04 (0.53-2.05)	0.888
Zero CES-D	1.17 (0.87-1.58)	0.278	0.87 (0.57-1.32)	0.524
Better than good health	0.91 (0.64-1.29)	0.616	1.17 (0.74-1.87)	0.486
Less than good health	0.79 (0.53-1.16)	0.229	1.08 (0.64-1.81)	0.757
Better than good eyesight	1.28 (0.93-1.76)	0.125	1.26 (0.82-1.95)	0.285
Less than good eyesight	1.00 (0.66-1.51)	0.227	1.01 (0.60-1.70)	0.963
Pseudo R-squared	0.17		0.15	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix B3. Logit Results. Effects of Medicare Policy Change, Predisposing Factors, Enabling Factors and Need Factors on the Use of Cholesterol Testing Using an Alternative Comparison Group of Individuals Ages 72 and 73

	Cholesterol Testing			
	Women		Men	
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Policy indicator				
Post 2005	2.22*** (1.27-3.89)	0.005	1.54 (0.76-3.11)	0.229
Treatment	1.00 (0.59-1.70)	0.975	1.28 (0.65-2.53)	0.473
Post 2005* Treatment	0.84 (0.32-2.20)	0.724	0.63 (0.19-2.10)	0.460
Predisposing factors				
Previous cholesterol	5.81*** (3.79-8.90)	0.000	13.51*** (7.70-23.70)	0.000
Married	1.40 (0.86-2.30)	0.173	0.84 (0.40-1.75)	0.537
White	0.22 (0.02-2.30)	0.206	3.93* (0.82-18.84)	0.087
Black	0.16 (0.01-1.73)	0.132	2.28 (0.41-12.56)	0.341
Hispanic	0.22 (0.01-2.65)	0.234	4.03 (0.56-28.92)	0.165
High school/GED	1.56* (0.92-2.66)	0.095	1.07 (0.52-2.20)	0.850
Some college and beyond	2.30*** (1.24-4.28)	0.008	1.18 (0.55-2.57)	0.660
Enabling factors				
Employer provided insurance	0.77 (0.50-1.20)	0.260	1.26 (0.72-2.23)	0.410
Employment	0.59 (0.25-1.36)	0.222	0.59 (0.25-1.41)	0.242
Driving	1.34 (0.71-2.52)	0.357	1.48 (0.39-5.62)	0.563
Income2	1.79** (1.03-3.10)	0.036	1.56 (0.72-3.39)	0.254
Income3	1.72* (0.90-3.28)	0.098	1.21 (0.53-2.74)	0.642
Northeast	1.36 (0.54-3.42)	0.505	1.70 (0.56-5.15)	0.347
Midwest	0.98 (0.46-2.10)	0.974	0.94 (0.37-2.39)	0.908
South	0.98 (0.47-2.03)	0.965	1.51 (0.62-3.71)	0.358
Rural	0.79 (0.51-1.22)	0.298	0.78 (0.45-1.35)	0.389
Need factors				
Not smoking	0.95 (0.52-1.71)	0.872	1.08 (0.53-2.19)	0.821
Not drinking	1.14 (0.67-1.91)	0.620	0.72 (0.40-1.27)	0.257
Overweight	1.65** (1.06-2.57)	0.025	1.25 (0.71-2.22)	0.430
Exercise	1.19 (0.65-2.15)	0.564	1.53 (0.74-3.18)	0.248
No chronic diseases	0.39*** (0.22-0.68)	0.001	0.61 (0.30-1.24)	0.181
No ADL	1.37 (0.71-2.66)	0.337	1.69 (0.64-4.42)	0.285
Zero CES-D	0.63** (0.41-0.99)	0.046	1.01 (0.56-1.82)	0.960
Better than good health	0.75 (0.44-1.28)	0.297	0.53* (0.28-1.00)	0.052
Less than good health	0.92 (0.50-1.68)	0.788	1.91 (0.87-4.21)	0.105
Better than good eyesight	0.96 (0.59-1.56)	0.879	0.82 (0.45-1.49)	0.526
Less than good eyesight	0.61* (0.34-1.09)	0.096	0.73 (0.35-1.52)	0.412
Pseudo R-squared	0.20		0.25	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix B4. Logit Results. Effects of Medicare Policy Change, Predisposing Factors, Enabling Factors and Need Factors on the Use of Flu Vaccine Using an Alternative Comparison Group of Individuals Ages 72 and 73

	Flu Vaccine			
	Women		Men	
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Policy indicator				
Post 2005	0.88 (0.55-1.40)	0.602	0.50** (0.30-0.85)	0.011
Treatment	1.08 (0.65-1.80)	0.750	0.90 (0.52-1.55)	0.707
Post 2005* Treatment	0.64 (0.28-1.45)	0.291	0.98 (0.40-2.39)	0.976
Predisposing factors				
Previous flu vaccine	31.28*** (20.83-46.96)	0.000	25.80*** (16.17-41.15)	0.000
Married	1.85*** (1.18-2.90)	0.007	1.12 (0.62-2.01)	0.693
White	0.47 (0.09-2.32)	0.358	0.58 (0.08-3.82)	0.573
Black	0.30 (0.05-1.58)	0.157	0.15* (0.02-1.06)	0.057
Hispanic	0.22* (0.03-1.33)	0.100	0.24 (0.03-2.05)	0.196
High school/GED	0.80 (0.48-1.35)	0.416	0.85 (0.47-1.55)	0.613
Some college and beyond	0.99 (0.56-1.75)	0.982	0.69 (0.36-1.29)	0.251
Enabling factors				
Employer provided insurance	0.98 (0.66-1.45)	0.929	1.20 (0.78-1.84)	0.397
Employment	0.76 (0.34-1.74)	0.528	0.83 (0.40-1.71)	0.617
Driving	1.13 (0.63-2.03)	0.679	0.51 (0.11-2.20)	0.367
Income2	0.89 (0.54-1.49)	0.678	1.75* (0.93-3.30)	0.083
Income3	0.78 (0.44-1.39)	0.411	1.32 (0.68-2.59)	0.406
Northeast	2.18** (1.02-4.66)	0.044	0.87 (0.38-1.99)	0.745
Midwest	1.55 (0.81-2.97)	0.179	1.12 (0.54-2.35)	0.746
South	2.43*** (1.28-4.59)	0.006	1.30 (0.65-2.61)	0.448
Rural	1.35 (0.90-2.02)	0.151	0.85 (0.55-1.32)	0.483
Need factors				
Not Smoking	1.69* (0.96-2.97)	0.066	2.01** (1.09-3.70)	0.024
Not Drinking	0.62* (0.38-1.00)	0.051	1.01 (0.66-1.56)	0.929
Overweight	1.10 (0.73-1.66)	0.627	1.42 (0.88-2.27)	0.143
Exercise	1.18 (0.65-2.12)	0.576	1.04 (0.56-1.92)	0.896
No chronic diseases	0.68 (0.38-1.23)	0.207	0.61 (0.33-1.12)	0.112
No ADL	0.62 (0.33-1.16)	0.138	0.61 (0.27-1.35)	0.225
Zero CES-D	0.95 (0.64-1.40)	0.804	0.99 (0.63-1.55)	0.970
Better than good health	0.90 (0.57-1.41)	0.651	0.67 (0.41-1.09)	0.112
Less than good health	1.15 (0.67-1.96)	0.594	0.79 (0.43-1.45)	0.451
Better than good eyesight	1.05 (0.69-1.60)	0.817	1.71** (1.07-2.75)	0.024
Less than good eyesight	1.14 (0.66-1.96)	0.638	1.05 (0.59-1.88)	0.851
Pseudo R-squared	0.39		0.37	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

APPENDIX C

Appendix C1. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Mammogram

	Mammogram			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks	1.87***(1.27-2.73)	0.001		
New work limiting condition			1.50 (0.83-2.73)	0.177
New ADL				
New major illnesses			2.03** (1.03-4.01)	0.040
New minor illnesses			1.39 (0.86-2.25)	0.171
Hospitalization1				
Hospitalization2				
Predisposing factors				
Age	0.98 (0.96-1.00)	0.194	0.98 (0.96-1.01)	0.318
Married	0.79 (0.49-1.25)	0.321	0.81 (0.50-1.29)	0.383
White	0.53** (0.29-0.98)	0.044	0.56* (0.31-1.04)	0.067
Black	0.90 (0.43-1.91)	0.802	0.94 (0.44-1.98)	0.882
High school/GED	0.81 (0.51-1.29)	0.378	0.80 (0.50-1.28)	0.364
Some college and beyond	1.10 (0.66-1.86)	0.694	1.12 (0.66-1.88)	0.669
Enabling factors				
Employer provided insurance	1.26 (0.83-1.92)	0.275	1.29 (0.85-1.97)	0.225
Employment	1.23 (0.77-1.96)	0.387	1.17 (0.73-1.87)	0.505
Income2	0.96 (0.58-1.59)	0.894	0.94 (0.57-1.55)	0.823
Income3	1.40 (0.78-2.49)	0.251	1.39 (0.78-2.48)	0.260
Northeast	0.90 (0.49-1.64)	0.860	0.99 (0.54-1.79)	0.975
Midwest	0.96 (0.53-1.72)	0.892	1.07 (0.59-1.92)	0.812
South	0.83 (0.52-1.32)	0.607	0.89 (0.56-1.42)	0.648
Rural	0.71 (0.47-1.06)	0.101	0.73 (0.49-1.10)	0.141
Need factors				
Not smoking	1.26 (0.82-1.95)	0.281	1.22 (0.79-1.88)	0.360
Not drinking	0.78 (0.49-1.23)	0.292	0.82 (0.52-1.30)	0.421
Overweight	1.41* (0.96-2.07)	0.077	1.44* (0.98-2.11)	0.062
Exercise	0.90 (0.61-1.31)	0.590	0.87 (0.59-1.27)	0.477
Pseudo R-squared	0.060		0.055	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix C2. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Mammogram

	Mammogram			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition			1.46 (0.79-2.69)	0.222
New ADL	0.86 (0.48-1.51)	0.600	0.80 (0.44-1.43)	0.462
New major illnesses	2.11** (1.06-4.18)	0.032	1.64 (0.80-3.36)	0.173
New minor illnesses	1.42 (0.88-2.31)	0.149	1.37 (0.84-2.24)	0.204
Hospitalization1			1.11 (0.48-2.60)	0.795
Hospitalization2			2.30*** (1.34-3.96)	0.003
Predisposing factors				
Age	0.98 (0.96-1.00)	0.272	0.98 (0.96-1.01)	0.238
Married	0.79 (0.50-1.27)	0.340	0.81 (0.50-1.30)	0.395
White	0.56* (0.31-1.04)	0.067	0.52** (0.28-0.97)	0.042
Black	0.95 (0.45-1.99)	0.891	0.89 (0.42-1.90)	0.775
High school/GED	0.81 (0.51-1.29)	0.385	0.82 (0.51-1.32)	0.426
Some college and beyond	1.12 (0.67-1.89)	0.654	1.15 (0.68-1.96)	0.587
Enabling factors				
Employer provided insurance	1.28 (0.84-1.95)	0.245	1.29 (0.84-1.98)	0.234
Employment	1.14 (0.71-1.81)	0.578	1.20 (0.75-1.93)	0.439
Income2	0.91 (0.55-1.50)	0.730	1.01 (0.61-1.69)	0.943
Income3	1.35 (0.76-2.40)	0.305	1.46 (0.81-2.63)	0.197
Northeast	1.01 (0.55-1.83)	0.970	0.97 (0.53-1.76)	0.920
Midwest	1.08 (0.60-1.94)	0.791	1.01 (0.56-1.84)	0.952
South	0.88 (0.55-1.40)	0.604	0.88 (0.55-1.40)	0.593
Rural	0.74 (0.49-1.11)	0.148	0.71 (0.47-1.06)	0.101
Need factors				
Not smoking	1.21 (0.78-1.86)	0.385	1.23 (0.79-1.91)	0.342
Not drinking	0.84 (0.53-1.33)	0.469	0.80 (0.50-1.27)	0.355
Overweight	1.45* (0.99-2.14)	0.054	1.39* (0.94-2.06)	0.091
Exercise	0.85 (0.58-1.25)	0.429	0.91 (0.62-1.34)	0.652
Pseudo R-squared	0.055		0.068	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix C3. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Breast Self-Exam

	Breast self-exam			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks	1.16 (0.85-1.56)	0.332		
New work limiting condition			0.88 (0.51-1.49)	0.638
New ADL				
New major illnesses			1.22 (0.71-2.09)	0.459
New minor illnesses			1.02 (0.66-1.57)	0.909
Hospitalization1				
Hospitalization2				
Predisposing factors				
Age	0.99 (0.97-1.01)	0.757	0.99 (0.98-1.01)	0.892
Married	0.93 (0.64-1.33)	0.698	0.92 (0.64-1.34)	0.693
White	0.46*** (0.29-0.73)	0.001	0.45*** (0.29-0.73)	0.001
Black	0.87 (0.48-1.56)	0.656	0.84 (0.46-1.52)	0.572
High school/GED	1.31 (0.85-2.02)	0.211	1.28 (0.82-1.98)	0.266
Some college and beyond	1.11 (0.69-1.78)	0.644	1.12 (0.70-1.81)	0.614
Enabling factors				
Employer provided insurance	0.93 (0.66-1.30)	0.681	0.92 (0.65-1.29)	0.642
Employment	0.99 (0.68-1.45)	0.979	0.98 (0.67-1.43)	0.925
Income2	0.85 (0.56-1.28)	0.440	0.87 (0.57-1.32)	0.536
Income3	0.79 (0.49-1.27)	0.329	0.81 (0.50-1.31)	0.403
Northeast	1.45 (0.91-2.29)	0.113	1.48* (0.93-2.35)	0.092
Midwest	1.42 (0.91-2.22)	0.118	1.39 (0.89-2.19)	0.143
South	1.08 (0.74-1.58)	0.658	1.10 (0.75-1.62)	0.596
Rural	1.38* (0.97-1.94)	0.066	1.37* (0.96-1.93)	0.075
Need factors				
Not smoking	0.83 (0.56-1.23)	0.364	0.81 (0.54-1.20)	0.302
Not drinking	0.64** (0.46-0.90)	0.012	0.66** (0.47-0.93)	0.018
Overweight	0.98 (0.72-1.33)	0.915	0.96 (0.71-1.31)	0.827
Exercise	0.96 (0.71-1.30)	0.806	0.93 (0.69-1.26)	0.662
Pseudo R-squared	0.027		0.026	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix C4. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Breast Self-Exam

	Breast self-exam			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition			0.83 (0.48-1.43)	0.507
New ADL	1.07 (0.67-1.70)	0.772	1.12 (0.69-1.81)	0.635
New major illnesses	1.22 (0.71-2.10)	0.451	1.18 (0.68-2.07)	0.542
New minor illnesses	1.00 (0.65-1.54)	0.984	1.03 (0.66-1.59)	0.887
Hospitalization1			1.23 (0.70-2.14)	0.461
Hospitalization2			1.16 (0.74-1.79)	0.506
Predisposing factors				
Age	0.99 (0.97-1.01)	0.787	0.99 (0.98-1.01)	0.878
Married	0.93 (0.65-1.35)	0.732	0.92 (0.64-1.34)	0.688
White	0.46*** (0.29-0.73)	0.001	0.45*** (0.28-0.72)	0.001
Black	0.86 (0.48-1.55)	0.629	0.82 (0.45-1.49)	0.530
High school/GED	1.29 (0.84-1.99)	0.233	1.28 (0.82-1.98)	0.267
Some college and beyond	1.10 (0.69-1.76)	0.668	1.12 (0.70-1.80)	0.878
Enabling factors				
Employer provided insurance	0.93 (0.66-1.30)	0.678	0.92 (0.65-1.30)	0.665
Employment	0.99 (0.68-1.45)	0.990	0.98 (0.67-1.44)	0.942
Income2	0.84 (0.55-1.27)	0.419	0.88 (0.58-1.34)	0.561
Income3	0.78 (0.48-1.26)	0.319	0.81 (0.50-1.32)	0.413
Northeast	1.44 (0.91-2.29)	0.118	1.47 (0.63-1.65)	0.103
Midwest	1.41 (0.90-2.21)	0.127	1.44 (0.44-1.09)	0.114
South	1.08 (0.74-1.58)	0.674	1.09 (0.49-1.16)	0.629
Rural	1.38* (0.97-1.94)	0.066	1.38* (0.97-1.95)	0.070
Need factors				
Not smoking	0.82 (0.55-1.22)	0.342	0.80 (0.54-1.19)	0.284
Not drinking	0.64** (0.46-0.91)	0.012	0.67** (0.47-0.94)	0.021
Overweight	0.99 (0.73-1.34)	0.950	0.94 (0.69-1.28)	0.728
Exercise	0.95 (0.70-1.29)	0.770	0.93 (0.69-1.26)	0.675
Pseudo R-squared	0.027		0.028	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix C5. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Pap Smear

	Pap smear			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks	1.48** (1.06-2.08)	0.021		
New work limiting condition			1.35 (0.83-2.19)	0.220
New ADL				
New major illnesses			1.44 (0.82-2.53)	0.204
New minor illnesses			1.22 (0.78-1.90)	0.368
Hospitalization1				
Hospitalization2				
Predisposing factors				
Age	0.97** (0.95-0.99)	0.016	0.97** (0.95-0.99)	0.023
Married	1.00 (0.68-1.49)	0.968	1.00 (0.67-1.50)	0.969
White	0.53** (0.31-0.90)	0.019	0.57** (0.33-1.97)	0.040
Black	0.53* (0.27-1.06)	0.074	0.59 (0.29-1.17)	0.135
High school/GED	1.10 (0.71-1.69)	0.655	1.05 (0.68-1.61)	0.825
Some college and beyond	1.06 (0.65-1.73)	0.797	1.00 (0.61-1.64)	0.980
Enabling factors				
Employer provided insurance	1.11 (0.76-1.63)	0.564	1.13 (0.77-1.66)	0.510
Employment	1.59** (1.00-2.52)	0.049	1.54* (0.97-2.45)	0.064
Income2	0.98 (0.63-1.51)	0.940	1.00 (0.65-1.56)	0.970
Income3	1.00 (0.60-1.66)	0.981	1.03 (0.62-1.72)	0.884
Northeast	1.03 (0.59-1.79)	0.905	1.07 (0.62-1.86)	0.791
Midwest	0.93 (0.55-1.58)	0.814	0.96 (0.57-1.64)	0.903
South	1.11 (0.73-1.69)	0.611	1.12 (0.74-1.72)	0.574
Rural	0.72* (0.49-1.05)	0.089	0.70* (0.48-1.03)	0.075
Need factors				
Not smoking	1.11 (0.73-1.70)	0.599	1.13 (0.74-1.72)	0.565
Not drinking	1.28 (0.84-1.97)	0.246	1.27 (0.83-1.95)	0.265
Overweight	1.12 (0.79-1.59)	0.506	1.11 (0.78-1.59)	0.528
Exercise	1.00 (0.71-1.41)	0.969	1.01 (0.71-1.43)	0.933
Pseudo R-squared	0.047		0.046	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix C6. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Pap Smear

	Pap smear			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition			1.33 (0.81-2.18)	0.256
New ADL	0.81 (0.47-1.37)	0.431	0.73 (0.42-1.26)	0.256
New major illnesses	1.49 (0.85-2.63)	0.162	1.32 (0.73-2.39)	0.346
New minor illnesses	1.28 (0.82-1.99)	0.267	1.23 (0.78-1.93)	0.361
Hospitalization1			1.94* (0.96-3.91)	0.063
Hospitalization2			1.95*** (1.24-3.07)	0.004
Predisposing factors				
Age	0.97** (0.95-0.99)	0.023	0.97** (0.95-0.99)	0.018
Married	0.99 (0.66-1.46)	0.965	1.00 (0.67-1.50)	0.961
White	0.55** (0.32-0.93)	0.028	0.55** (0.32-0.94)	0.030
Black	0.56* (0.28-1.10)	0.096	0.56 (0.28-1.12)	0.103
High school/GED	1.04 (0.68-1.60)	0.826	1.07 (0.69-1.66)	0.748
Some college and beyond	1.02 (0.62-1.66)	0.932	1.00 (0.61-1.64)	0.997
Enabling factors				
Employer provided insurance	1.10 (0.75-1.60)	0.615	1.16 (0.79-1.71)	0.430
Employment	1.52* (0.96-2.41)	0.072	1.63** (1.02-2.61)	0.039
Income2	0.97 (0.63-1.50)	0.908	1.05 (0.67-1.64)	0.813
Income3	1.02 (0.61-1.69)	0.931	1.06 (0.63-1.77)	0.820
Northeast	1.08 (0.62-1.88)	0.762	1.12 (0.64-1.95)	0.682
Midwest	0.97 (0.57-1.64)	0.914	1.02 (0.60-1.75)	0.923
South	1.14 (0.75-1.73)	0.528	1.12 (0.73-1.71)	0.596
Rural	0.74 (0.50-1.07)	0.113	0.73 (0.49-1.07)	0.108
Need factors				
Not smoking	1.09 (0.72-1.67)	0.657	1.10 (0.72-1.68)	0.655
Not drinking	1.30 (0.84-1.99)	0.226	1.26 (0.82-1.94)	0.288
Overweight	1.16 (0.82-1.65)	0.390	1.08 (0.76-1.55)	0.642
Exercise	0.99 (0.70-1.40)	0.971	1.01 (0.71-1.44)	0.913
Pseudo R-squared	0.045		0.058	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix C7. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Prostate Cancer Screening

	Prostate			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks	2.24*** (1.53-3.29)	0.000		
New work limiting condition			1.38 (0.71-2.68)	0.339
New ADL				
New major illnesses			2.09* (0.95-4.61)	0.065
New minor illnesses			2.06*** (1.20-3.52)	0.008
Hospitalization1				
Hospitalization2				
Predisposing factors				
Age	1.02* (0.99-1.05)	0.060	1.02* (0.99-1.05)	0.056
Married	1.72** (1.02-2.89)	0.041	1.70** (1.00-2.88)	0.048
White	0.91 (0.48-1.70)	0.767	0.89 (0.47-1.68)	0.732
Black	1.81 (0.84-3.91)	0.129	1.90 (0.88-4.10)	0.101
High school/GED	1.29 (0.74-2.23)	0.355	1.34 (0.77-2.32)	0.294
Some college and beyond	1.65* (0.93-2.92)	0.085	1.77** (1.00-3.15)	0.050
Enabling factors				
Employer provided insurance	2.16*** (1.37-3.41)	0.001	2.10*** (1.33-3.33)	0.001
Employment	0.78 (0.48-1.28)	0.332	0.72 (0.44-1.17)	0.193
Income2	1.27 (0.71-2.29)	0.413	1.24 (0.68-2.23)	0.472
Income3	1.40 (0.76-2.58)	0.275	1.37 (0.74-2.53)	0.308
Northeast	1.70* (1.14-4.50)	0.083	1.73* (1.12-4.41)	0.072
Midwest	0.75 (0.74-2.39)	0.333	0.77 (0.71-2.30)	0.402
South	0.85 (0.65-1.96)	0.478	0.89 (0.66-2.00)	0.641
Rural	1.01 (0.68-1.51)	0.926	1.05 (0.71-1.58)	0.777
Need factors				
Not smoking	1.32 (0.86-2.02)	0.193	1.36 (0.89-2.09)	0.154
Not drinking	0.89 (0.61-1.30)	0.557	0.85 (0.58-1.24)	0.414
Overweight	0.92 (0.60-1.43)	0.733	0.94 (0.61-1.46)	0.805
Exercise	0.62** (0.43-0.89)	0.011	0.57*** (0.39-0.83)	0.004
Pseudo R-squared	0.092		0.088	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix C8. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Prostate Cancer Screening

	Prostate			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition			1.23 (0.62-2.43)	0.545
New ADL	2.80** (1.21-6.45)	0.016	2.35* (0.95-5.79)	0.062
New major illnesses	1.96* (0.90-4.24)	0.087	1.82 (0.80-4.14)	0.148
New minor illnesses	2.10*** (1.25-3.52)	0.005	2.05*** (1.19-3.52)	0.009
Hospitalization1			1.43 (0.67-3.07)	0.348
Hospitalization2			1.38 (0.74-2.57)	0.299
Predisposing factors				
Age	1.02* (0.99-1.05)	0.051	1.02** (1.00-1.05)	0.040
Married	1.71** (1.01-2.89)	0.046	1.64* (0.96-2.81)	0.069
White	0.93 (0.49-1.77)	0.848	0.87 (0.46-1.65)	0.676
Black	1.93* (0.89-4.19)	0.095	1.78 (0.82-3.89)	0.144
High school/GED	1.31 (0.76-2.27)	0.323	1.29 (0.74-2.25)	0.353
Some college and beyond	1.68* (0.94-2.98)	0.077	1.68* (0.94-3.00)	0.078
Enabling factors				
Employer provided insurance	2.17*** (1.37-3.42)	0.001	2.20*** (1.38-3.50)	0.001
Employment	0.74 (0.45-1.21)	0.236	0.76 (0.46-1.25)	0.292
Income2	1.40 (0.77-2.54)	0.267	1.33 (0.73-2.44)	0.344
Income3	1.60 (0.86-3.00)	0.136	1.53 (0.81-2.87)	0.184
Northeast	1.66* (0.90-3.04)	0.100	1.60 (1.04-4.21)	0.129
Midwest	076 (0.42-1.37)	0.368	0.76 (0.72-2.35)	0.376
South	0.89 (0.57-1.40)	0.636	0.90 (0.68-2.07)	0.686
Rural	1.02 (0.69-1.53)	0.892	1.04 (0.69-1.55)	0.844
Need factors				
Not smoking	1.28 (0.84-1.97)	0.242	1.36 (0.88-2.09)	0.161
Not drinking	0.88 (0.61-1.29)	0.530	0.83 (0.56-1.21)	0.341
Overweight	0.93 (0.60-1.45)	0.772	0.96 (0.62-1.51)	0.889
Exercise	0.60*** (0.41-0.87)	0.007	0.61** (0.42-0.89)	0.011
Pseudo R-squared	0.095		0.095	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix C9. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Cholesterol Testing for Men

	Cholesterol Testing			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks	2.75*** (1.80-4.19)	0.000		
New work limiting condition			1.62 (0.79-3.30)	0.181
New ADL				
New major illnesses			2.00* (0.90-4.41)	0.086
New minor illnesses			2.44*** (1.36-4.38)	0.003
Hospitalization1				
Hospitalization2				
Predisposing factors				
Age	1.02 (0.99-1.04)	0.126	1.02 (0.99-1.04)	0.142
Married	2.37*** (1.35-4.16)	0.002	2.45*** (1.39-4.31)	0.002
White	0.82 (0.43-1.55)	0.554	0.85 (0.45-1.60)	0.618
Black	1.17 (0.51-2.65)	0.702	1.20 (0.53-2.71)	0.660
High school/GED	1.09 (0.61-1.94)	0.752	1.09 (0.61-1.94)	0.762
Some college and beyond	1.67* (0.92-3.01)	0.088	1.63 (0.90-2.95)	0.102
Enabling factors				
Employer provided insurance	1.30 (0.82-2.08)	0.256	1.27 (0.79-2.03)	0.306
Employment	0.91 (0.55-1.51)	0.729	0.87 (0.53-1.43)	0.591
Income2	0.99 (0.54-1.82)	0.988	1.05 (0.57-1.94)	0.853
Income3	1.56 (0.82-2.93)	0.168	1.58 (0.83-2.98)	0.157
Northeast	1.27 (0.63-2.55)	0.487	1.37 (0.68-2.74)	0.371
Midwest	0.76 (0.42-1.38)	0.378	0.79 (0.43-1.43)	0.441
South	0.91 (0.57-1.45)	0.714	0.98 (0.61-1.56)	0.939
Rural	0.92 (0.60-1.40)	0.712	0.90 (0.59-1.37)	0.636
Need factors				
Not smoking	1.72** (1.11-2.65)	0.015	1.61** (1.04-2.48)	0.030
Not drinking	0.81 (0.54-1.20)	0.301	0.86 (0.58-1.28)	0.481
Overweight	1.42 (0.91-2.21)	0.120	1.41 (0.90-2.19)	0.129
Exercise	0.91 (0.62-1.35)	0.673	0.83 (0.56-1.22)	0.358
Pseudo R-squared	0.095		0.086	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix C10. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Cholesterol Testing for Men

	Cholesterol Testing			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition			1.31 (0.62-2.77)	0.471
New ADL	2.78*** (1.30-5.93)	0.008	2.17* (0.98-4.83)	0.056
New Major illnesses	2.45** (1.11-5.40)	0.025	1.67 (0.72-3.90)	0.229
New Minor illnesses	2.64*** (1.48-4.68)	0.001	2.28*** (1.25-4.15)	0.007
Hospitalization1			2.07* (0.91-4.70)	0.081
Hospitalization2			2.85*** (1.32-6.14)	0.008
Predisposing factors				
Age	1.02* (0.99-1.05)	0.060	1.01 (0.99-1.04)	0.169
Married	2.39*** (1.36-4.20)	0.002	2.25*** (1.26-4.01)	0.006
White	0.77 (0.41-1.48)	0.447	0.83 (0.43-1.60)	0.582
Black	1.17 (0.51-2.67)	0.698	1.19 (0.51-2.77)	0.678
High school/GED	1.10 (0.62-1.96)	0.732	1.08 (0.60-1.95)	0.787
Some college and beyond	1.66* (0.91-3.04)	0.093	1.67* (0.91-3.05)	0.095
Enabling factors				
Employer provided insurance	1.33 (0.84-2.13)	0.220	1.23 (0.77-1.99)	0.376
Employment	0.89 (0.54-1.47)	0.663	0.95 (0.57-1.58)	0.852
Income2	1.05 (0.57-1.94)	0.861	1.16 (0.62-2.18)	0.638
Income3	1.67 (0.88-3.18)	0.114	1.87* (0.97-3.62)	0.059
Northeast	1.34 (0.67-2.69)	0.397	1.27 (0.62-2.60)	0.498
Midwest	0.82 (0.45-1.49)	0.524	0.80 (0.44-1.46)	0.475
South	1.00 (0.63-1.60)	0.985	0.95 (0.59-1.53)	0.842
Rural	0.89 (0.58-1.36)	0.602	0.93 (0.61-1.43)	0.769
Need factors				
Not smoking	1.60** (1.04-2.48)	0.032	1.71** (1.09-2.66)	0.018
Not drinking	0.83 (0.55-1.23)	0.355	0.83 (0.55-1.23)	0.361
Overweight	1.41 (0.90-2.20)	0.126	1.42 (0.90-2.24)	0.125
Exercise	0.87 (0.59-1.29)	0.510	0.93 (0.62-1.38)	0.733
Pseudo R-squared	0.098		0.108	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix C11. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Cholesterol Testing for Women

	Cholesterol Testing			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks	1.79*** (1.24-2.59)	0.002		
New work limiting condition			1.10 (0.58-2.08)	0.758
New ADL				
New major illnesses			4.58*** (1.83-11.45)	0.001
New minor illnesses			1.57* (0.93-2.66)	0.087
Hospitalization1				
Hospitalization2				
Predisposing factors				
Age	1.00 (0.98-1.03)	0.373	1.01 (0.98-1.03)	0.305
Married	1.06 (0.68-1.65)	0.780	1.18 (0.75-1.85)	0.459
White	1.02 (0.55-1.89)	0.929	0.99 (0.53-1.84)	0.984
Black	1.16 (0.57-2.35)	0.678	1.17 (0.57-2.39)	0.661
High school/GED	0.87 (0.54-1.40)	0.566	0.89 (0.55-1.46)	0.663
Some college and beyond	0.80 (0.46-1.36)	0.413	0.84 (0.48-1.45)	0.534
Enabling factors				
Employer provided insurance	1.43* (0.94-2.18)	0.092	1.33 (0.87-2.05)	0.179
Employment	1.05 (0.69-1.60)	0.819	1.03 (0.67-1.59)	0.860
Income2	0.69 (0.41-1.16)	0.170	0.62* (0.36-1.06)	0.084
Income3	1.18 (0.68-2.03)	0.549	1.17 (0.67-2.03)	0.578
Northeast	2.49*** (1.40-4.42)	0.002	2.44*** (1.36-4.36)	0.003
Midwest	1.40 (0.80-2.45)	0.231	1.58 (0.90-2.78)	0.111
South	1.51* (0.96-2.38)	0.070	1.55* (0.98-2.46)	0.058
Rural	0.87 (0.59-1.30)	0.522	0.91 (0.61-1.36)	0.671
Need factors				
Not smoking	1.33 (0.87-2.04)	0.180	1.38 (0.89-2.14)	0.146
Not drinking	1.05 (0.69-1.58)	0.806	1.05 (0.69-1.59)	0.806
Overweight	1.38* (0.96-1.98)	0.080	1.38* (0.95-2.00)	0.082
Exercise	0.98 (0.69-1.38)	0.909	0.97 (0.68-1.38)	0.870
Pseudo R-squared	0.048		0.058	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix C12. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Cholesterol Testing for Women

	Cholesterol Testing			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition			0.98 (0.51-1.89)	0.968
New ADL	1.79* (0.97-3.32)	0.062	1.66 (0.87-3.15)	0.118
New major illnesses	4.07*** (1.61-10.2)	0.003	3.38** (1.30-8.76)	0.012
New minor illnesses	1.45 (0.86-2.44)	0.155	1.49 (0.87-2.53)	0.141
Hospitalization1			2.19** (1.00-4.80)	0.048
Hospitalization2			1.60 (0.84-3.04)	0.153
Predisposing factors				
Age	1.00 (0.98-1.03)	0.373	1.01 (0.98-1.03)	0.378
Married	1.13 (0.73-1.77)	0.568	1.16 (0.74-1.84)	0.498
White	0.96 (0.52-1.78)	0.905	0.95 (0.51-1.78)	0.882
Black	1.10 (0.54-2.25)	0.783	1.07 (0.52-2.21)	0.851
High school/GED	0.89 (0.55-1.44)	0.643	0.90 (0.55-1.48)	0.683
Some college and beyond	0.80 (0.46-1.37)	0.427	0.86 (0.49-1.50)	0.607
Enabling factors				
Employer provided insurance	1.41 (0.92-2.16)	0.111	1.38 (0.89-2.13)	0.141
Employment	1.05 (0.69-1.61)	0.798	1.07 (0.69-1.65)	0.741
Income2	0.66 (0.39-1.13)	0.133	0.61* (0.35-1.05)	0.077
Income3	1.14 (0.66-1.97)	0.635	1.10 (0.63-1.94)	0.717
Northeast	2.44*** (1.37-4.35)	0.002	2.66*** (1.48-4.79)	0.001
Midwest	1.48 (0.84-2.60)	0.165	1.62* (0.91-2.88)	0.094
South	1.49* (0.94-2.36)	0.082	1.49* (0.94-2.38)	0.088
Rural	0.88 (0.59-1.32)	0.560	0.93 (0.62-1.39)	0.731
Need factors				
Not smoking	1.41 (0.91-2.19)	0.115	1.36 (0.87-2.13)	0.165
Not drinking	1.04 (0.69-1.57)	0.841	1.03 (0.67-1.56)	0.892
Overweight	1.39* (0.96-2.00)	0.078	1.39* (0.95-2.01)	0.082
Exercise	0.98 (0.69-1.40)	0.941	1.01 (0.71-1.46)	0.915
Pseudo R-squared	0.060		0.068	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix C13. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Flu Vaccine for Men

	Flu Vaccine			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks	1.64*** (1.17-2.29)	0.003		
New work limiting condition			1.11 (0.63-1.97)	0.703
New ADL				
New major illnesses			1.83** (1.01-3.34)	0.046
New minor illnesses			1.12 (0.70-1.79)	0.614
Hospitalization1				
Hospitalization2				
Predisposing factors				
Age	1.03*** (1.01-1.06)	0.002	1.03*** (1.01-1.06)	0.004
Married	1.24 (0.79-1.93)	0.345	1.26 (0.80-1.99)	0.302
White	1.82* (0.96-3.45)	0.064	1.76* (0.93-3.33)	0.079
Black	2.10** (1.01-4.36)	0.046	2.11** (1.02-4.39)	0.044
High school/GED	0.86 (0.52-1.40)	0.547	0.79 (0.48-1.30)	0.366
Some college and beyond	1.03 (1.01-1.06)	0.894	0.96 (0.58-1.59)	0.897
Enabling factors				
Employer provided insurance	0.88 (0.58-1.32)	0.546	0.84 (0.56-1.26)	0.413
Employment	1.06 (0.69-1.64)	0.775	0.99 (0.64-1.52)	0.965
Income2	0.89 (0.53-1.50)	0.671	0.92 (0.54-1.57)	0.775
Income3	1.05 (0.61-1.79)	0.849	1.16 (0.67-2.00)	0.584
Northeast	1.23 (0.74-2.04)	0.413	1.18 (0.49-1.47)	0.516
Midwest	1.32 (0.78-2.22)	0.294	1.39 (0.40-1.06)	0.214
South	0.93 (0.61-1.40)	0.734	0.91 (0.70-2.18)	0.673
Rural	1.05 (0.72-1.53)	0.777	1.02 (0.70-1.50)	0.890
Need factors				
Not smoking	1.32 (0.88-1.97)	0.170	1.27 (0.85-1.89)	0.241
Not drinking	0.98 (0.70-1.37)	0.921	1.02 (0.73-1.43)	0.864
Overweight	1.31 (0.88-1.95)	0.170	1.29 (0.86-1.91)	0.207
Exercise	0.72* (0.52-1.00)	0.055	0.72* (0.52-1.00)	0.057
Pseudo R-squared	0.047		0.043	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix C14. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Flu Vaccine for Men

	Flu Vaccine			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition			0.97 (0.53-1.74)	0.920
New ADL	2.03** (1.13-3.65)	0.018	1.59 (0.85-2.98)	0.145
New major illnesses	2.03** (1.14-3.61)	0.016	1.44 (0.76-2.74)	0.258
New minor illnesses	1.03 (0.65-1.64)	0.883	1.04 (0.65-1.68)	0.857
Hospitalization1			1.50 (0.80-2.81)	0.200
Hospitalization2			1.81** (1.09-2.99)	0.020
Predisposing factors				
Age	1.03*** (1.01-1.06)	0.002	1.03*** (1.01-1.06)	0.003
Married	1.22 (0.78-1.92)	0.373	1.30 (0.82-2.07)	0.256
White	1.71* (0.90-3.23)	0.096	1.66 (0.87-3.14)	0.118
Black	1.93* (0.93-4.02)	0.076	2.06* (0.99-4.30)	0.054
High school/GED	0.83 (0.50-1.37)	0.482	0.80 (0.48-1.33)	0.402
Some college and beyond	0.99 (0.60-1.64)	0.995	0.98 (0.59-1.62)	0.942
Enabling factors				
Employer provided insurance	0.89 (0.59-1.34)	0.586	0.89 (0.59-1.34)	0.592
Employment	1.08 (0.69-1.67)	0.728	1.08 (0.69-1.69)	0.711
Income2	0.95 (0.56-1.61)	0.862	1.00 (0.58-1.73)	0.982
Income3	1.17 (0.68-2.00)	0.568	1.22 (0.70-2.13)	0.474
Northeast	1.19 (0.72-1.99)	0.485	1.11 (0.66-1.86)	0.688
Midwest	1.39 (0.83-2.35)	0.208	1.41 (0.83-2.37)	0.199
South	0.95 (0.63-1.44)	0.822	0.87 (0.57-1.32)	0.524
Rural	1.08 (0.74-1.57)	0.690	1.03 (0.70-1.51)	0.883
Need factors				
Not smoking	1.29 (0.87-1.93)	0.203	1.27 (0.85-1.91)	0.235
Not drinking	1.01 (0.72-1.41)	0.942	0.97 (0.69-1.36)	0.871
Overweight	1.31 (0.88-1.95)	0.179	1.30 (0.87-1.95)	0.189
Exercise	0.71** (0.51-0.99)	0.046	0.77 (0.56-1.08)	0.137
Pseudo R-squared	0.050		0.052	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix C15. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Flu Vaccine for Women

	Flu Vaccine			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks	1.47** (1.09-1.98)	0.011		
New work limiting condition			0.66 (0.38-1.17)	0.160
New ADL				
New major illnesses			1.36 (0.74-2.49)	0.322
New minor illnesses			1.63*** (1.12-2.37)	0.010
Hospitalization1				
Hospitalization2				
Predisposing factors				
Age	1.02** (1.00-1.04)	0.016	1.02*** (1.00-1.04)	0.006
Married	0.83 (0.57-1.21)	0.349	0.84 (0.57-1.23)	0.381
White	0.74 (0.46-1.19)	0.214	0.74 (0.46-1.20)	0.232
Black	0.60* (0.34-1.03)	0.069	0.61* (0.35-1.06)	0.080
High school/GED	1.13 (0.74-1.71)	0.554	1.11 (0.73-1.68)	0.611
Some college and beyond	1.07 (0.68-1.69)	0.760	1.09 (0.69-1.73)	0.701
Enabling factors				
Employer provided insurance	1.12 (0.79-1.61)	0.505	1.11 (0.77-1.59)	0.558
Employment	0.79 (0.55-1.12)	0.193	0.76 (0.53-1.09)	0.139
Income2	1.05 (0.67-1.65)	0.808	1.06 (0.67-1.66)	0.797
Income3	1.37 (0.85-2.21)	0.186	1.39 (0.86-2.24)	0.167
Northeast	0.93 (0.58-1.47)	0.750	0.94 (0.59-1.49)	0.794
Midwest	1.40 (0.89-2.22)	0.142	1.41 (0.89-2.23)	0.140
South	0.94 (0.65-1.37)	0.766	0.93 (0.64-1.36)	0.741
Rural	0.90 (0.64-1.27)	0.579	0.92 (0.65-1.29)	0.651
Need factors				
Not smoking	1.10 (0.76-1.59)	0.603	1.07 (0.74-1.55)	0.703
Not drinking	1.11 (0.78-1.59)	0.538	1.17 (0.82-1.68)	0.374
Overweight	1.12 (0.83-1.53)	0.441	1.11 (0.81-1.50)	0.512
Exercise	0.81 (0.60-1.09)	0.179	0.79 (0.59-1.07)	0.130
Pseudo R-squared	0.029		0.032	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix C16. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Flu Vaccine for Women

	Flu Vaccine			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition			0.63 (0.35-1.12)	0.118
New ADL	1.03 (0.62-1.73)	0.895	1.02 (0.60-1.73)	0.944
New major illnesses	1.34 (0.73-2.47)	0.342	1.15 (0.61-2.16)	0.668
New minor illnesses	1.62*** (1.12-2.35)	0.010	1.60** (1.10-2.33)	0.014
Hospitalization1			1.33 (0.75-2.38)	0.325
Hospitalization2			1.47* (0.94-2.31)	0.088
Predisposing factors				
Age	1.02*** (1.00-1.04)	0.010	1.02*** (1.00-1.04)	0.008
Married	0.83 (0.57-1.21)	0.340	0.84 (0.58-1.24)	0.398
White	0.77 (0.47-1.23)	0.278	0.72 (0.44-1.17)	0.192
Black	0.61* (0.35-1.06)	0.082	0.59* (0.34-1.03)	0.068
High school/GED	1.10 (0.73-1.67)	0.634	1.14 (0.75-1.74)	0.531
Some college and beyond	1.05 (0.66-1.66)	0.815	1.12 (0.70-1.80)	0.608
Enabling factors				
Employer provided insurance	1.12 (0.78-1.61)	0.515	1.11 (0.77-1.59)	0.562
Employment	0.77 (0.54-1.10)	0.155	0.77 (0.54-1.11)	0.167
Income2	1.03 (0.66-1.61)	0.886	1.08 (0.69-1.70)	0.730
Income3	1.36 (0.85-2.19)	0.198	1.40 (0.87-2.27)	0.162
Northeast	0.94 (0.59-1.50)	0.814	0.96 (0.60-1.53)	0.881
Midwest	1.41 (0.89-2.23)	0.141	1.45 (0.91-2.30)	0.116
South	0.94 (0.65-1.37)	0.769	0.94 (0.64-1.36)	0.745
Rural	0.91 (0.65-1.28)	0.620	0.93 (0.66-1.31)	0.707
Need factors				
Not smoking	1.10 (0.76-1.59)	0.613	1.06 (0.73-1.53)	0.761
Not drinking	1.14 (0.80-1.64)	0.453	1.16 (0.81-1.66)	0.409
Overweight	1.13 (0.83-1.54)	0.423	1.09 (0.80-1.49)	0.559
Exercise	0.80 (0.59-1.08)	0.148	0.81 (0.60-1.08)	0.161
Pseudo R-squared	0.030		0.034	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

APPENDIX D

Appendix D1. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Mammogram with Each of the Health Shock Variables Included in a Single Model

	Mammogram			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition	1.53 (0.84-2.76)	0.157		
New ADL			0.95 (0.55-1.66)	0.878
New major illnesses				
New minor illnesses				
Hospitalization1				
Hospitalization2				
Predisposing factors				
Age	0.98 (0.96-1.01)	0.328	0.98 (0.96-1.01)	0.273
Married	0.77 (0.48-1.24)	0.293	0.76 (0.48-1.291	0.253
White	0.57* (0.31-1.05)	0.074	0.57* (0.31-1.04)	0.071
Black	0.90 (0.43-1.90)	0.801	0.90 (0.43-1.89)	0.788
High school/GED	0.78 (0.49-1.24)	0.307	0.79 (0.50-1.26)	0.337
Some college and beyond	1.04 (0.62-1.75)	0.854	1.05 (0.63-1.76)	0.836
Enabling factors				
Employer provided insurance	1.28 (0.84-1.94)	0.241	1.28 (0.84-1.94)	0.245
Employment	1.18 (0.74-1.88)	0.478	1.15 (0.72-1.83)	0.545
Income2	0.96 (0.58-1.57)	0.881	0.93 (0.57-1.52)	0.775
Income3	1.39 (0.78-2.48)	0.253	1.35 (0.76-2.39)	0.301
Northeast	1.00 (0.55-1.79)	0.999	1.01 (0.56-1.83)	0.949
Midwest	1.03 (0.58-1.86)	0.896	1.03 (0.58-1.85)	0.895
South	0.92 (0.58-1.46)	0.743	0.91 (0.57-1.43)	0.688
Rural	0.75 (0.50-1.11)	0.159	0.75 (0.50-1.12)	0.163
Need factors				
Not smoking	1.20 (0.78-1.85)	0.388	1.19 (0.77-1.83)	0.415
Not drinking	0.79 (0.50-1.24)	0.306	0.80 (0.51-1.25)	0.330
Overweight	1.47** (1.00-2.15)	0.046	1.48** (1.01-2.17)	0.043
Exercise	0.83 (0.57-1.22)	0.357	0.82 (0.56-1.20)	0.316
Pseudo R-squared	0.046		0.045	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix D2. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Mammogram with Each of the Health Shock Variables Included in a Single Model

	Mammogram			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition				
New ADL				
New major illnesses	2.06** (1.04-4.05)	0.036		
New minor illnesses	1.40 (0.86-2.25)	0.167		
Hospitalization1			1.11 (0.48-2.53)	0.796
Hospitalization2			2.41*** (1.44-4.04)	0.001
Predisposing factors				
Age	0.98 (0.96-1.00)	0.265	0.98 (0.96-1.00)	0.154
Married	0.79 (0.50-1.27)	0.345	0.77 (0.48-1.23)	0.285
White	0.56* (0.30-1.03)	0.065	0.52** (0.28-0.96)	0.037
Black	0.93 (0.44-1.97)	0.866	0.84 (0.39-1.77)	0.653
High school/GED	0.81 (0.51-1.30)	0.394	0.83 (0.52-1.33)	0.445
Some college and beyond	1.12 (0.67-1.89)	0.652	1.12 (0.66-1.88)	0.662
Enabling factors				
Employer provided insurance	1.29 (0.85-1.97)	0.222	1.30 (0.85-1.98)	0.215
Employment	1.14 (0.71-1.82)	0.568	1.18 (0.74-1.88)	0.488
Income2	0.91 (0.55-1.50)	0.719	1.00 (0.61-1.66)	0.976
Income3	1.34 (0.76-2.40)	0.309	1.42 (0.79-2.53)	0.233
Northeast	1.00 (0.55-1.81)	0.985	0.96 (0.53-1.74)	0.900
Midwest	1.07 (0.59-1.91)	0.817	0.96 (0.53-1.73)	0.905
South	0.88 (0.55-1.39)	0.584	0.87 (0.54-1.38)	0.559
Rural	0.74 (0.49-1.10)	0.143	0.71 (0.47-1.07)	0.105
Need factors				
Not smoking	1.21 (0.78-1.86)	0.381	1.22 (0.79-1.89)	0.353
Not drinking	0.83 (0.53-1.31)	0.441	0.76 (0.48-1.19)	0.238
Overweight	1.44* (0.98-2.11)	0.060	1.40* (0.95-2.06)	0.083
Exercise	0.86 (0.58-1.25)	0.439	0.88 (0.60-1.29)	0.529
Pseudo R-squared	0.054		0.061	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix D3. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Breast Self-Exam with Each of the Health Shock Variables Included in a Single Model

	Breast self-exam			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition	0.88 (0.52-1.50)	0.653		
New ADL			1.08 (0.68-1.72)	0.733
New major illnesses				
New minor illnesses				
Hospitalization1				
Hospitalization2				
Predisposing factors				
Age	0.99 (0.98-1.01)	0.928	0.99 (0.98-1.01)	0.818
Married	0.92 (0.64-1.33)	0.666	0.93 (0.64-1.34)	0.700
White	0.46*** (0.29-0.73)	0.001	0.46*** (0.29-0.73)	0.001
Black	0.84 (0.46-1.52)	0.571	0.86 (0.48-1.54)	0.625
High school/GED	1.27 (0.82-1.96)	0.278	1.29 (0.84-1.98)	0.242
Some college and beyond	1.11 (0.69-1.79)	0.643	1.09 (0.68-1.74)	0.696
Enabling factors				
Employer provided insurance	0.92 (0.65-1.30)	0.645	0.93 (0.66-1.31)	0.689
Employment	0.98 (0.67-1.43)	0.929	0.99 (0.68-1.45)	0.987
Income2	0.87 (0.58-1.33)	0.541	0.84 (0.56-1.27)	0.425
Income3	0.81 (0.50-1.31)	0.402	0.78 (0.48-1.26)	0.320
Northeast	1.49* (0.94-2.37)	0.086	1.45 (0.91-2.30)	0.111
Midwest	1.39 (0.89-2.18)	0.144	1.41 (0.90-2.20)	0.128
South	1.11 (0.76-1.63)	0.574	1.09 (0.74-1.59)	0.652
Rural	1.36* (0.96-1.92)	0.079	1.37* (0.97-1.93)	0.071
Need factors				
Not smoking	0.80 (0.54-1.18)	0.271	0.81 (0.55-1.20)	0.308
Not drinking	0.66** (0.47-0.93)	0.018	0.64** (0.46-0.90)	0.012
Overweight	0.97 (0.71-1.31)	0.860	0.99 (0.73-1.34)	0.975
Exercise	0.93 (0.69-1.25)	0.644	0.95 (0.70-1.28)	0.758
Pseudo R-squared	0.026		0.027	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix D4. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Breast Self-Exam with Each of the Health Shock Variables Included in a Single Model

	Breast self-exam			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition				
New ADL				
New major illnesses	1.23 (0.72-2.10)	0.439		
New minor illnesses	1.00 (0.65-1.54)	0.977		
Hospitalization1			1.23 (0.71-2.13)	0.455
Hospitalization2			1.13 (0.74-1.71)	0.553
Predisposing factors				
Age	0.99 (0.97-1.01)	0.794	0.99 (0.98-1.01)	0.809
Married	0.93 (0.65-1.35)	0.729	0.92 (0.64-1.33)	0.678
White	0.46*** (0.29-0.73)	0.001	0.46*** (0.29-0.73)	0.001
Black	0.86 (0.48-1.55)	0.634	0.85 (0.47-1.53)	0.597
High school/GED	1.29 (0.84-1.99)	0.237	1.28 (0.83-1.98)	0.250
Some college and beyond	1.10 (0.69-1.76)	0.676	1.08 (0.68-1.73)	0.722
Enabling factors				
Employer provided insurance	0.92 (0.66-1.30)	0.657	0.92 (0.65-1.30)	0.651
Employment	0.99 (0.68-1.45)	0.989	0.99 (0.68-1.45)	0.992
Income2	0.84 (0.55-1.27)	0.416	0.84 (0.55-1.27)	0.428
Income3	0.78 (0.48-1.26)	0.319	0.78 (0.48-1.26)	0.325
Northeast	1.45 (0.91-2.29)	0.111	1.46 (0.92-2.31)	0.105
Midwest	1.42 (0.90-2.21)	0.122	1.47* (0.93-2.30)	0.093
South	1.08 (0.74-1.58)	0.665	1.08 (0.74-1.59)	0.660
Rural	1.38* (0.98-1.95)	0.064	1.39* (0.98-1.97)	0.058
Need factors				
Not smoking	0.82 (0.55-1.22)	0.343	0.81 (0.54-1.20)	0.303
Not drinking	0.65** (0.46-0.91)	0.013	0.65** (0.46-0.92)	0.015
Overweight	0.99 (0.73-1.34)	0.959	0.98 (0.72-1.33)	0.908
Exercise	0.95 (0.70-1.28)	0.751	0.94 (0.70-1.27)	0.717
Pseudo R-squared	0.027		0.028	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix D5. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Pap Smear with Each of the Health Shock Variables Included in a Single Model

	Pap smear			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition	1.37 (1.06-2.08)	0.193		
New ADL			0.86 (0.51-1.45)	0.592
New major illnesses				
New minor illnesses				
Hospitalization1				
Hospitalization2				
Predisposing factors				
Age	0.97** (0.95-0.99)	0.032	0.97** (0.95-0.99)	0.032
Married	1.00 (0.68-1.49)	0.966	0.99 (0.67-1.47)	0.974
White	0.58** (0.31-0.90)	0.049	0.56** (0.33-0.96)	0.035
Black	0.60 (0.27-1.06)	0.151	0.57 (0.29-1.12)	0.105
High school/GED	1.02 (0.71-1.69)	0.895	1.03 (0.67-1.57)	0.889
Some college and beyond	0.97 (0.65-1.73)	0.903	0.98 (0.60-1.59)	0.951
Enabling factors				
Employer provided insurance	1.14 (0.76-1.63)	0.496	1.11 (0.76-1.62)	0.580
Employment	1.56* (1.00-2.52)	0.057	1.53* (0.97-2.43)	0.065
Income2	1.00 (0.63-1.51)	0.966	0.96 (0.62-1.49)	0.888
Income3	1.04 (0.60-1.66)	0.858	1.02 (0.62-1.69)	0.919
Northeast	1.07 (0.59-1.79)	0.800	1.08 (0.62-1.87)	0.776
Midwest	0.98 (0.55-1.58)	0.944	0.98 (0.58-1.66)	0.969
South	1.13 (0.73-1.69)	0.568	1.14 (0.75-1.73)	0.526
Rural	0.69* (0.49-1.05)	0.059	0.72* (0.49-1.05)	0.090
Need factors				
Not smoking	1.11 (0.73-1.70)	0.602	1.08 (0.71-1.65)	0.690
Not drinking	1.29 (0.84-1.97)	0.242	1.31 (0.82-2.00)	0.210
Overweight	1.10 (0.79-1.59)	0.564	1.14 (0.81-1.62)	0.433
Exercise	1.00 (0.71-1.41)	0.999	0.97 (0.69-1.37)	0.894
Pseudo R-squared	0.043		0.041	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix D6. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Pap Smear with Each of the Health Shock Variables Included in a Single Model

	Pap smear			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition				
New ADL				
New major illnesses	1.44 (0.82-2.52)	0.196		
New minor illnesses	1.26 (0.81-1.95)	0.296		
Hospitalization1			1.83* (0.93-3.59)	0.076
Hospitalization2			1.90*** (1.23-2.94)	0.003
Predisposing factors				
Age	0.97** (0.95-0.99)	0.022	0.97** (0.95-0.99)	0.014
Married	1.00 (0.67-1.48)	1.000	1.00 (0.67-1.49)	0.979
White	0.54** (0.32-0.92)	0.024	0.53** (0.31-0.90)	0.019
Black	0.54* (0.27-1.08)	0.083	0.51* (0.26-1.02)	0.058
High school/GED	1.06 (0.69-1.63)	0.773	1.09 (0.71-1.67)	0.693
Some college and beyond	1.04 (0.64-1.68)	0.873	1.03 (0.63-1.67)	0.901
Enabling factors				
Employer provided insurance	1.11 (0.76-1.62)	0.572	1.15 (0.79-1.69)	0.451
Employment	1.51* (0.95-2.40)	0.075	1.58** (1.00-2.51)	0.050
Income2	0.96 (0.62-1.49)	0.881	0.99 (0.64-1.53)	0.977
Income3	1.00 (0.61-1.67)	0.970	1.01 (0.61-1.68)	0.951
Northeast	1.07 (0.62-1.85)	0.801	1.08 (0.62-1.87)	0.774
Midwest	0.96 (0.57-1.62)	0.890	1.01 (0.60-1.71)	0.954
South	1.13 (0.74-1.72)	0.557	1.12 (0.73-1.70)	0.592
Rural	0.73 (0.50-1.06)	0.107	0.73 (0.50-1.07)	0.113
Need factors				
Not smoking	1.10 (0.72-1.67)	0.641	1.08 (0.70-1.64)	0.717
Not drinking	1.29 (0.84-1.98)	0.235	1.28 (0.83-1.96)	0.254
Overweight	1.15 (0.81-1.63)	0.419	1.10 (0.77-1.57)	0.575
Exercise	1.00 (0.71-1.41)	0.987	1.00 (0.71-1.42)	0.962
Pseudo R-squared	0.044		0.052	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix D7. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Prostate Cancer Screening with Each of the Health Shock Variables Included in a Single Model

	Prostate			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition	1.85* (0.99-3.47)	0.052		
New ADL			3.15*** (1.38-7.23)	0.007
New major illnesses				
New minor illnesses				
Hospitalization1				
Hospitalization2				
Predisposing factors				
Age	1.02* (0.99-1.05)	0.067	1.02** (1.00-1.05)	0.050
Married	1.75** (1.04-2.94)	0.033	1.74** (1.04-2.93)	0.035
White	0.93 (0.50-1.74)	0.837	0.98 (0.52-1.83)	0.956
Black	1.94* (0.90-4.15)	0.088	1.95* (0.90-4.19)	0.087
High school/GED	1.34 (0.78-2.30)	0.289	1.32 (0.77-2.26)	0.314
Some college and beyond	1.69* (0.96-2.99)	0.067	1.58 (0.89-2.78)	0.113
Enabling factors				
Employer provided insurance	2.06*** (1.31-3.24)	0.002	2.15*** (1.37-3.39)	0.001
Employment	0.72 (0.45-1.17)	0.190	0.73 (0.45-1.19)	0.212
Income2	1.18 (0.66-2.12)	0.570	1.35 (0.75-2.43)	0.314
Income3	1.31 (0.71-2.40)	0.377	1.53 (0.83-2.84)	0.170
Northeast	1.68* (0.93-3.05)	0.084	1.58 (0.87-2.87)	0.130
Midwest	0.77 (0.43-1.37)	0.382	0.77 (0.43-1.37)	0.383
South	0.87 (0.55-1.35)	0.538	0.87 (0.55-1.35)	0.536
Rural	1.05 (0.70-1.56)	0.796	1.00 (0.67-1.48)	0.984
Need factors				
Not smoking	1.28 (0.84-1.95)	0.241	1.20 (0.79-1.83)	0.382
Not drinking	0.86 (0.59-1.25)	0.433	0.89 (0.61-1.29)	0.541
Overweight	0.95 (0.61-1.47)	0.832	0.96 (0.62-1.48)	0.867
Exercise	0.56*** (0.39-0.81)	0.002	0.59*** (0.41-0.86)	0.006
Pseudo R-squared	0.073		0.080	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix D8. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Prostate Cancer Screening with Each of the Health Shock Variables Included in a Single Model

	Prostate			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition				
New ADL				
New major illnesses	2.01* (0.93-4.34)	0.073		
New minor illnesses	2.19*** (1.31-3.66)	0.003		
Hospitalization1			1.49 (0.67-3.07)	0.281
Hospitalization2			1.91** (0.74-2.57)	0.024
Predisposing factors				
Age	1.02* (0.99-1.05)	0.058	1.02* (1.00-1.05)	0.083
Married	1.75** (1.03-2.95)	0.035	1.74** (0.96-2.81)	0.036
White	0.94 (0.50-1.77)	0.854	0.97 (0.46-1.65)	0.931
Black	1.97* (0.91-4.25)	0.082	1.89* (0.82-3.89)	0.099
High school/GED	1.33 (0.77-2.30)	0.296	1.27 (0.74-2.25)	0.378
Some college and beyond	1.71* (0.96-3.03)	0.064	1.55 (0.94-3.00)	0.124
Enabling factors				
Employer provided insurance	2.09*** (1.33-3.29)	0.001	2.06*** (1.38-3.50)	0.002
Employment	0.71 (0.44-1.16)	0.181	0.74 (0.46-1.25)	0.240
Income2	1.29 (0.72-2.32)	0.391	1.28 (0.73-2.44)	0.401
Income3	1.43 (0.78-2.64)	0.244	1.41 (0.81-2.87)	0.265
Northeast	1.73* (0.95-3.15)	0.072	1.57 (1.04-4.21)	0.135
Midwest	0.78 (0.44-1.40)	0.421	0.79 (0.72-2.35)	0.447
South	0.89 (0.57-1.39)	0.620	0.87 (0.68-2.07)	0.570
Rural	1.04 (0.70-1.54)	0.844	1.01 (0.69-1.55)	0.931
Need factors				
Not smoking	1.31 (0.86-2.00)	0.206	1.27 (0.88-2.09)	0.257
Not drinking	0.89 (0.61-1.30)	0.567	0.88 (0.56-1.21)	0.528
Overweight	0.91 (0.59-1.40)	0.686	0.96 (0.62-1.51)	0.855
Exercise	0.58*** (0.40-0.83)	0.004	0.61*** (0.42-0.89)	0.009
Pseudo R-squared	0.087		0.075	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix D9. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Cholesterol Testing for Men with Each of the Health Shock Variables Included in a Single Model

	Cholesterol Testing			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition	2.09** (1.06-4.14)	0.033		
New ADL			2.78*** (1.31-5.87)	0.007
New major illnesses				
New minor illnesses				
Hospitalization1				
Hospitalization2				
Predisposing factors				
Age	1.02 (0.99-1.04)	0.167	1.02* (0.99-1.05)	0.059
Married	2.57*** (1.47-4.48)	0.001	2.51*** (1.44-4.38)	0.001
White	0.84 (0.44-1.57)	0.589	0.77 (0.40-1.44)	0.415
Black	1.21 (0.54-2.70)	0.635	1.16 (0.52-2.60)	0.708
High school/GED	1.10 (0.62-1.95)	0.725	1.12 (0.64-1.98)	0.681
Some college and beyond	1.61 (0.90-2.87)	0.108	1.58 (0.88-2.83)	0.119
Enabling factors				
Employer provided insurance	1.30 (0.82-2.05)	0.265	1.36 (0.86-2.15)	0.180
Employment	0.82 (0.50-1.34)	0.438	0.82 (0.50-1.34)	0.444
Income2	1.01 (0.55-1.85)	0.968	0.98 (0.54-1.80)	0.971
Income3	1.52 (0.81-2.84)	0.191	1.55 (0.83-2.92)	0.167
Northeast	1.21 (0.61-2.40)	0.580	1.15 (0.58-2.29)	0.672
Midwest	0.73 (0.40-1.31)	0.298	0.77 (0.43-1.37)	0.379
South	0.92 (0.58-1.46)	0.749	0.96 (0.61-1.52)	0.875
Rural	0.88 (0.58-1.33)	0.554	0.86 (0.57-1.30)	0.485
Need factors				
Not smoking	1.55** (1.01-2.38)	0.041	1.52* (0.99-2.32)	0.053
Not drinking	0.84 (0.57-1.24)	0.393	0.81 (0.55-1.19)	0.285
Overweight	1.45* (0.93-2.25)	0.095	1.45* (0.94-2.25)	0.091
Exercise	0.81 (0.55-1.19)	0.300	0.86 (0.58-1.25)	0.438
Pseudo R-squared	0.068		0.073	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix D10. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Cholesterol Testing for Men with Each of the Health Shock Variables Included in a Single Model

	Cholesterol Testing			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition				
New ADL				
New major illnesses	2.28** (1.04-5.00)	0.039		
New minor illnesses	2.73*** (1.54-4.84)	0.001		
Hospitalization1			2.29** (1.03-5.07)	0.041
Hospitalization2			4.15*** (2.02-8.55)	0.000
Predisposing factors				
Age	1.02 (0.99-1.04)	0.108	1.01 (0.99-1.04)	0.279
Married	2.37*** (1.35-4.13)	0.002	2.27*** (1.28-4.00)	0.005
White	0.84 (0.44-1.58)	0.595	0.86 (0.45-1.63)	0.654
Black	1.17 (0.51-2.64)	0.704	1.13 (0.49-2.58)	0.770
High school/GED	1.08 (0.61-1.92)	0.776	1.06 (0.60-1.89)	0.827
Some college and beyond	1.59 (0.88-2.86)	0.120	1.55 (0.85-2.80)	0.145
Enabling factors				
Employer provided insurance	1.32 (0.83-2.10)	0.234	1.26 (0.79-2.01)	0.322
Employment	0.84 (0.51-1.38)	0.498	0.85 (0.52-1.40)	0.541
Income2	0.98 (0.54-1.79)	0.957	0.99 (0.53-1.84)	0.989
Income3	1.48 (0.79-2.79)	0.214	1.60 (0.85-3.03)	0.143
Northeast	1.34 (0.67-2.68)	0.396	1.09 (0.54-2.19)	0.802
Midwest	0.83 (0.46-1.49)	0.533	0.78 (0.43-1.41)	0.430
South	1.00 (0.63-1.59)	0.985	0.90 (0.57-1.44)	0.679
Rural	0.89 (0.59-1.36)	0.612	0.91 (0.60-1.38)	0.668
Need factors				
Not smoking	1.62** (1.05-2.49)	0.029	1.69** (1.09-2.62)	0.017
Not drinking	0.86 (0.58-1.27)	0.452	0.81 (0.55-1.21)	0.320
Overweight	1.41 (0.90-2.20)	0.123	1.50* (0.95-2.34)	0.075
Exercise	0.85 (0.58-1.25)	0.421	0.95 (0.64-1.40)	0.814
Pseudo R-squared	0.087		0.089	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix D11. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Cholesterol Testing for Women with Each of the Health Shock Variables Included in a Single Model

	Cholesterol Testing			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition	1.21 (0.65-2.24)	0.538		
New ADL			2.14** (1.18-3.88)	0.012
New major illnesses				
New minor illnesses				
Hospitalization1				
Hospitalization2				
Predisposing factors				
Age	1.01 (0.99-1.03)	0.228	1.01 (0.98-1.03)	0.307
Married	1.13 (0.73-1.76)	0.575	1.10 (0.70-1.70)	0.668
White	1.01 (0.55-1.87)	0.952	0.97 (0.52-1.78)	0.926
Black	1.17 (0.58-2.37)	0.651	1.08 (0.53-2.19)	0.820
High school/GED	0.84 (0.52-1.36)	0.488	0.84 (0.52-1.36)	0.502
Some college and beyond	0.80 (0.46-1.37)	0.424	0.77 (0.45-1.32)	0.351
Enabling factors				
Employer provided insurance	1.40 (0.92-2.14)	0.113	1.49* (0.98-2.27)	0.061
Employment	1.05 (0.69-1.60)	0.807	1.06 (0.70-1.62)	0.757
Income2	0.64 (0.38-1.09)	0.103	0.67 (0.40-1.13)	0.135
Income3	1.17 (0.68-2.03)	0.561	1.12 (0.65-1.94)	0.665
Northeast	2.54*** (1.43-4.49)	0.001	2.54*** (1.44-4.49)	0.001
Midwest	1.53 (0.87-2.68)	0.113	1.43 (0.82-2.50)	0.204
South	1.64** (1.04-2.57)	0.030	1.54* (0.98-2.41)	0.059
Rural	0.93 (0.63-1.37)	0.723	0.90 (0.61-1.33)	0.614
Need factors				
Not smoking	1.21 (0.79-1.84)	0.374	1.26 (0.83-1.93)	0.270
Not drinking	1.07 (0.71-1.60)	0.744	1.05 (0.69-1.58)	0.802
Overweight	1.38* (0.96-1.98)	0.079	1.38* (0.96-1.98)	0.078
Exercise	0.93 (0.66-1.33)	0.723	0.96 (0.68-1.36)	0.843
Pseudo R-squared	0.037		0.043	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix D12. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Cholesterol Testing for Women with Each of the Health Shock Variables Included in a Single Model

	Cholesterol Testing			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition				
New ADL				
New major illnesses	4.60*** (1.84-11.4)	0.001		
New minor illnesses	1.48 (0.88-2.48)	0.136		
Hospitalization1			2.25** (1.03-4.91)	0.041
Hospitalization2			2.12** (1.17-3.81)	0.012
Predisposing factors				
Age	1.00 (0.98-1.03)	0.364	1.00 (0.98-1.03)	0.434
Married	1.13 (0.73-1.77)	0.571	1.05 (0.68-1.64)	0.806
White	1.01 (0.54-1.86)	0.967	1.01 (0.55-1.87)	0.958
Black	1.18 (0.58-2.40)	0.637	1.10 (0.54-2.23)	0.787
High school/GED	0.86 (0.53-1.40)	0.568	0.83 (0.51-1.34)	0.457
Some college and beyond	0.78 (0.46-1.34)	0.378	0.78 (0.46-1.33)	0.375
Enabling factors				
Employer provided insurance	1.35 (0.89-2.06)	0.154	1.43* (0.93-2.18)	0.095
Employment	1.04 (0.68-1.59)	0.846	1.08 (0.70-1.64)	0.720
Income2	0.68 (0.40-1.15)	0.158	0.70 (0.41-1.17)	0.181
Income3	1.16 (0.67-2.01)	0.585	1.10 (0.64-1.92)	0.711
Northeast	2.40*** (1.35-4.28)	0.003	2.76*** (1.55-4.91)	0.001
Midwest	1.52 (0.87-2.67)	0.138	1.57 (0.90-2.76)	0.110
South	1.54* (0.98-2.43)	0.060	1.60** (1.02-2.52)	0.040
Rural	0.87 (0.59-1.30)	0.514	0.89 (0.60-1.31)	0.566
Need factors				
Not smoking	1.41 (0.92-2.19)	0.113	1.25 (0.82-1.92)	0.285
Not drinking	1.05 (0.70-1.59)	0.785	1.04 (0.68-1.56)	0.851
Overweight	1.40* (0.97-2.02)	0.068	1.43* (0.99-2.06)	0.052
Exercise	0.96 (0.68-1.37)	0.843	0.98 (0.69-1.40)	0.948
Pseudo R-squared	0.055		0.048	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix D13. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Flu Vaccine for Men with Each of the Health Shock Variables Included in a Single Model

	Flu vaccine			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition	1.28 (0.74-2.22)	0.363		
New ADL			2.09**	0.012
New major illnesses				
New minor illnesses				
Hospitalization1				
Hospitalization2				
Predisposing factors				
Age	1.03*** (1.01-1.06)	0.004	1.04*** (1.01-1.06)	0.001
Married	1.28 (0.81-2.01)	0.280	1.23 (0.80-1.99)	0.357
White	1.80* (0.95-3.40)	0.068	1.75* (0.93-3.33)	0.081
Black	2.19** (1.06-4.54)	0.033	2.01* (1.02-4.39)	0.058
High school/GED	0.79 (0.48-1.30)	0.356	0.84 (0.48-1.30)	0.496
Some college and beyond	0.95 (0.58-1.57)	0.864	0.99 (0.58-1.59)	0.970
Enabling factors				
Employer provided insurance	0.83 (0.56-1.25)	0.395	0.89 (0.56-1.26)	0.584
Employment	0.97 (0.63-1.50)	0.910	1.06 (0.64-1.52)	0.781
Income2	0.92 (0.54-1.56)	0.761	0.94 (0.54-1.57)	0.836
Income3	1.15 (0.67-1.97)	0.604	1.14 (0.67-2.00)	0.616
Northeast	1.22 (0.74-2.02)	0.430	1.24 (0.49-1.47)	0.398
Midwest	1.39 (0.82-2.33)	0.213	1.39* (0.40-1.06)	0.209
South	0.92 (0.61-1.40)	0.721	0.97 (0.70-2.18)	0.906
Rural	1.01 (0.69-1.47)	0.954	1.06 (0.70-1.50)	0.748
Need factors				
Not smoking	1.26 (0.85-1.88)	0.243	1.29 (0.85-1.89)	0.200
Not drinking	1.02 (0.73-1.43)	0.881	1.00 (0.73-1.43)	0.977
Overweight	1.31 (0.88-1.94)	0.180	1.33 (0.86-1.91)	0.154
Exercise	0.72 (0.52-0.99)	0.048	0.70** (0.52-1.00)	0.035
Pseudo R-squared	0.039		0.045	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix D14. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Flu Vaccine for Men with Each of the Health Shock Variables Included in a Single Model

	Flu Vaccine			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition				
New ADL				
New major illnesses	2.06** (1.17-3.65)	0.012		
New minor illnesses	1.10 (0.70-1.75)	0.653		
Hospitalization1			1.58 (0.85-2.93)	0.140
Hospitalization2			2.08*** (1.32-3.27)	0.001
Predisposing factors				
Age	1.03*** (1.01-1.06)	0.004	1.03*** (1.01-1.06)	0.003
Married	1.25 (0.80-1.95)	0.326	1.29 (0.82-2.03)	0.268
White	1.78* (0.94-3.36)	0.076	1.75* (0.92-3.32)	0.085
Black	2.03* (0.97-4.21)	0.057	2.08** (1.00-4.32)	0.049
High school/GED	0.85 (0.51-1.39)	0.527	0.87 (0.52-1.43)	0.590
Some college and beyond	1.01 (0.61-1.68)	0.940	1.03 (0.62-1.71)	0.888
Enabling factors				
Employer provided insurance	0.86 (0.57-1.28)	0.465	0.88 (0.58-1.32)	0.553
Employment	1.00 (0.65-1.53)	0.998	1.06 (0.69-1.65)	0.767
Income2	0.89 (0.53-1.51)	0.678	0.94 (0.55-1.60)	0.828
Income3	1.09 (0.64-1.85)	0.748	1.08 (0.62-1.85)	0.778
Northeast	1.19 (0.72-1.99)	0.484	1.15 (0.69-1.92)	0.581
Midwest	1.35 (0.80-2.28)	0.246	1.35 (0.80-2.28)	0.256
South	0.94 (0.62-1.42)	0.779	0.89 (0.59-1.36)	0.612
Rural	1.06 (0.74-1.55)	0.724	1.06 (0.72-1.55)	0.748
Need factors				
Not smoking	1.28 (0.86-1.91)	0.215	1.29 (0.86-1.93)	0.206
Not drinking	1.03 (0.74-1.44)	0.845	0.97 (0.69-1.36)	0.887
Overweight	1.30 (0.87-1.93)	0.189	1.34 (0.90-2.00)	0.146
Exercise	0.70** (0.50-0.97)	0.034	0.74* (0.53-1.03)	0.079
Pseudo R-squared	0.045		0.049	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix D15. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Flu Vaccine for Women with Each of the Health Shock Variables Included in a Single Model

	Flu Vaccine			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition	0.69 (0.39-1.21)	0.204		
New ADL			1.07 (0.64-1.79)	0.771
New major illnesses				
New minor illnesses				
Hospitalization1				
Hospitalization2				
Predisposing factors				
Age	1.02*** (1.00-1.04)	0.007	1.02** (1.00-1.04)	0.012
Married	0.85 (0.58-1.24)	0.409	0.84 (0.57-1.22)	0.360
White	0.74 (0.45-1.18)	0.211	0.75 (0.47-1.21)	0.243
Black	0.60* (0.34-1.03)	0.066	0.59* (0.34-1.02)	0.063
High school/GED	1.09 (0.72-1.65)	0.677	1.08 (0.72-1.63)	0.696
Some college and beyond	1.06 (0.67-1.68)	0.789	1.02 (0.65-1.62)	0.900
Enabling factors				
Employer provided insurance	1.09 (0.76-1.57)	0.609	1.11 (0.77-1.58)	0.562
Employment	0.77 (0.54-1.10)	0.160	0.78 (0.55-1.11)	0.175
Income2	1.05 (0.67-1.64)	0.827	1.02 (0.65-1.60)	0.907
Income3	1.37 (0.85-2.19)	0.192	1.34 (0.83-2.15)	0.218
Northeast	0.94 (0.59-1.49)	0.799	0.94 (0.59-1.49)	0.799
Midwest	1.40 (0.88-2.22)	0.144	1.39 (0.88-2.20)	0.153
South	0.94 (0.65-1.37)	0.773	0.95 (0.65-1.37)	0.793
Rural	0.93 (0.66-1.31)	0.712	0.92 (0.66-1.30)	0.668
Need factors				
Not smoking	1.03 (0.71-1.48)	0.867	1.06 (0.73-1.52)	0.751
Not drinking	1.16 (0.81-1.66)	0.398	1.13 (0.79-1.62)	0.478
Overweight	1.13 (0.83-1.53)	0.428	1.15 (0.85-1.56)	0.361
Exercise	0.77* (0.57-1.03)	0.088	0.78* (0.58-1.04)	0.100
Pseudo R-squared	0.025		0.024	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix D16. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Flu Vaccine for Women with Each of the Health Shock Variables Included in a Single Model

	Flu Vaccine			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
Any health shocks				
New work limiting condition				
New ADL				
New major illnesses	1.35 (0.73-2.47)	0.332		
New minor illnesses	1.63*** (1.12-2.36)	0.010		
Hospitalization1			1.33 (0.75-2.36)	0.326
Hospitalization2			1.43* (0.94-2.18)	0.090
Predisposing factors				
Age	1.02*** (1.00-1.04)	0.010	1.02** (1.00-1.04)	0.016
Married	0.82 (0.57-1.20)	0.329	0.84 (0.57-1.22)	0.369
White	0.77 (0.48-1.24)	0.289	0.73 (0.45-1.18)	0.209
Black	0.61* (0.35-1.06)	0.086	0.59* (0.34-1.01)	0.059
High school/GED	1.10 (0.73-1.67)	0.623	1.12 (0.74-1.69)	0.590
Some college and beyond	1.05 (0.67-1.67)	0.804	1.07 (0.67-1.69)	0.771
Enabling factors				
Employer provided insurance	1.12 (0.78-1.61)	0.514	1.10 (0.77-1.57)	0.593
Employment	0.77 (0.54-1.10)	0.155	0.79 (0.55-1.13)	0.202
Income2	1.03 (0.66-1.62)	0.876	1.05 (0.67-1.65)	0.821
Income3	1.37 (0.85-2.20)	0.190	1.36 (0.85-2.19)	0.198
Northeast	0.94 (0.59-1.50)	0.819	0.96 (0.60-1.53)	0.881
Midwest	1.41 (0.89-2.22)	0.142	1.43 (0.90-2.25)	0.125
South	0.94 (0.65-1.37)	0.781	0.95 (0.66-1.38)	0.823
Rural	0.91 (0.65-1.28)	0.624	0.93 (0.67-1.31)	0.714
Need factors				
Not smoking	1.09 (0.76-1.59)	0.624	1.05 (0.73-1.52)	0.772
Not drinking	1.14 (0.80-1.64)	0.448	1.12 (0.79-1.61)	0.503
Overweight	1.13 (0.83-1.54)	0.422	1.14 (0.84-1.54)	0.392
Exercise	0.80 (0.59-1.07)	0.139	0.79 (0.59-1.06)	0.126
Pseudo R-squared	0.030		0.026	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

APPENDIX E

Appendix E1. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Mammogram Using Eight Individual Variables for Each of the New Doctor-Diagnosed Illnesses

	Mammogram			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
New work limiting condition			1.47 (0.80-2.69)	0.210
New ADL				
Hospitalization1				
Hospitalization2				
Cancer	6.44** (1.20-34.40)	0.029	6.21** (1.16-33.17)	0.032
Lung Disease	4.45** (1.25-15.82)	0.021	4.28** (1.20-15.24)	0.025
Heart Disease	0.84 (0.29-2.46)	0.763	0.86 (0.29-2.54)	0.798
Stroke	0.92 (0.11-7.25)	0.941	0.88 (0.11-6.81)	0.905
Hypertension	1.93* (0.92-4.03)	0.079	1.97* (0.94-4.11)	0.070
Diabetes	1.03 (0.29-3.60)	0.959	1.02 (0.29-3.60)	0.968
Arthritis	1.01 (0.48-2.12)	0.967	1.00 (0.47-2.09)	0.998
Psychiatric Problems	1.25 (0.42-3.78)	0.682	1.23 (0.41-3.70)	0.703
Predisposing factors				
Age	0.98 (0.96-1.01)	0.317	0.98 (0.96-1.01)	0.382
Married	0.82 (0.51-1.32)	0.428	0.84 (0.52-1.35)	0.478
White	0.57* (0.30-1.05)	0.075	0.57* (0.30-1.06)	0.077
Black	0.99 (0.46-2.12)	0.993	1.00 (0.47-2.14)	0.988
High school/GED	0.83 (0.52-1.33)	0.453	0.82 (0.51-1.32)	0.422
Some college and beyond	1.11 (0.65-1.88)	0.691	1.10 (0.65-1.87)	0.709
Enabling factors				
Employer provided insurance	1.29 (0.84-1.97)	0.239	1.28 (0.83-1.97)	0.250
Employment	1.15 (0.72-1.83)	0.559	1.17 (0.73-1.89)	0.492
Income2	0.87 (0.53-1.45)	0.614	0.90 (0.54-1.51)	0.714
Income3	1.37 (0.77-2.45)	0.281	1.42 (0.79-2.54)	0.237
Northeast	0.97 (0.53-1.78)	0.934	0.96 (0.52-1.75)	0.898
Midwest	1.05 (0.59-1.90)	0.848	1.06 (0.58-1.91)	0.842
South	0.88 (0.55-1.40)	0.602	0.90 (0.56-1.44)	0.670
Rural	0.73 (0.48-1.09)	0.132	0.73 (0.48-1.09)	0.130
Need factors				
Not smoking	1.20 (0.77-1.86)	0.408	1.21 (0.78-1.88)	0.392
Not drinking	0.81 (0.51-1.29)	0.390	0.81 (0.51-1.28)	0.379
Overweight	1.46* (0.99-2.15)	0.055	1.45* (0.98-2.15)	0.058
Exercise	0.90 (0.61-1.33)	0.622	0.91 (0.62-1.35)	0.667
Pseudo R-squared	0.066		0.066	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix E2. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Mammogram Using Eight Individual Variables for Each of the New Doctor-Diagnosed Illnesses

	Mammogram			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
New work limiting condition			1.42 (0.76-2.64)	0.269
New ADL	0.78 (0.43-1.40)	0.414	0.72 (0.39-1.32)	0.299
Hospitalization1			1.28 (0.54-3.03)	0.566
Hospitalization2			2.49*** (1.43-4.34)	0.001
Cancer	6.73** (1.24-36.36)	0.027	5.18* (0.94-28.43)	0.058
Lung Disease	4.78** (1.33-17.14)	0.016	4.19** (1.14-15.32)	0.030
Heart Disease	0.84 (0.29-2.46)	0.759	0.55 (0.18-1.73)	0.314
Stroke	0.99 (0.12-7.92)	0.996	0.75 (0.08-6.39)	0.795
Hypertension	2.00* (0.95-4.21)	0.066	2.06* (0.97-4.37)	0.059
Diabetes	1.04 (0.30-3.60)	0.951	1.00 (0.28-3.57)	0.996
Arthritis	1.04 (0.49-2.19)	0.907	1.01 (0.47-2.16)	0.978
Psychiatric Problems	1.32 (0.43-4.00)	0.618	1.27 (0.41-3.86)	0.674
Predisposing factors				
Age	0.98 (0.96-1.01)	0.331	0.98 (0.96-1.01)	0.288
Married	0.82 (0.51-1.32)	0.418	0.84 (0.52-1.36)	0.489
White	0.57* (0.30-1.06)	0.078	0.52** (0.28-0.98)	0.044
Black	1.01 (0.47-2.16)	0.968	0.93 (0.43-2.02)	0.874
High school/GED	0.83 (0.51-1.33)	0.438	0.83 (0.51-1.35)	0.472
Some college and beyond	1.11 (0.65-1.88)	0.691	1.13 (0.66-1.94)	0.633
Enabling factors				
Employer provided insurance	1.26 (0.82-1.94)	0.274	1.28 (0.82-1.97)	0.267
Employment	1.14 (0.71-1.83)	0.573	1.22 (0.76-1.97)	0.407
Income2	0.88 (0.53-1.46)	0.627	0.98 (0.59-1.65)	0.968
Income3	1.38 (0.77-2.47)	0.272	1.50 (0.83-2.72)	0.173
Northeast	0.98 (0.53-1.79)	0.955	0.94 (0.51-1.73)	0.856
Midwest	1.07 (0.59-1.93)	0.811	1.00 (0.55-1.81)	0.999
South	0.89 (0.55-1.42)	0.628	0.87 (0.54-1.40)	0.585
Rural	0.73 (0.49-1.10)	0.140	0.70* (0.46-1.06)	0.094
Need factors				
Not smoking	1.20 (0.77-1.86)	0.415	1.22 (0.78-1.91)	0.363
Not drinking	0.83 (0.52-1.31)	0.429	0.79 (0.49-1.26)	0.335
Overweight	1.48** (1.00-2.20)	0.046	1.42* (0.95-2.12)	0.080
Exercise	0.90 (0.61-1.33)	0.604	0.96 (0.65-1.43)	0.877
Pseudo R-squared	0.067		0.081	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix E3. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Breast Self-Exam Using Eight Individual Variables for Each of the New Doctor-Diagnosed Illnesses

	Breast Self-exam			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
New work limiting condition			0.92 (0.54-1.60)	0.793
New ADL				
Hospitalization1				
Hospitalization2				
Cancer	2.06 (0.70-6.09)	0.187	2.03 (0.68-6.01)	0.198
Lung Disease	1.65 (0.63-4.27)	0.302	1.64 (0.63-4.26)	0.306
Heart Disease	0.49 (0.20-1.21)	0.127	0.49 (0.20-1.20)	0.119
Stroke	5.50* (0.89-33.71)	0.065	5.33* (0.87-32.70)	0.070
Hypertension	1.77* (0.89-3.51)	0.099	1.85* (0.92-3.68)	0.080
Diabetes	1.15 (0.37-3.54)	0.805	1.35 (0.42-4.25)	0.606
Arthritis	0.66 (0.33-1.33)	0.252	0.67 (0.33-1.35)	0.274
Psychiatric Problems	0.48 (0.16-1.14)	0.183	0.48 (0.16-1.44)	0.196
Predisposing factors				
Age	0.99 (0.97-1.01)	0.722	0.99 (0.97-1.01)	0.832
Married	0.94 (0.65-1.36)	0.752	0.93 (0.64-1.35)	0.713
White	0.46*** (0.29-1.74)	0.001	0.46*** (0.29-0.73)	0.001
Black	0.90 (0.50-1.63)	0.741	0.87 (0.48-1.60)	0.674
High school/GED	1.28 (0.83-1.98)	0.254	1.28 (0.82-1.99)	0.268
Some college and beyond	1.03 (0.64-1.65)	0.896	1.06 (0.66-1.72)	0.786
Enabling factors				
Employer provided insurance	0.91 (0.64-1.28)	0.605	0.90 (0.64-1.28)	0.581
Employment	1.00 (0.68-1.46)	0.997	0.98 (0.66-1.44)	0.920
Income2	0.85 (0.56-1.29)	0.466	0.89 (0.58-1.35)	0.594
Income3	0.77 (0.48-1.25)	0.305	0.81 (0.50-1.32)	0.409
Northeast	1.46 (0.92-2.34)	0.106	1.50* (0.94-2.40)	0.087
Midwest	1.44 (0.92-2.26)	0.106	1.42 (0.90-2.24)	0.125
South	1.07 (0.73-1.57)	0.719	1.09 (0.74-1.61)	0.642
Rural	1.36* (0.96-1.93)	0.078	1.35* (0.95-1.92)	0.088
Need factors				
Not smoking	0.83 (0.56-1.24)	0.374	0.82 (0.54-1.22)	0.335
Not drinking	0.62*** (0.44-0.87)	0.007	0.63*** (0.45-0.89)	0.010
Overweight	1.02 (0.75-1.39)	0.885	0.99 (0.72-1.35)	0.962
Exercise	0.97 (0.71-1.31)	0.853	0.95 (0.70-1.29)	0.766
Pseudo R-squared	0.040		0.039	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix E4. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Breast Self-Exam Using Eight Individual Variables for Each of the New Doctor-Diagnosed Illnesses

	Breast Self-exam			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
New work limiting condition			0.87 (0.50-1.51)	0.627
New ADL	1.08 (0.67-1.76)	0.729	1.13 (0.68-1.85)	0.626
Hospitalization1			1.34 (0.76-2.36)	0.300
Hospitalization2			1.20 (0.77-1.88)	0.417
Cancer	2.07** (0.70-6.12)	0.185	2.10 (0.69-6.44)	0.190
Lung Disease	1.63** (0.63-4.24)	0.311	1.72 (0.64-4.59)	0.276
Heart Disease	0.49 (0.20-1.21)	0.125	0.43* (0.17-1.08)	0.074
Stroke	5.31 (0.85-33.01)	0.073	4.76* (0.74-30.44)	0.099
Hypertension	1.77* (0.89-3.51)	0.100	1.82* (0.91-3.62)	0.088
Diabetes	1.16 (0.37-3.60)	0.789	1.39 (0.44-4.41)	0.572
Arthritis	0.66 (0.33-1.33)	0.251	0.71 (0.35-1.44)	0.354
Psychiatric Problems	0.47 (0.16-1.39)	0.174	0.47 (0.16-1.39)	0.176
Predisposing factors				
Age	0.99 (0.97-1.01)	0.711	0.99 (0.97-1.01)	0.814
Married	0.94 (0.65-1.36)	0.757	0.93 (0.64-1.35)	0.721
White	0.47* (0.29-0.74)	0.001	0.45*** (0.28-0.73)	0.001
Black	0.90 (0.49-1.63)	0.734	0.85 (0.46-1.56)	0.617
High school/GED	1.29 (0.83-1.99)	0.250	1.28 (0.82-1.99)	0.274
Some college and beyond	1.03 (0.64-1.65)	0.889	1.05 (0.65-1.71)	0.813
Enabling factors				
Employer provided insurance	0.91 (0.64-1.29)	0.626	0.91 (0.64-1.29)	0.607
Employment	1.00 (0.68-1.46)	0.999	0.98 (0.67-1.45)	0.948
Income2	0.85 (0.56-1.30)	0.470	0.90 (0.59-1.37)	0.628
Income3	0.77 (0.48-1.25)	0.305	0.81 (0.50-1.33)	0.421
Northeast	1.46 (0.91-2.33)	0.112	1.50* (0.93-2.40)	0.091
Midwest	1.44 (0.91-2.25)	0.112	1.47* (0.93-2.33)	0.097
South	1.07 (0.73-1.56)	0.728	1.08 (0.73-1.59)	0.682
Rural	1.36 (0.96-1.92)	0.083	1.36* (0.96-1.94)	0.082
Need factors				
Not smoking	0.83 (0.55-1.24)	0.373	0.81 (0.54-1.21)	0.320
Not drinking	0.62 (0.44-0.87)	0.006	0.63** (0.45-0.90)	0.011
Overweight	1.02** (0.75-1.38)	0.893	0.97 (0.71-1.32)	0.862
Exercise	0.97 (0.72-1.32)	0.877	0.96 (0.70-1.30)	0.790
Pseudo R-squared	0.040		0.042	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix E5. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Pap Smear Using Eight Individual Variables for Each of the New Doctor-Diagnosed Illnesses

	Pap smear			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
New work limiting condition			1.35 (0.83-2.21)	0.219
New ADL				
Hospitalization1				
Hospitalization2				
Cancer	2.39 (0.75-7.57)	0.137	2.40 (0.75-7.61)	0.137
Lung Disease	1.24 (0.48-3.14)	0.649	1.18 (0.46-3.03)	0.721
Heart Disease	1.19 (0.50-2.81)	0.689	1.23 (0.51-2.93)	0.638
Stroke	1.41 (0.19-10.21)	0.729	1.52 (0.20-11.13)	0.676
Hypertension	1.57 (0.74-3.34)	0.232	1.62 (0.76-3.44)	0.208
Diabetes	1.25 (0.42-3.73)	0.681	0.94 (0.29-3.02)	0.927
Arthritis	1.06 (0.55-2.03)	0.859	1.09 (0.56-2.10)	0.797
Psychiatric Problems	1.54 (0.67-3.55)	0.307	1.46 (0.63-3.38)	0.376
Predisposing factors				
Age	0.97** (0.95-0.99)	0.021	0.97** (0.95-0.99)	0.020
Married	0.98 (0.66-1.46)	0.956	1.00 (0.66-1.49)	0.996
White	0.53** (0.31-0.90)	0.019	0.55** (0.32-0.95)	0.034
Black	0.55* (0.28-1.11)	0.097	0.60 (0.30-1.21)	0.161
High school/GED	1.09 (0.71-1.67)	0.691	1.07 (0.69-1.65)	0.749
Some college and beyond	1.06 (0.65-1.72)	0.813	1.02 (0.62-1.68)	0.929
Enabling factors				
Employer provided insurance	1.11 (0.75-1.62)	0.589	1.13 (0.77-1.65)	0.528
Employment	1.49* (0.94-2.36)	0.090	1.51* (0.95-2.41)	0.079
Income2	0.96 (0.62-1.49)	0.881	1.01 (0.65-1.57)	0.949
Income3	1.03 (0.62-1.71)	0.902	1.06 (0.63-1.76)	0.825
Northeast	1.08 (0.62-1.87)	0.782	1.08 (0.62-1.88)	0.781
Midwest	0.96 (0.57-1.64)	0.906	0.96 (0.56-1.64)	0.906
South	1.13 (0.74-1.73)	0.544	1.13 (0.74-1.73)	0.558
Rural	0.73 (0.50-1.07)	0.113	0.71* (0.48-1.03)	0.078
Need factors				
Not smoking	1.10 (0.72-1.68)	0.654	1.12 (0.73-1.72)	0.590
Not drinking	1.28 (0.84-1.97)	0.245	1.26 (0.82-1.94)	0.282
Overweight	1.13 (0.79-1.61)	0.481	1.10 (0.77-1.57)	0.579
Exercise	1.02 (0.72-1.45)	0.881	1.03 (0.72-1.46)	0.854
Pseudo R-squared	0.047		0.049	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix E6. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Pap Smear Using Eight Individual Variables for Each of the New Doctor-Diagnosed Illnesses

	Pap smear			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
New work limiting condition			1.34 (0.81-2.22)	0.248
New ADL	0.75 (0.43-1.31)	0.318	0.67 (0.38-1.18)	0.170
Hospitalization1			1.99* (0.98-4.02)	0.054
Hospitalization2			1.94*** (1.22-3.08)	0.005
Cancer	2.41 (0.75-7.64)	0.135	1.84 (0.55-6.10)	0.314
Lung Disease	1.29 (0.50-3.29)	0.589	1.32 (0.50-3.48)	0.574
Heart Disease	1.22 (0.51-2.88)	0.650	1.06 (0.43-2.58)	0.895
Stroke	1.78 (0.23-13.69)	0.577	1.84 (0.22-15.48)	0.573
Hypertension	1.63 (0.76-3.46)	0.204	1.70 (0.79-3.64)	0.169
Diabetes	1.25 (0.42-3.72)	0.684	0.86 (0.26-2.81)	0.808
Arthritis	1.07 (0.55-2.05)	0.835	1.14 (0.59-2.22)	0.688
Psychiatric Problems	1.65 (0.71-3.84)	0.244	1.53 (0.64-3.64)	0.330
Predisposing factors				
Age	0.97** (0.95-0.99)	0.023	0.97** (0.95-0.99)	0.016
Married	0.97 (0.65-1.45)	0.910	1.00 (0.67-1.50)	0.984
White	0.54** (0.31-0.91)	0.023	0.54** (0.31-0.94)	0.030
Black	0.57 (0.29-1.14)	0.116	0.58 (0.29-1.17)	0.134
High school/GED	1.07 (0.69-1.64)	0.755	1.08 (0.70-1.69)	0.702
Some college and beyond	1.03 (0.63-1.69)	0.893	1.00 (0.60-1.65)	0.991
Enabling factors				
Employer provided insurance	1.09 (0.74-1.60)	0.640	1.15 (0.78-1.70)	0.456
Employment	1.49* (0.94-2.37)	0.087	1.60** (1.00-2.56)	0.048
Income2	0.97 (0.63-1.51)	0.927	1.06 (0.68-1.66)	0.774
Income3	1.05 (0.63-1.74)	0.851	1.08 (0.64-1.81)	0.769
Northeast	1.10 (0.63-1.90)	0.734	1.12 (0.64-1.97)	0.670
Midwest	0.97 (0.57-1.65)	0.934	1.01 (0.59-1.74)	0.947
South	1.14 (0.75-1.75)	0.514	1.12 (0.73-1.72)	0.597
Rural	0.74 (0.51-1.08)	0.122	0.73 (0.50-1.07)	0.114
Need factors				
Not smoking	1.09 (0.71-1.67)	0.671	1.10 (0.72-1.70)	0.645
Not drinking	1.29 (0.84-1.98)	0.236	1.25 (0.81-1.92)	0.310
Overweight	1.14 (0.80-1.63)	0.446	1.07 (0.75-1.53)	0.692
Exercise	1.01 (0.72-1.44)	0.922	1.03 (0.73-1.47)	0.836
Pseudo R-squared	0.048		0.062	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix E7. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Prostate Cancer Screening Using Eight Individual Variables for Each of the New Doctor-Diagnosed Illnesses

	Prostate			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
New work limiting condition			1.48 (0.75-2.93)	0.250
New ADL				
Hospitalization1				
Hospitalization2				
Cancer	8.93* (0.89-89.71)	0.063	9.24* (0.91-93.51)	0.060
Lung Disease	2.26 (0.56-9.14)	0.250	1.93 (0.47-7.93)	0.357
Heart Disease	1.23 (0.40-3.74)	0.712	1.40 (0.44-4.43)	0.562
Stroke	0.49 (0.03-6.44)	0.593	0.37 (0.02-5.64)	0.475
Hypertension	3.11*** (1.31-7.42)	0.010	2.72** (1.11-6.65)	0.028
Diabetes	1.20 (0.35-4.06)	0.763	1.06 (0.31-3.68)	0.915
Arthritis	1.59 (0.77-3.27)	0.202	1.56 (0.74-3.25)	0.235
Psychiatric Problems	1.56 (0.35-6.94)	0.558	1.49 (0.33-6.65)	0.598
Predisposing factors				
Age	1.02** (1.00-1.05)	0.046	1.02** (1.00-1.05)	0.045
Married	1.67* (0.98-2.84)	0.056	1.63* (0.95-2.78)	0.072
White	0.89 (0.47-1.68)	0.725	0.84 (0.44-1.60)	0.610
Black	1.94* (0.90-4.19)	0.089	1.86 (0.86-4.02)	0.114
High school/GED	1.40 (0.81-2.43)	0.223	1.40 (0.81-2.44)	0.225
Some college and beyond	1.74* (0.98-3.10)	0.059	1.79** (1.00-3.20)	0.047
Enabling factors				
Employer provided insurance	2.18*** (1.38-3.44)	0.001	2.18*** (1.37-3.46)	0.001
Employment	0.71 (0.43-1.15)	0.172	0.71 (0.43-1.16)	0.182
Income2	1.27 (0.70-2.32)	0.419	1.23 (0.67-2.24)	0.497
Income3	1.41 (0.76-2.61)	0.270	1.35 (0.73-2.51)	0.328
Northeast	1.62 (0.88-2.97)	0.116	1.61 (0.88-2.97)	0.120
Midwest	0.74 (0.41-1.33)	0.326	0.73 (0.40-1.31)	0.297
South	0.85 (0.54-1.33)	0.477	0.85 (0.54-1.34)	0.486
Rural	1.01 (0.68-1.51)	0.935	1.03 (0.69-1.55)	0.857
Need factors				
Not smoking	1.35 (0.87-1.08)	0.171	1.40 (0.90-2.17)	0.127
Not drinking	0.89 (0.61-1.30)	0.574	0.85 (0.58-1.24)	0.413
Overweight	0.89 (0.58-1.38)	0.629	0.92 (0.59-1.44)	0.740
Exercise	0.57*** (0.39-0.83)	0.003	0.57*** (0.39-0.83)	0.003
Pseudo R-squared	0.092		0.092	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix E8. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Prostate Cancer Screening Using Eight Individual Variables for Each of the New Doctor-Diagnosed Illnesses

	Prostate			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
New work limiting condition			1.32 (0.66-2.65)	0.428
New ADL	2.96** (1.27-6.89)	0.012	2.50** (1.01-6.22)	0.047
Hospitalization1			1.65 (0.76-3.58)	0.203
Hospitalization2			1.43 (0.74-2.76)	0.275
Cancer	9.66* (0.97-95.91)	0.053	9.03* (0.86-93.99)	0.065
Lung Disease	2.04 (0.49-8.40)	0.323	1.93 (0.45-8.21)	0.371
Heart Disease	1.14 (0.37-3.52)	0.809	1.11 (0.33-3.70)	0.860
Stroke	0.36 (0.02-6.03)	0.479	0.22 (0.01-3.91)	0.308
Hypertension	3.01** (1.25-7.22)	0.013	2.72** (1.10-6.67)	0.029
Diabetes	1.16 (0.33-4.03)	0.805	0.97 (0.27-3.45)	0.964
Arthritis	1.51 (0.73-3.13)	0.260	1.60 (0.76-3.38)	0.215
Psychiatric Problems	1.48 (0.33-6.60)	0.605	1.47 (0.32-6.62)	0.614
Predisposing factors				
Age	1.02** (1.00-1.05)	0.039	1.03** (1.00-1.05)	0.030
Married	1.62* (0.95-2.77)	0.073	1.56 (0.90-2.69)	0.108
White	0.89 (0.46-1.69)	0.729	0.80 (0.42-1.54)	0.518
Black	1.90 (0.87-4.15)	0.103	1.73 (0.79-3.79)	0.165
High school/GED	1.38 (0.79-2.40)	0.249	1.37 (0.78-2.39)	0.264
Some college and beyond	1.69* (0.94-3.02)	0.075	1.71* (0.95-3.08)	0.070
Enabling factors				
Employer provided insurance	2.27*** (1.42-3.60)	0.001	2.29*** (1.43-3.66)	0.001
Employment	0.73 (0.44-1.20)	0.217	0.76 (0.46-1.26)	0.299
Income2	1.38 (0.75-2.54)	0.289	1.32 (0.72-2.44)	0.365
Income3	1.58 (0.84-2.97)	0.148	1.51 (0.80-2.84)	0.199
Northeast	1.53 (0.83-2.83)	0.169	1.48 (0.79-2.76)	0.215
Midwest	0.72 (0.40-1.30)	0.280	0.70 (0.38-1.28)	0.255
South	0.85 (0.54-1.34)	0.496	0.84 (0.53-1.34)	0.487
Rural	1.00 (0.67-1.49)	0.986	1.01 (0.67-1.52)	0.943
Need factors				
Not smoking	1.32 (0.85-2.04)	0.206	1.41 (0.90-2.20)	0.125
Not drinking	0.88 (0.60-1.29)	0.534	0.82 (0.56-1.21)	0.332
Overweight	0.92 (0.59-1.43)	0.724	0.94 (0.60-1.48)	0.811
Exercise	0.59*** (0.41-0.86)	0.007	0.61** (0.42-0.89)	0.012
Pseudo R-squared	0.100		0.102	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix E9. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Cholesterol Testing for Men Using Eight Individual Variables for Each of the New Doctor-Diagnosed Illnesses

	Cholesterol Testing			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
New work limiting condition			1.91* (0.90-4.05)	0.088
New ADL				
Hospitalization1				
Hospitalization2				
Cancer	1.93 (0.34-10.82)	0.454	1.87 (0.34-10.27)	0.469
Lung Disease	0.39 (0.06-2.45)	0.318	0.30 (0.04-1.97)	0.215
Heart Disease	4.77*** (1.44-15.79)	0.010	4.15** (1.23-13.90)	0.021
Stroke	3.65 (0.33-40.18)	0.289	4.21 (0.38-46.89)	0.242
Hypertension	3.02** (1.15-7.92)	0.025	2.74 (1.02-7.32)	0.044
Diabetes	14.68** (1.80-119.38)	0.012	13.42** (1.64-109.69)	0.015
Arthritis	1.43 (0.60-3.36)	0.409	1.13 (0.46-2.74)	0.786
Psychiatric Problems	1.27 (0.25-6.49)	0.769	1.20 (0.24-6.04)	0.821
Predisposing factors				
Age	1.02 (0.99-1.04)	0.134	1.01 (0.99-1.04)	0.182
Married	2.38*** (1.34-4.20)	0.003	2.43*** (1.37-4.34)	0.002
White	1.00 (0.52-1.93)	0.989	1.02 (0.53-1.99)	0.937
Black	1.30 (0.56-3.03)	0.536	1.34 (0.57-3.13)	0.490
High school/GED	0.98 (0.55-1.76)	0.968	0.99 (0.55-1.78)	0.985
Some college and beyond	1.42 (0.78-2.57)	0.248	1.48 (0.81-2.69)	0.199
Enabling factors				
Employer provided insurance	1.27 (0.79-2.04)	0.310	1.23 (0.76-1.99)	0.382
Employment	0.83 (0.50-1.37)	0.468	0.85 (0.51-1.41)	0.536
Income2	0.98 (0.53-1.83)	0.971	1.05 (0.56-1.97)	0.860
Income3	1.51 (0.79-2.87)	0.209	1.61 (0.84-3.09)	0.149
Northeast	1.34 (0.67-2.70)	0.398	1.37 (0.68-2.77)	0.371
Midwest	0.86 (0.47-1.56)	0.633	0.81 (0.44-1.48)	0.502
South	1.04 (0.65-1.66)	0.865	1.01 (0.63-1.63)	0.941
Rural	0.88 (0.58-1.35)	0.587	0.90 (0.59-1.38)	0.655
Need factors				
Not smoking	1.57** (1.01-2.45)	0.041	1.57** (1.01-2.44)	0.043
Not drinking	0.85 (0.57-1.27)	0.444	0.86 (0.57-1.28)	0.457
Overweight	1.37 (0.88-2.16)	0.159	1.37 (0.87-2.15)	0.164
Exercise	0.85 (0.57-1.26)	0.428	0.83 (0.56-1.22)	0.350
Pseudo R-squared	0.103		0.104	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix E10. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Cholesterol Testing for Men Using Eight Individual Variables for Each of the New Doctor-Diagnosed Illnesses

	Cholesterol Testing			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
New work limiting condition			1.52 (0.69-3.34)	0.287
New ADL	2.77*** (1.30-5.90)	0.008	2.20* (0.99-4.88)	0.051
Hospitalization1			2.04* (0.88-4.71)	0.092
Hospitalization2			2.55** (1.15-5.66)	0.020
Cancer	2.13 (0.37-12.23)	0.393	1.64 (0.28-9.34)	0.574
Lung Disease	0.38 (0.05-2.64)	0.331	0.37 (0.05-2.71)	0.328
Heart Disease	4.74*** (1.45-15.46)	0.010	2.94* (0.81-10.69)	0.100
Stroke	4.08 (0.37-44.96)	0.251	3.06 (0.27-34.84)	0.367
Hypertension	2.95** (1.11-7.79)	0.029	2.60* (0.96-7.03)	0.059
Diabetes	14.98** (1.82-122.89)	0.012	14.09** (1.67-118.60)	0.015
Arthritis	1.38 (0.58-3.27)	0.458	1.06 (0.42-2.62)	0.896
Psychiatric Problems	1.23 (0.24-6.33)	0.801	1.17 (0.22-6.17)	0.846
Predisposing factors				
Age	1.02* (0.99-1.05)	0.081	1.01 (0.99-1.04)	0.233
Married	2.40*** (1.35-4.27)	0.003	2.29*** (1.27-4.14)	0.006
White	0.92 (0.47-1.79)	0.810	0.98 (0.50-1.94)	0.967
Black	1.30 (0.55-3.04)	0.541	1.35 (0.56-3.21)	0.497
High school/GED	1.00 (0.55-1.80)	0.990	0.99 (0.54-1.80)	0.984
Some college and beyond	1.48 (0.81-2.71)	0.196	1.53 (0.83-2.81)	0.171
Enabling factors				
Employer provided insurance	1.28 (0.79-2.06)	0.303	1.21 (0.74-1.96)	0.435
Employment	0.87 (0.52-1.45)	0.606	0.92 (0.55-1.54)	0.755
Income2	1.07 (0.57-2.00)	0.830	1.15 (0.60-2.20)	0.655
Income3	1.70 (0.88-3.38)	0.111	1.88* (0.96-3.69)	0.064
Northeast	1.35 (0.67-2.71)	0.396	1.28 (0.62-2.62)	0.498
Midwest	0.86 (0.47-1.56)	0.618	0.81 (0.44-1.50)	0.518
South	1.04 (0.65-1.67)	0.853	0.98 (0.60-1.60)	0.954
Rural	0.88 (0.58-1.35)	0.577	0.93 (0.60-1.44)	0.763
Need factors				
Not smoking	1.57** (1.01-2.45)	0.045	1.66** (1.06-2.61)	0.026
Not drinking	0.82 (0.55-1.23)	0.346	0.82 (0.55-1.23)	0.351
Overweight	1.37 (0.88-2.16)	0.163	1.38 (0.87-2.19)	0.163
Exercise	0.88 (0.59-1.30)	0.524	0.93 (0.62-1.39)	0.729
Pseudo R-squared	0.113		0.122	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix E11. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Cholesterol Testing for Women Using Eight Individual Variables for Each of the New Doctor-Diagnosed Illnesses

	Cholesterol Testing			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
New work limiting condition			1.04 (0.54-1.98)	0.905
New ADL				
Hospitalization1				
Hospitalization2				
Cancer	1.95 (0.36-10.39)	0.430	2.02 (0.38-10.75)	0.410
Lung Disease	5.24** (1.00-27.38)	0.049	5.46** (1.03-28.75)	0.045
Heart Disease	7.07* (0.80-62.25)	0.078	6.84* (0.77-60.59)	0.084
Stroke	5.13 (0.53-49.54)	0.157	4.92 (0.51-47.42)	0.168
Hypertension	1.99 (0.85-4.63)	0.108	2.07* (0.88-4.82)	0.092
Diabetes	1.00 (0.23-4.26)	0.991	1.25 (0.27-5.70)	0.772
Arthritis	0.87 (0.42-1.80)	0.709	0.87 (0.42-1.82)	0.729
Psychiatric Problems	1.66 (0.38-7.18)	0.496	1.74 (0.40-7.57)	0.455
Predisposing factors				
Age	1.01 (0.99-1.03)	0.268	1.01 (0.99-1.03)	0.219
Married	1.11 (0.70-1.74)	0.643	1.16 (0.73-1.84)	0.510
White	0.92 (0.49-1.71)	0.798	0.89 (0.48-1.66)	0.727
Black	1.19 (0.58-2.45)	0.619	1.17 (0.57-2.41)	0.657
High school/GED	0.95 (0.58-1.55)	0.848	0.98 (0.59-1.61)	0.945
Some college and beyond	0.85 (0.49-1.46)	0.567	0.91 (0.52-1.59)	0.747
Enabling factors				
Employer provided insurance	1.33 (0.86-2.04)	0.186	1.32 (0.85-2.04)	0.208
Employment	1.00 (0.65-1.54)	0.987	1.00 (0.64-1.54)	0.995
Income2	0.66 (0.38-1.12)	0.126	0.60* (0.34-1.03)	0.065
Income3	1.23 (0.70-2.16)	0.461	1.23 (0.70-2.18)	0.456
Northeast	2.15*** (1.20-3.87)	0.010	2.18*** (1.20-3.94)	0.010
Midwest	1.46 (0.83-2.57)	0.187	1.51 (0.85-2.67)	0.155
South	1.48* (0.93-2.35)	0.090	1.49* (0.93-2.36)	0.091
Rural	0.84 (0.57-1.26)	0.420	0.88 (0.58-1.32)	0.547
Need factors				
Not smoking	1.50* (0.96-2.34)	0.069	1.47* (0.94-2.30)	0.092
Not drinking	1.11 (0.73-1.69)	0.608	1.10 (0.72-1.69)	0.627
Overweight	1.36* (0.94-1.97)	0.099	1.34 (0.92-1.95)	0.117
Exercise	0.96 (0.67-1.37)	0.848	0.97 (0.67-1.39)	0.881
Pseudo R-squared	0.062		0.065	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix E12. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Cholesterol Testing for Women Using Eight Individual Variables for Each of the New Doctor-Diagnosed Illnesses

	Cholesterol Testing			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
New work limiting condition			0.91 (0.46-1.77)	0.786
New ADL	1.75* (0.92-3.31)	0.086	1.63 (0.83-3.18)	0.153
Hospitalization1			2.32** (1.05-5.13)	0.037
Hospitalization2			1.62 (0.84-3.14)	0.148
Cancer	1.91 (0.36-10.23)	0.445	0.97 (0.15-6.31)	0.976
Lung Disease	4.87* (0.91-25.86)	0.063	4.66* (0.85-25.46)	0.075
Heart Disease	6.80* (0.77-60.12)	0.084	5.65 (0.62-50.80)	0.122
Stroke	3.37 (0.33-33.80)	0.302	3.48 (0.33-35.89)	0.295
Hypertension	1.99 (0.85-4.62)	0.110	2.13* (0.91-5.00)	0.081
Diabetes	0.95 (0.22-4.01)	0.945	1.07 (0.22-5.05)	0.927
Arthritis	0.83 (0.40-1.73)	0.634	0.73 (0.34-1.57)	0.430
Psychiatric Problems	1.79 (0.41-7.70)	0.434	1.93 (0.44-8.37)	0.379
Predisposing factors				
Age	1.01 (0.99-1.03)	0.278	1.01 (0.98-1.03)	0.282
Married	1.11 (0.71-1.75)	0.633	1.12 (0.70-1.78)	0.621
White	0.87 (0.47-1.63)	0.681	0.84 (0.44-1.59)	0.603
Black	1.12 (0.54-2.30)	0.752	1.05 (0.50-2.21)	0.877
High school/GED	0.98 (0.60-1.60)	0.938	0.99 (0.59-1.64)	0.974
Some college and beyond	0.87 (0.50-1.51)	0.641	0.96 (0.54-1.68)	0.892
Enabling factors				
Employer provided insurance	1.38 (0.89-2.13)	0.140	1.36 (0.87-2.12)	0.166
Employment	1.01 (0.66-1.56)	0.939	1.03 (0.66-1.59)	0.894
Income2	0.64 (0.37-1.09)	0.106	0.59* (0.34-1.03)	0.066
Income3	1.20 (0.68-2.11)	0.518	1.16 (0.66-2.07)	0.593
Northeast	2.20*** (1.22-3.97)	0.008	2.39*** (1.31-.34)	0.004
Midwest	1.43 (0.81-2.52)	0.212	1.57 (0.88-2.79)	0.123
South	1.45 (0.91-2.30)	0.111	1.44 (0.90-2.30)	0.126
Rural	0.85 (0.57-1.27)	0.438	0.89 (0.59-1.34)	0.596
Need factors				
Not smoking	1.49* (0.96-2.33)	0.076	1.45 (0.92-2.29)	0.102
Not drinking	1.09 (0.72-1.67)	0.666	1.09 (0.71-1.66)	0.686
Overweight	1.35 (0.93-1.96)	0.107	1.35 (0.93-1.98)	0.112
Exercise	0.98 (0.69-1.41)	0.952	1.02 (0.71-1.47)	0.888
Pseudo R-squared	0.066		0.076	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix E13. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Flu Vaccine for Men Using Eight Individual Variables for Each of the New Doctor-Diagnosed Illnesses

	Flu Vaccine			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
New work limiting condition			1.15 (0.64-2.05)	0.629
New ADL				
Hospitalization1				
Hospitalization2				
Cancer	1.68 (0.60-4.75)	0.321	1.60 (0.56-4.59)	0.376
Lung Disease	0.98 (0.23-4.16)	0.987	0.96 (0.22-4.11)	0.961
Heart Disease	1.51 (0.66-3.43)	0.320	1.34 (0.57-3.15)	0.491
Stroke	2.59 (0.51-13.05)	0.247	2.22 (0.40-12.38)	0.360
Hypertension	1.44 (0.72-2.90)	0.298	1.36 (0.67-2.78)	0.390
Diabetes	0.40 (0.11-1.42)	0.159	0.46 (0.13-1.62)	0.232
Arthritis	0.72 (0.33-1.53)	0.396	0.75 (0.34-1.62)	0.466
Psychiatric Problems	1.96 (0.71-5.43)	0.190	1.79 (0.63-5.10)	0.272
Predisposing factors				
Age	1.03*** (1.01-1.06)	0.004	1.03*** (1.01-1.06)	0.005
Married	1.23 (0.79-1.94)	0.350	1.26 (0.80-1.99)	0.311
White	1.75* (0.92-3.32)	0.086	1.74* (0.92-3.31)	0.088
Black	2.03* (0.97-4.23)	0.059	2.09** (1.00-4.37)	0.048
High school/GED	0.87 (0.53-1.43)	0.584	0.81 (0.49-1.35)	0.435
Some college and beyond	1.02 (0.61-1.68)	0.936	0.97 (0.59-1.62)	0.937
Enabling factors				
Employer provided insurance	0.85 (0.57-1.28)	0.448	0.83 (0.55-1.25)	0.394
Employment	0.95 (0.62-1.47)	0.839	0.94 (0.61-1.46)	0.815
Income2	0.90 (0.52-1.53)	0.700	0.91 (0.53-1.57)	0.760
Income3	1.12 (0.65-1.92)	0.675	1.17 (0.68-2.03)	0.558
Northeast	1.16 (0.69-1.93)	0.565	1.15 (0.69-1.92)	0.581
Midwest	1.34 (0.80-2.27)	0.260	1.36 (0.81-2.31)	0.240
South	0.93 (0.62-1.42)	0.763	0.91 (0.60-1.39)	0.681
Rural	1.07 (0.73-1.56)	0.705	1.03 (0.70-1.51)	0.856
Need factors				
Not smoking	1.30 (0.87-1.94)	0.197	1.28 (0.85-1.91)	0.228
Not drinking	1.01 (0.72-1.42)	0.918	1.01 (0.72-1.42)	0.918
Overweight	1.31 (0.88-1.95)	0.177	1.29 (0.87-1.93)	0.198
Exercise	0.70** (0.51-0.98)	0.038	0.73* (0.52-1.01)	0.062
Pseudo R-squared	0.048		0.045	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix E14. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Flu Vaccine for Men Using Eight Individual Variables for Each of the New Doctor-Diagnosed Illnesses

	Flu Vaccine			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
New work limiting condition			0.97 (0.53-1.78)	0.941
New ADL	1.94** (1.07-3.53)	0.029	1.53 (0.81-2.90)	0.184
Hospitalization1			1.53 (0.82-2.88)	0.180
Hospitalization2			2.01*** (1.20-3.35)	0.008
Cancer	1.70 (0.59-4.85)	0.320	1.25 (0.42-3.69)	0.686
Lung Disease	0.98 (0.22-4.28)	0.985	1.07 (0.24-4.65)	0.924
Heart Disease	1.52 (0.67-3.45)	0.311	0.98 (0.40-2.39)	0.966
Stroke	2.02 (0.37-10.96)	0.415	1.38 (0.24-7.86)	0.712
Hypertension	1.39 (0.69-2.81)	0.353	1.30 (0.63-2.68)	0.470
Diabetes	0.40 (0.11-1.42)	0.160	0.38 (0.10-1.37)	0.141
Arthritis	0.69 (0.32-1.49)	0.351	0.75 (0.35-1.63)	0.479
Psychiatric Problems	1.78 (0.63-5.02)	0.272	1.69 (0.57-4.94)	0.337
Predisposing factors				
Age	1.03*** (1.01-1.06)	0.002	1.03*** (1.01-1.06)	0.003
Married	1.21 (0.77-1.90)	0.404	1.29 (0.81-2.07)	0.272
White	1.69 (0.89-3.22)	0.104	1.63 (0.85-3.10)	0.137
Black	1.96* (0.93-4.09)	0.073	2.08* (0.99-4.36)	0.053
High school/GED	0.85 (0.52-1.41)	0.546	0.84 (0.50-1.40)	0.508
Some college and beyond	1.00 (0.60-1.65)	0.994	1.00 (0.60-1.66)	0.991
Enabling factors				
Employer provided insurance	0.88 (0.58-1.32)	0.544	0.88 (0.58-1.33)	0.547
Employment	1.03 (0.66-1.59)	0.894	1.05 (0.67-1.64)	0.820
Income2	0.96 (0.56-1.64)	0.888	1.02 (0.58-1.77)	0.937
Income3	1.19 (0.69-2.06)	0.516	1.25 (0.71-2.20)	0.424
Northeast	1.16 (0.69-1.94)	0.563	1.08 (0.64-1.82)	0.759
Midwest	1.38 (0.81-2.33)	0.224	1.38 (0.82-2.35)	0.223
South	0.95 (0.62-1.44)	0.812	0.87 (0.57-1.33)	0.538
Rural	1.08 (0.74-1.58)	0.678	1.03 (0.70-1.52)	0.866
Need factors				
Not smoking	1.31 (0.88-1.96)	0.180	1.30 (0.86-1.95)	0.207
Not drinking	0.99 (0.71-1.39)	0.987	0.95 (0.68-1.34)	0.792
Overweight	1.32 (0.88-1.96)	0.167	1.31 (0.87-1.96)	0.183
Exercise	0.71** (0.51-0.99)	0.048	0.78 (0.56-1.09)	0.153
Pseudo R-squared	0.053		0.055	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix E15. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Flu Vaccine for Women Using Eight Individual Variables for Each of the New Doctor-Diagnosed Illnesses

	Flu Vaccine			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
New work limiting condition			0.64 (0.36-1.15)	0.141
New ADL				
Hospitalization1				
Hospitalization2				
Cancer	0.95 (0.25-3.59)	0.946	0.95 (0.25-3.59)	0.945
Lung Disease	1.98 (0.77-5.08)	0.154	2.04 (0.80-5.21)	0.135
Heart Disease	1.46 (0.56-3.76)	0.434	1.41 (0.54-3.66)	0.474
Stroke	2.02 (0.31-13.18)	0.462	1.91 (0.29-12.53)	0.498
Hypertension	0.94 (0.49-1.77)	0.847	0.96 (0.50-1.81)	0.907
Diabetes	2.42* (0.89-6.54)	0.080	2.79* (1.01-7.69)	0.046
Arthritis	1.78** (1.09-2.92)	0.020	1.74** (1.05-2.87)	0.029
Psychiatric Problems	1.07 (0.42-2.74)	0.883	1.18 (0.46-3.02)	0.724
Predisposing factors				
Age	1.02*** (1.00-1.04)	0.009	1.02*** (1.00-1.04)	0.005
Married	0.81 (0.55-1.19)	0.289	0.83 (0.57-1.21)	0.348
White	0.75 (0.47-1.21)	0.250	0.72 (0.44-1.16)	0.184
Black	0.58* (0.33-1.02)	0.059	0.57* (0.32-1.00)	0.052
High school/GED	1.11 (0.73-1.69)	0.602	1.12 (0.73-1.70)	0.588
Some college and beyond	1.04 (0.65-1.65)	0.859	1.08 (0.67-1.72)	0.746
Enabling factors				
Employer provided insurance	1.16 (0.80-1.66)	0.419	1.14 (0.79-1.65)	0.464
Employment	0.80 (0.56-1.14)	0.231	0.79 (0.55-1.13)	0.211
Income2	1.03 (0.66-1.62)	0.877	1.05 (0.67-1.66)	0.810
Income3	1.39 (0.86-2.24)	0.176	1.42 (0.88-2.30)	0.149
Northeast	0.93 (0.58-1.49)	0.785	0.93 (0.58-1.48)	0.763
Midwest	1.38 (0.87-2.19)	0.166	1.38 (0.87-2.20)	0.167
South	0.92 (0.63-1.34)	0.676	0.91 (0.62-1.32)	0.637
Rural	0.91 (0.65-1.28)	0.605	0.92 (0.65-1.29)	0.631
Need factors				
Not smoking	1.10 (0.76-1.60)	0.604	1.07 (0.74-1.57)	0.693
Not drinking	1.13 (0.79-1.62)	0.480	1.16 (0.81-1.67)	0.401
Overweight	1.12 (0.82-1.53)	0.445	1.09 (0.80-1.49)	0.562
Exercise	0.80 (0.59-1.08)	0.153	0.80 (0.59-1.08)	0.149
Pseudo R-squared	0.034		0.035	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

Appendix E16. Logit Results. Effects of Health Shocks, Predisposing Factors, Enabling Factors and Need Factors on the Use of Flu Vaccine for Women Using Eight Individual Variables for Each of the New Doctor-Diagnosed Illnesses

	Flu Vaccine			
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Health shock indicator				
New work limiting condition			0.62 (0.34-1.10)	0.107
New ADL	1.00 (0.59-1.68)	0.999	0.98 (0.57-1.69)	0.954
Hospitalization1			1.34 (0.75-2.40)	0.313
Hospitalization2			1.43 (0.90-2.26)	0.123
Cancer	0.95 (0.25-3.59)	0.948	0.78 (0.20-3.03)	0.725
Lung Disease	1.98 (0.77-5.08)	0.155	1.88 (0.73-4.82)	0.188
Heart Disease	1.46 (0.56-3.77)	0.437	1.22 (0.46-3.21)	0.687
Stroke	2.02 (0.31-13.38)	0.464	1.63 (0.24-10.77)	0.609
Hypertension	0.93 (0.49-1.77)	0.844	0.95 (0.50-1.81)	0.897
Diabetes	2.42* (0.89-6.55)	0.080	2.77** (1.00-7.63)	0.048
Arthritis	1.78** (1.08-2.92)	0.021	1.73** (1.05-2.87)	0.031
Psychiatric Problems	1.07 (0.41-2.74)	0.885	1.16 (0.45-2.99)	0.744
Predisposing factors				
Age	1.02*** (1.00-1.04)	0.010	1.02*** (1.00-1.04)	0.006
Married	0.81 (0.55-1.19)	0.299	0.84 (0.57-1.23)	0.370
White	0.75 (0.46-1.21)	0.242	0.70 (0.43-1.14)	0.155
Black	0.58* (0.33-1.01)	0.056	0.56** (0.32-0.98)	0.045
High school/GED	1.11 (0.73-1.68)	0.616	1.14 (0.75-1.75)	0.527
Some college and beyond	1.04 (0.65-1.64)	0.871	1.10 (0.69-1.77)	0.669
Enabling factors				
Employer provided insurance	1.16 (0.80-1.66)	0.425	1.14 (0.79-1.64)	0.478
Employment	0.80 (0.56-1.14)	0.229	0.80 (0.56-1.15)	0.244
Income2	1.03 (0.65-1.62)	0.892	1.07 (0.68-1.70)	0.742
Income3	1.38 (0.85-2.22)	0.185	1.43 (0.88-2.32)	0.144
Northeast	0.93 (0.58-1.49)	0.782	0.95 (0.59-1.52)	0.841
Midwest	1.39 (0.87-2.20)	0.161	1.41 (0.89-2.26)	0.141
South	0.92 (0.63-1.34)	0.672	0.91 (0.62-1.33)	0.639
Rural	0.91 (0.65-1.28)	0.600	0.93 (0.66-1.31)	0.680
Need factors				
Not smoking	1.10 (0.76-1.60)	0.599	1.06 (0.73-1.55)	0.742
Not drinking	1.13 (0.79-1.63)	0.479	1.15 (0.80-1.66)	0.425
Overweight	1.12 (0.82-1.53)	0.440	1.08 (0.79-148)	0.600
Exercise	0.80 (0.60-1.08)	0.160	0.81 (0.60-1.10)	0.185
Pseudo R-squared	0.034		0.038	

* significant at 10%;
** significant at 5%;
*** significant at 1%.
CI, confidence interval

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ABSTRACT

ECONOMIC ANALYSIS OF PREVENTIVE CARE UTILIZATION AMONG OLDER ADULTS

by

BOON PENG NG

August 2014

Advisor: Gail A. Jensen

Major: Economics

Degree: Doctor of Philosophy

This dissertation seeks to examine the economic determinants of the use of preventive services among older adults. It contains two studies that focus on the effects of public health policy and health shocks on the initiation of use of preventive services among older adults.

In January 2005, Medicare began covering a one-time initial preventive physical examination (IPPE), also called a "Welcome to Medicare" visit, for new beneficiaries. This benefit was only available during a beneficiary's first six months after enrolling in Part B. The first study examines the effects of covering an IPPE on the use of mammograms, breast self-exams, Pap smears, prostate cancer screenings, cholesterol screenings, and flu vaccines among beneficiaries new to Medicare Part B. Using data from the 1996-2008 Health and Retirement Study (HRS) and the RAND HRS, I estimate multivariate logit models to quantify the effects of Medicare coverage of an IPPE on the utilization of each of these preventive care services. The findings indicate that, among both men and women, the introduction of Medicare IPPE coverage during a beneficiary's first six months under Part B did not increase the utilization of any of the preventive services examined.

Although about 70% of older adults will have one chronic condition and 50% will have more than one chronic illness such as heart disease, cancer, stroke, etc. (CDC 2009), only 25% of adults ages 50-64, and fewer than 40% of adults ages 65 and older are up-to-date on recommended preventive healthcare services. The second study evaluates whether new information, acquired through the occurrence of unexpected adverse health events, leads an individual to begin using preventive care services. Using data from the longitudinal Health and Retirement Study (HRS) and the RAND HRS, multivariate logit models are estimated to model the dynamic effects of exogenous health shocks on the initiation of use of mammograms, breast self-exams, Pap smears, prostate cancer screening, cholesterol tests, and flu vaccinations. Findings reveal that among adults with a history of not using preventive care, an unexpected adverse health event often spurs them to begin using such services. Among women ages 40 and older, those who experience an adverse health shock are 1.87 times more likely to begin getting mammograms, 1.48 times more likely to begin getting Pap smears, 1.79 times more likely to begin getting cholesterol tests, and 1.46 times more likely to begin getting flu vaccinations. Among men ages 40 and older, those who experience an adverse health shock are 2.24 times more likely to begin getting prostate cancer screenings, 2.75 times more likely to begin getting cholesterol checks, and 1.64 times more likely to begin getting flu vaccinations. These findings provide strong evidence that people change their health behaviors in positive ways following the occurrence of a negative health experience.

AUTOBIOGRAPHICAL STATEMENT

BOON PENG NG

Education:
Ph.D. Economics, Wayne State University, Detroit, MI, August 2014 GPA: 3.95
M.A. Economics, Wayne State University, Detroit, MI, December 2006 GPA: 3.93
M.S. Mechanical Engineering, Michigan Technological University, MI, August 2000 GPA: 3.95
B.S. Mechanical Engineering, Michigan Technological University, MI, March 1998

Research Interests:
Health Economics, Industrial Organization

Dissertation:
"Economic Analysis of Preventive Care Utilization among Older Adults"
Advisor: Gail A. Jensen, Professor, Department of Economics and Institute of Gerontology, Wayne State University, Detroit, MI

Work Experience:
Ford Learning & Development, College of Engineering, Ford Motor Co., Dearborn, MI
Instructor, October 2000- present

- Work with cross-functional organizations to develop and write various technical courses and training curriculum to improve designers' and engineers' core competencies.
- Traveled to and trained Ford Asia Pacific (China and India), and Ford of Europe (England and Germany) designers and engineers in stack-up analysis (GD&T) and taught other various technical classes for commonization and to enable substantial improvement to the quality of design.
- Received Ford Motor Company Recognition Award Program seven times for proactive and outstanding performances on various projects.

Teaching Experience:
Part-time Faculty, Economics Department, Wayne State University, Detroit, MI (2011- present)

- Taught ECO 1000: Survey of Economics and ECO 2010: Principles of Microeconomics

Awards:

- Ford Motor Company's Recognition Award and nominated for Ford China Ambassador Award, 2014.
- Guest speaker at Lawrence Technological University, 2013.
- Graduate-Professional Scholarship, Graduate School, Wayne State University, 2006 and 2010.
- Research and Teaching Assistantships, Mechanical Engineering Department, Michigan Technological University (1998-2000).