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MEDICARE AND DISPARITIES IN WOMEN'S HEALTH

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ABSTRACT

We investigate the effect of universal health insurance on health outcome and the use of health services by exploiting a natural experiment that changes the insurance status of most Americans at age 65; that is, eligibility for the U.S. Medicare program. We compare inequalities in health and health care use just before and after the age of universal Medicare coverage (65) in the United States. We focus in this paper on the use of services related to breast cancer. We test whether Medicare improves the use of early detection services and ultimately stage of diagnosis of breast cancer particularly for groups shown to be more likely to be uninsured prior to age 65, such as black women or women with less than a high school education. Our results show that education differences in mammography and breast exam receipt and ultimately in stage of diagnosis of breast cancer lessen after the age of 65 for white women. We also find that turning 65 significantly increases the chance that a black woman, especially a less educated black woman, has had a mammogram. We do not find comparable evidence that stage of diagnosis is improved for black women after the age of 65.

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While many Americans are healthier and have a longer life expectancy than ever before, significant variation in life expectancy exists, and health problems develop at a much earlier age in some than in others. In fact, many researchers have documented that socioeconomic differences in health status may be largest in middle age (prior to age 65). Despite this fact, the specific role that U.S. universal health insurance eligibility at age 65 contributes to the decline of socioeconomic differentials in health over the life course has not been examined.

Although virtually everyone 65 and over in the United States has health insurance through the Medicare program, a significant fraction of those aged 55 to 64 do not have group coverage, and many lack options for purchasing affordable insurance to tide them over until they are eligible for Medicare at age 65 [Loprest and Zedlewski, 1998]. Concern about this fact has been voiced frequently in the press during the past couple of years, and is the subject of several new policy reports [for example, Swartz and Stevenson, 2001]. Although there is variance in the degree of health coverage both before and after age 65, the fraction of near elderly Americans lacking *any* insurance is particularly striking. According to the March 2000 Current Population Survey, almost 13 percent of near elderly (aged 55 to 64) men and 16 percent of women were uninsured in 1999. Race and education status are strongly related to the risk of uninsurance, with nearly 18 percent of blacks and approximately a quarter of those without a high school education lacking insurance. This fraction is even higher for those aged 62 to 64, and may increase in the future due to the increasing proportion of divorced women in this group and the decline in retiree health coverage [GAO, 1998]. This lack of insurance could inhibit the use of health services and the health status of this age group, as well as to preclude the possibility of this group's progression to older ages in a healthy and active condition.

As has been frequently reported in the press recently, the U.S. Medicare program does not provide complete coverage for all services, and much recent research documents the effect of the availability of supplemental coverage to Medicare on the use of Medicare-covered services [Doescher et al., 2000; Khandker and McCormack, 1999; Saag et al., 1998]. Partly as a result, Gornick et al. [1996] document that there are significant inequalities in the use of Medicare services by race and income. This is not surprising, since it is well known that there are significant inequalities in health and health care use by socioeconomic status both in the United States and in other industrialized countries, most of which have universal government-financed insurance coverage for most health services [Van Doorslaer et al., 2000; Shaw et al., 1999; Forbes, Hayward and Agwani, 1991]. In evaluating the effect of the U.S. Medicare program on the distribution of health outcomes in the United States, the important question concerns the magnitude of socioeconomic differences in health or the use of health services for the U.S. elderly *relative* to the non-elderly (or relative to differences for the elderly in other countries with different insurance programs).

Despite an overall decline in death rates in the United States since 1960, Pappas et al. [1993] find that poor or poorly educated people still die at higher rates than those with higher incomes or better educations, and this disparity actually increased in the 25 years following Kitagawa and Hauser's classic study of 1960 [1973]. Pappas et al. also document a widening gap in the death rate between blacks and whites. The magnitude of these socioeconomic differences in health has been found to vary by age, and much work documents a narrowing of socioeconomic differences in health at older ages in the United States. Demographers have reported, for example, that mortality rates for blacks exceed those for whites for most causes and at most ages, until at some point around ages in the 70s and 80s, when these rates tend to "cross

over," with white mortality then exceeding black. Proposed explanations include theories akin to models of "survival of the fittest," where higher mortality for more disadvantaged groups at younger ages then leaves a particularly robust group alive at older ages. Although some recent evidence [Elo and Preston, 1997] questions the existence of an actual mortality crossover, significant evidence of a narrowing of socioeconomic differences in health over the life course continues to exist [Deaton and Paxson, 1998; Backlund et al., 1996], and is stronger for measures of morbidity than mortality [Preston and Taubman, 1994]. House et al. 1990, for example, have documented that socioeconomic differences in mortality as well as the prevalence of chronic conditions, limitations to functional status, or so-called excess or preventable morbidity may be largest in middle age (prior to age 65), as have other researchers [Kitigawa and Hauser, 1973; Elo and Preston, 1996; Feldman et al., 1989; Preston and Elo, 1995].

The work here uses a series of cross-sectional data to compare socioeconomic differences in health and health care use for those just over and under age 65 in the United States. A recent study by the RAND Corporation provides encouraging evidence regarding the appropriateness of the use of cross sectional data to examine what it called "health inequalities by socioeconomic status over the life course". Beckett [2000] uses a ten-year follow-up of the National Health and Nutrition Examination Survey I Epidemiologic Followup Study to test the hypothesis that: "the convergence in health inequalities in later life is an artifact of mortality selection, which biases downwards the 'true' association between SES and health in later life". Beckett, however, finds no support for this hypothesis, leading to the importance of investigating alternative explanations for this convergence.

This paper takes a broad view toward examining the distribution of the benefits of the Medicare program (the main government health care program in the United States) by examining

the use of health care services and ultimately health outcome for more and less advantaged groups before and after the age of 65. We focus on the use of services and outcome related to breast cancer, a disease that shows significant variation in outcome, and one for which appropriate use of early detection services is thought to significantly improve survival. Our intent is to test whether Medicare measurably improves the use of early detection services or stage of diagnosis of breast cancer particularly for groups shown to be more likely to be uninsured prior to the age of 65, such as black women or women with less than a high school education. The analysis of early detection uses individual-level data from the Centers for Disease Control and Prevention (CDC) to examine patterns of receipt of mammography, physician breast exams and routine physician checkups. The analysis of breast cancer severity among those diagnosed with breast cancer uses individual-level data on all cases of breast cancer diagnosed within eleven geographic areas in the United States from the National Cancer Institute (NCI).

According to Ayanian et al. [1993], "This disease [breast cancer] causes the loss of more years of potential life among women under 65 years of age than any other non-traumatic condition in the United States, yet it is curable if detected early." Breast cancer is in fact among the most frequent causes of death for women between ages 55 and 74, and one that has actually been increasing in frequency over most of the past 30 years.[1] As a result, breast cancer represented 3.9 percent of all deaths in 1970 and 5.6 percent of all deaths in 1988. Although the breast cancer mortality rate has subsequently declined, the fight against the disease is clearly far from over. In particular, although breast cancer mortality has recently decreased for white women, mortality continues to rise for black women. This fact could be due either to rising prevalence of breast cancer among black women, or to less access to early detection and treatment, or to a combination of both factors.[2] Other researchers have found that black women

continue to have a lower prevalence of breast cancer even in the 1990s. Their higher mortality could therefore reflect either lower access to early detection and effective treatment among black women, or a deadlier course of the disease for black women. Later in this paper, we explore access to early detection for the two groups in order to examine this first hypothesis.[3]

I. Health Insurance, Use of Health Services, and Health Outcome

Lack of health insurance is widely thought to decrease utilization of health services and therefore possibly result in worse health outcomes. Public policy has long provided health insurance to low-income children through the Medicaid program and through individual state initiatives such as New York's Child Health Plus. Similarly, the Medicare program provides health insurance to those aged 65 and over and certain disabled individuals. Grossman [1972] formalized an economic model of demand for health. Health itself can not be directly purchased, but can be self-produced through the purchase of medical care and use of own time in obtaining medical care and engaging in health promotion activities, within limits of an individual's genetic endowments. The effect of medical care on health is generally thought to be positive, though varying for different types of medical care input, and demand for care depends on the price of medical care services, the price of time, family income, and preferences.

Insured individuals generally face a lower out-of-pocket price for health care and demand more health services. Estimating the elasticity of demand for health care, however, is often complicated by selection of patients into certain types of insurance plans according to both observed and unobserved health status. Individuals in poor health, for example, may choose plans with more generous coverage, leading to overestimates of the elasticity of demand for health care using cross section data due to unobserved health status. The RAND health

insurance experiment of the early 80s therefore randomly assigned some individuals to have very limited insurance (95 percent coinsurance) and others to more generous plans [Newhouse, 1993]. Results indicated that individuals facing a lower out-of-pocket price for health care did use more services, though the elasticity was lower than estimated with some purely cross sectional datasets. The magnitude of the elasticity of demand varied with the type of health care, and was higher for outpatient than for inpatient care. The effect on observed health status itself, though, was rather limited. Individuals who faced a high price for health care tended to show relatively poor outcomes for blood pressure and vision, but were comparable to others on most other available measures of health status.

Using cross sectional data, Sorlie et al. [1994] found that persons under 65 without insurance had higher overall mortality than those with employer-provided insurance, adjusting for age and income. According to the authors, the higher mortality in those with no insurance reflects an indeterminate mix of selection on existing health status [those with better health can work and obtain better insurance] and access to medical care [those with insurance face a lower out-of-pocket price for use of health services]. Hurd and McGarry [1996] use the Asset and Health Dynamics Survey and find that the elderly who have insurance supplementing Medicare use more health care services than those without supplementary insurance. Because their data show little relationship between observable health measures and the propensity to hold private insurance, they interpret their result as an effect of the incentives embodied in the insurance, rather than as the result of adverse selection in the purchase of insurance. Health status, though, is notoriously difficult to observe and measure. It is also possible that the unobservable might not even be in health, but rather may be related to education, risk aversion, or the propensity to use services. It seems likely that individuals who intend to use health care services intensively

would be more likely to have supplementary insurance, even controlling for observed health status.

Finally, Ayanian et al. [1993] find that women without private health insurance who have breast cancer receive this diagnosis later and die sooner after the diagnosis than privately insured women with breast cancer. The risk of death was, however, nearly as much higher for Medicaid as for the uninsured, suggesting that the poorer outcomes for Medicaid and the uninsured may reflect the type of patients who are uninsured or on Medicaid rather than the incentives embodied in insurance.

Our paper examines the effect of obtaining Medicare insurance coverage on health care use and health outcome. Since virtually all individuals automatically obtain Medicare coverage upon turning 65 (conditional upon being alive then), this paper avoids the bias present in many other studies estimating the effect of insurance on health care use, since individuals are not selecting Medicare coverage based on current health status or other variables, observed or not.

A. Insurance Status Beginning at Age 65

Medicare was established in 1965 as a two-part program, where Part A provides hospital insurance, and Part B provides supplementary medical insurance. Essentially everyone over age 64 is covered by Part A. Almost all elderly choose to pay a relatively small premium to acquire Part B coverage. Part B covers a wide variety of medical expenditures, including fees for specified preventive services.

Although virtually all women aged 65 and over have at least some health insurance through the Medicare program, there are differences in the extent of coverage, even among this young elderly group. About one-tenth of current Medicare enrollees are in managed care plans which cover services with very little copayment required. The rest of Medicare enrollees are

subject to the $100 annual deductible and 20 percent coinsurance under Part B, though the majority have Medicaid or self or employer-purchased Medigap plans that may pay all or portions of the Part B copayment and deductible. Approximately 10.5 percent of Medicare fee-for-service enrollees have Medicare only, and would have to pay 20 percent of the cost of mammograms out-of-pocket [Blustein, 1995].

In 1991, Medicare began covering the cost of screening mammography for Medicare beneficiaries every two years, and since 1998 it has covered this service every year. This leaves Medicare beneficiaries with no supplemental coverage but who have exceeded their $100 annual deductible with an average out-of-pocket payment of approximately $11.93 in 1994 (i.e. the 20 percent copayment of the 1994 Medicare allowed charge for mammography), plus a possible "balance bill" of up to $8.94 [Blustein, 1995]. For the majority of Medicare enrollees with supplemental insurance or managed care, the out-of-pocket cost of mammography would be significantly lower.

B. Insurance Status Prior to Age 65

Although virtually all women over the age of 65 have at least some insurance through the Medicare program, a significant portion of women lack insurance before reaching that age. According to the March Current Population Survey (CPS), the proportion of women aged 55 to 64 who were uninsured increased from about 13 percent in 1990 to about 16 percent in 2000. As can be seen from Figure I, race and education are strongly related to the risk of un-insurance, with nearly one-third of black women without a high school education lacking insurance, compared to only about 8 percent of white women with at least a high school education.

For uninsured individuals, most screening mammograms cost between $50 and $150 [National Cancer Institute, 1997b], a cost that is significantly higher than that faced by most

insured individuals, including those on Medicare. Since minorities and individuals with less education are most likely to lack insurance or have limited insurance before age 65, we pay particular attention to the use of health services and health outcome of this group as they turn 65, compared to the experience of whites and those with more education.

II. Differences-In-Differences Analysis

Our goal is to compare the use of health services among the pre-Medicare group (those aged 55 to 64) to that of the post-Medicare group (those aged 65 to 74). Age differences in health and health care use are estimated in two ways. The first includes a linear age variable, measuring the slope of the relationship between age and the use of health services. A dichotomous variable indicating whether or not an individual is age 65 or over is also included, in order to test whether there is an intercept change in this relationship at age 65. A second estimation strategy replaces the linear age variable and "turned 65" dichotomous variable with nineteen individual age dummies representing single-year ages between 55 and 74 (with one left-out category). This allows the relationship between health and ages between 55 and 74 to have any nonlinear pattern.

This study design in effect exploits a national experiment that changes the insurance status of most Americans at age 65. The question is whether education or racial differences in the use of health services are less after the age of 65 compared to before. The analytic method employed is a differences-in-differences (DD) estimation, a method that has been increasingly used by empirical economists. The DD method is employed here as a means of addressing a major source of confounding in previous work on insurance and health status, i.e. the fact that selection into insurance programs is not random, and is likely to be related to unobservable

components of health status, or to difficult-to-observe differences in risk aversion or the propensity to use services. These unobservables are likely to be correlated with both insurance status and the use of health services, thus biasing traditional estimates of the effect of insurance based on cross-section data. This confounding is avoided in the present study by use of the DD strategy.

The DD estimator is based on the following model:

$$(1) \quad H_i = \beta_0 + \beta_1 AGE_i + \beta_2 OVER65_i + \beta_3 LESSHIGH_i + \beta_4 BLACK_i + \beta_5 MARRIED_i + \beta_6 WORKING_i + \beta_7 LESSHIGH_i*OVER65_i + \varepsilon_{i.}$$

In this equation, the variable H for individual i denotes a measure of health status or use of health services. AGE is a linear age variable (measuring ages between 55 and 74). This variable measures the overall slope of the relationship between age and health status or the use of health services. OVER65 is a dichotomous variable indicating whether or not an individual is age 65 or over, and is the variable testing whether there is an intercept change in the relationship between education and health at age 65.

The variable LESSHIGH for individual i is a dummy variable measuring whether or not an individual is high school educated. BLACK is a dummy variable for minority status (relative to white), MARRIED measures marital status, and WORKING controls for employment status. B_7 is the DD estimator, which tests whether the relationship between education and health differs after age 65 compared to before.

Our measures of the use of health services include whether a woman reports that she has not obtained care in the past year due to cost, the probability that a women has had a regular physician checkup in the past year, and the probabilities that a woman has had a mammogram or a physician breast exam in the past two years. If reaching the current age of Medicare eligibility

seems to improve the relative use of health services by minorities or those with little education, then expanding Medicare eligibility to those under age 65 may be particularly important.

III. The Effect of Turning 65 on the Use of Early Detection Services

Leading analysts of breast cancer diagnosis and treatment suggest that women over the age of 50 receive a mammogram every one to two years in order to improve chances of early detection, breast-conserving treatment, and ultimately breast cancer survival [U.S. Preventive Services Task Force, 1998]. We use data on the receipt of mammography, as well as physician breast exams and routine physician checkups, among women aged 55 to 74 from the Centers for Disease Control and Prevention's (CDC) Behavioral Risk Factor Surveillance System (BRFSS). We will compare, for example, mammography receipt before and after the age of 65 among more and less educated women and among black and white women, to see if "turning 65" improves utilization of mammography technology for less advantaged groups compared to more advantaged groups.

The CDC has collaborated with state health departments since 1981 to collect this data in order to track health behaviors related to premature causes of death. We use data starting in 1991, when two standard questions regarding mammography use were asked by phone in all participating states, as well as questions regarding the receipt of routine doctor's checkups and professional breast exams.[4] Since the BRFSS survey asks the mammography question in every year, it provides the large sample size needed to examine the receipt of preventive health services by single-year age group. The survey is designed to be representative by state and is stratified by age, sex and race.[5] Table I reports sample statistics on receipt of mammography and other access

measures from the BRFSS data. The sample is restricted to women who are either black or white.

As can be seen from the table, approximately 15 percent of women with less than a high school degree in the 55 to 74 year age group report that they did not receive health care sometime in the past year due to cost. This is true of only 6 percent of women who completed high school. We examine this variable since the probability of obtaining a mammogram is highly correlated with other measures of access to health care. For those who had ever had a mammogram, in 1989-1991 the BRFSS survey questionnaire included a question regarding why the mammogram was done. Seventy-one percent of respondents reported that it was "the doctor's idea," while less than 28 percent said it was their idea (a little less than two percent said it was "someone else's idea"). In addition, O'Malley et al. [1997] found that breast and cervical cancer screening rates increase if one has a usual source of care, especially if one has a regular clinician at that usual source. They conclude that an emphasis on continuity of care, especially on usual source of care, may help to bridge the gap in access to cancer prevention services faced by minority women.

Although the percent of women who have had a checkup in the past year is similar between the two education groups, only 62 percent of women without a high school degree have received a mammogram in the past two years, compared to 77 percent of women with a high school degree. Similarly, about 68 percent of women without a high school degree have received a physician's breast exam in the past two years, compared to nearly 81 percent of women with a high school degree. The research goal is to test whether these differences in receipt of health services are less after age 65 than before. [6]

Table II examines the probability that a woman has had a physician's checkup in the past year, and the probability that she reports having needed to see a doctor but could not due to cost. Logit models are estimated separately by race and education. As can be seen from the table, married, working women with a lower body mass index are less likely to lack care due to cost. Older women are also less likely to lack care due to cost. This is particularly true at age 65, an effect which is strongest for women without a high school education. Using sample characteristics, predicted probabilities for the "over 65" variable are reported in the bottom panel of the table. As can be seen from this panel, for example, turning 65 reduces the probability that a woman has lacked care due to cost by approximately 25 percent for black woman with a high school degree, compared to about 35 percent for black women without a high school degree.

Figure II reproduces results from the first two columns of Table II, replacing the linear age variable and "turned 65" dichotomous variable with nineteen individual age dummies, representing single-year ages between 55 and 74.[7] Since the sample size is smaller for black women, the standard errors are considerably higher when nineteen individual age dummies are added to the logits for black women. This is therefore just done for white women. As can be seen from this picture, older women in general are less likely to report lacking care due to cost, though the decrease is particularly strong right at age 65, especially for women without a high school education.

Table II also estimates the probability that a woman had has a physician checkup in the past year (by race and education). All else equal, unmarried, working women are less likely to have had a checkup. Older women are more likely to have had a checkup, particularly beginning at age 65. Turning 65 increases the probability that a black woman without a high school education has had a checkup by about 5 percent, compared to about 3 percent for a black women

with a high school education, and only about 1 percent for a white woman with a high school education.

Figure III graphs the predicted probabilities when the linear age and dichotomous turned 65 variable are replaced with nineteen individual age dummies. As can be seen from this picture, white women with a high school degree are more likely to have had a checkup than those without a high school degree *before the age of 65.* After age 65, this gap is eliminated.

The leftmost columns of Table III report the probability that a woman has received a mammogram in the past two years. Increased mammography use is thought to result in a shift toward earlier-stage diagnosis and greater survival probabilities. As can be seen from Table III, unmarried, working women are less likely to have received a mammogram. All else equal, working particularly reduces the chance that a woman without a high school education has had a mammogram. Presumably, these woman may have less flexible work schedules making it more difficult for them to obtain care.

Although older women overall may be less likely to have a mammogram, perhaps due to physician practice patterns, this effect is attenuated at age 65. Turning 65 increases the chance of having had a mammogram in the past two years, an effect which is stonger for black women, and women with less than a high school education. Turning 65 increases the chance that a white woman with a high school education has a mammogram by less than three percent. This increase is over six percent for white women without a high school education. Turning 65 increases the chance that a black women with a high school education has had a recent mammogram by less than four percent, compared to about nine percent for black women without a high school education.

Figures IV and V depict the predicted probabilities that a white woman has had a mammogram in the past two years by single-year age group. These figures show that the increase in the probability is particularly apparent at age 65, and for women without a high school education. For these women, turning 65 increases the chance of having had a recent mammogram by about four percentage points, compared to a pre-65 mean of about 60 percent. It is important to note from Figure IV, however, that this improvement, though significant, does not nearly eliminate the gap in mammography receipt between women with more and less education. This gap remains very substantial after age 65.

The final columns of Table III examine the chance that women have had a physician breast exam in the past two years, and show results very similar to the results for mammography. Turning 65 significantly increases the chance of having had a physician breast exam in the past two years, particularly for black women and women with less than a high school education.

IV. The Effect of Turning 65 on the Stage of Breast Cancer Diagnosis

We now consider the effect of turning 65 for more and less advantaged women on the severity of breast cancer among those diagnosed with breast cancer. We use data on breast cancer stage of diagnosis from NCI's 1973-1998 Surveillance, Epidemiology, and End Results (SEER) program. The SEER program collects data on cancer diagnosis within eleven population-based cancer registry areas throughout the United States.[8] These eleven geographic areas were chosen to represent different demographic and epidemiologic attributes, and together represent an estimated 13.9 percent of the U.S. population [National Cancer Institute, 1997a]. Medical organizations within each area report data on all newly diagnosed *in situ* and malignant cancers, including selected patient demographics and severity at the time of diagnosis of cancer

for residents in the coverage area. Since the SEER data contains only limited demographic information (race and marital status), we also merge the SEER data with data from the Area Resource File (ARF) on county education and physician supply statistics.

From the SEER data, we select all women who are diagnosed with breast cancer for the first time between the ages of 55 and 74.[9] We focus on the time period beginning in 1980, as this is the period of significant improvement in stage of diagnosis and breast cancer survival. We excluded a few cases of unknown stage, resulting in 125,393 cases of newly diagnosed breast cancer between 1980 and 1998. Table I contains descriptive statistics for white and black women aged 55 to 74 diagnosed with breast cancer between 1980 and 1998. As can be seen from the table, black women are more likely to have their breast cancer diagnosed late than are white women.[10] This is unfortunate, since early detection is thought to be the best predictor of a woman's expected years of survival following diagnosis.

Table IV explores the probability that a woman is diagnosed late rather than early with breast cancer, again using a logit model. Looking first at the covariates, older, married women living in counties with more doctors per capita are less likely to have their breast cancer diagnosed late.[11] Area effects (not reported) are consistent with the finding of other researchers that mortality, overall, is higher in the North and lower in the South (which has been elsewhere shown to be related to different average fertility patterns, among other reasons).

Turning 65 does seem to significantly reduce the chances of late stage diagnosis among white women. This increase is in the range of 5-6 percent, and seems slightly higher for women in counties with low educational attainment (defined as counties where the percent of adults aged 25 and over who are high school educated is less than 75). The effect of "turning 65" on the probability of survival is generally smaller, and is analyzed in Decker and Rapaport [2002]. The

models here predicting stage of diagnosis for black women are not as good as those for white women, and show an implausibly large reduction in the probability of late stage diagnosis among black women living in counties with low education status.

Unfortunately, our dichotomous "Medicare" (turning 65) variable is, of course, inherently correlated with age. Age in general seems to be negatively correlated with the probability of late diagnosis, possibly due to mammography's increased chance of correctly detecting early cancers in less dense breasts of older women. For this reason, Kerlikowske at al [1996] report that mammography screening is more accurate in older women.[12] A negative relationship between age and stage could therefore be partly due to better insurance coverage among older women, but also due to increased accuracy of the early detection services.

Accordingly, we have re-estimated the model in Table IV by replacing the linear age and Medicare variables for white women with individual dummy variables for each single year of age between 56 and 74. Predicted probabilities for each of these age dummies (and the omitted category) are depicted in Figures VI - VIII. As can be seen from these figures, the probability of late diagnosis seems to decrease right at age 65. This decrease, however, does not seem to differ by county education status. NCI has future plans to include zip code or census-tract level demographics with the SEER data, which will allow for a more refined analysis. These improved measures of area socioeconomic status will better allow researchers to see if the identified improvement in stage of diagnosis at age 65 is greater in poorer areas than in wealthier ones, where reaching the age of Medicare eligibility may be less important.

V. Conclusions and Discussion

Although a desire to improve the health of recipients is surely an ultimate goal of any expansion in public insurance, very little work has attempted to compare health outcomes for public insurance recipients and non-recipients and to relate differences to differences in specific health inputs. Given the fact that a significant portion of the near elderly are uninsured and that significant variation in breast cancer stage of diagnosis and survival exists, we believe that our research is an important first step toward the goal of examining the effect of socioeconomic status and health insurance on health outcome. Examining breast cancer health outcome changes for women on Medicare compared to the near elderly may ultimately shed light on the possible effects that a recently discussed expansion of public insurance coverage for the near elderly may have on the health of near elderly women.

We find that Medicare appears to significantly improve the chances that a white woman is diagnosed early with breast cancer, especially a less educated white women. It is true that less educated women are less likely to be insured but also may be less likely to get a mammogram or physical breast exam even controlling for insurance status, which would suggest a clear need for outreach in communities with low education. Our results show, however, that the difference in mammography and breast exam receipt and consequently the difference in stage of diagnosis between less educated and more educated white women is less after the age of 65. Our analysis therefore suggests that health coverage in addition to education and outreach may be a possible means of improving breast cancer stage of diagnosis, and ultimately survival and well-being for older women.

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Endnotes

1. Between 1970 and 1988, the mortality rate for white women aged 65 to 74 from breast cancer increased from 1.0 to 1.1 per thousand. During the same time period, the total mortality rate for these women decreased from 25 deaths per thousand to 20 per thousand. Mortality from heart attack decreased from 5.5 to 2.5 per thousand.

2. For most of the past 25 years, overall breast cancer mortality among black women was lower than that among white women, a fact which other researchers have hypothesized was related to earlier and greater fertility among black women, a factor which is thought to reduce breast cancer prevalence. References to this hypothesized relationship can be found, for example, in Geronimus and Bound [1990].

3. Other researchers have found that faster tumor growth may account for part [but not all] of the worse survival among black women [Eley et al., 1994].

4. The mammography questions are: (1) "Have you ever had a mammogram?"; and (2) "How long has it been since you last had a mammogram?". The questions regarding professional breast exams and routine checkups are similar.

5. Because small states are over-represented relative to larger states and since the survey does slightly under-sample whites as reported by the CDC, we have used sample weights in our presentation of

sample statistics in Table I. The weights, however, make virtually no difference in the analysis, and are not used in subsequent tables.

6. We rely on education as our measure of socioeconomic status, and do not include income as a variable in the BRFSS. Overall, income is missing for approximately 11 percent of the BRFSS sample (almost exactly the same percent missing income as in the similar and more often used National Health Interview Survey). In our sample of women aged 55 to 74, though, about 20 percent of the sample did not report family income. In addition, education is a preferred measure of socioeconomic status, since the overwhelming majority of women in our age group have completed their formal education, and education is therefore less endogenous to changes in insurance status or health than is income.

7. This graph depicts predicted probabilities from logit estimation using sample characteristics. It includes the same independent variables as reported in Table II. That is, marital status, body mass index, working status, year and region effects.

8. These areas are: San Franciso-Oakland, Connecticut, Detroit, Hawaii, Iowa, New Mexico, Seattle-Puget Sound, Utah, San Jose-Monterey, and Los Angeles.

9. For women having multiple breast cancer diagnoses, we selected for analysis the first breast cancer diagnosed (if it was diagnosed between the ages of 55 and 74).

10. For our analysis, early diagnoses include cancer (or pre-cancerous lesions) that have not yet spread to the lymph nodes. Late diagnoses include those cancers that have spread to at least one lymph node, and include those cancers that have spread much further (metastasized to distant areas).

11. This finding is consistent with Eley et al. [1994], who report that being divorced, separated, or never married increases the risk of breast cancer death, relative to married.

12. That it, the sensitivity of first screening mammography (calculated as the number of true-positive exams divided by the number of true-positive plus false-negative exams), increases steadily with age from 30-39 years to 70+.

Table I
Access to Health Care Among Women Aged 55 to 74
Weighted Sample Means

	Mean	Standard deviation	Mean	Standard deviation
	High school degree or more		Less than high school degree	
Behavioral Risk Factor Surveillance System (BRFSS), 1991-2000				
Did not receive care in the past year due to cost	0.060	0.237	0.150	0.357
Checkup in the past year	0.829	0.377	0.825	0.380
Mammogram in the past 2 years	0.766	0.424	0.624	0.484
Physician breast exam in the past 2 years	0.805	0.396	0.680	0.466
Black	0.071	0.257	0.181	0.385
Age	64.08	5.73	65.37	5.60
Married	0.640	0.480	0.510	0.500
Body mass index	29.05	15.60	31.57	17.59
Working	0.320	0.467	0.176	0.381
Number of observations	126,469		32,889	
	White		Black	
Surveillance, Epidemiology and End Results (SEER), 1980-1998				
Diagnosed late	0.333	0.471	0.410	0.492
Age	64.70	5.64	64.02	5.67
Married	0.626	0.484	0.400	0.490
County characteristics				
Percent of those aged 25+ high school educated	79.31	6.86	63.39	7.39
Non-Federal physicians per 1,000 population	2.856	1.848	3.463	1.914
Number of observations	116,062		9,331	

Table II
Access to Health Care Among Women Aged 55 to 74

	Needed to See a Doctor But Could Not Because of Cost				Physician Checkup in the Past Year			
	White		Black		White		Black	
	High school degree	Less than high school	High school degree	Less than high school	High school degree	Less than high school	High school degree	Less than high school
Turned 65	-0.445*	-0.534*	-0.328*	-0.533*	0.061*	0.193*	0.362*	0.488*
	(0.051)	(0.071)	(0.149)	(0.138)	(0.031)	(0.061)	(0.158)	(0.178)
Age	-0.066*	-0.056*	-0.044*	-0.011	0.017*	0.013*	-0.003	-0.015
	(0.004)	(0.006)	(0.013)	(0.012)	(0.003)	(0.006)	(0.014)	(0.016)
Married	-0.782*	-0.324*	-0.507*	0.029	0.198*	-.009	0.271*	0.156
	(0.026)	(0.038)	(0.085)	(0.084)	(0.016)	(0.032)	(0.087)	(0.110)
Body mass index	0.003*	0.005*	0.002	0.003	0.001*	0.00004	0.004	-0.001
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.003)	(0.002)
Working	-0.327*	-0.283*	-0.351*	-0.077	-0.189*	-0.399*	-0.059	-0.653*
	(0.028)	(0.049)	(0.085)	(0.094)	(0.018)	(0.040)	(0.090)	(0.107)
Log likelihood	-10,237	-25,855	-2,593	-2,562	-55,274	-13,199	-2,372	-1,784
N	118,785	27,522	7,587	5,322	118,981	27,616	7,580	5,323
Before age 65	0.070	0.165	0.123	0.240	0.816	0.792	0.892	0.866
Turning 65 effect	-0.024	-0.060	-0.031	-0.083	0.009	0.030	0.030	0.047
% Difference	-34.29%	-36.36%	-25.20%	-34.58%	1.10%	3.79%	3.36%	5.43%

This table uses data from the BRFSS, 1991-2000. Each column consists of logit estimates. All regressions include year and region effects. Standard errors are in parentheses under coefficient estimates. "Before age 65" refers to the predicted probability of the dependent variable for those under age 65. The "Turning 65 effect" refers to the difference between the predicted probability of the dependent variable for those over 65 minus that for those under 65. The symbols * and ** refer to significance at the 5 and 10% level respectively.

Table III
Access to Health Care Among Women Aged 55 to 74

	Mammogram in the Past 2 Years				Physician Breast Exam in the Past 2 Years			
	White		Black		White		Black	
	High school degree	Less than high school	High school degree	Less than high school	High school degree	Less than high school	High school degree	Less than high school
Turned 65	0.113*	0.163*	0.188**	0.272*	0.100*	0.129*	0.190	0.206**
	(0.028)	(0.050)	(0.113)	(0.117)	(0.029)	(0.052)	(0.117)	(0.119)
Age	-0.009*	-0.004	-0.022*	-0.031*	-0.024*	-0.013*	-0.031*	-0.028*
	(0.003)	(0.004)	(0.010)	(0.011)	(0.003)	(0.005)	(0.011)	(0.011)
Married	0.453*	0.300*	0.315*	-0.016	0.376*	0.218*	0.189*	0.011
	(0.014)	(0.026)	(0.063)	(0.072)	(0.015)	(0.027)	(0.065)	(0.073)
Body mass index	-0.002*	-0.003*	-0.004*	-0.006*	-0.003*	-0.004	-0.005*	-0.005*
	(0.000)	(0.001)	(0.002)	(0.002)	(0.000)	(0.001)	(0.002)	(0.002)
Working	0.004	-0.078*	-0.005	-0.213*	0.030**	-0.052	0.032	-0.130
	(0.017)	(0.035)	(0.067)	(0.082)	(0.018)	(0.036)	(0.070)	(0.083)
Log likelihood	-62,732	-17,926	-3,843	-3,283	-58,525	-17,301	-3,670	-3,203
N	118,981	27,616	7,585	5,359	118,981	27,616	7,605	5,347
Before age 65	0.761	0.600	0.775	0.642	0.794	0.657	0.798	0.685
Turning 65 effect	0.020	0.038	0.030	0.058	0.016	0.028	0.029	0.042
% Difference	2.63%	6.33%	3.87%	9.03%	2.02%	4.26%	3.63%	6.13%

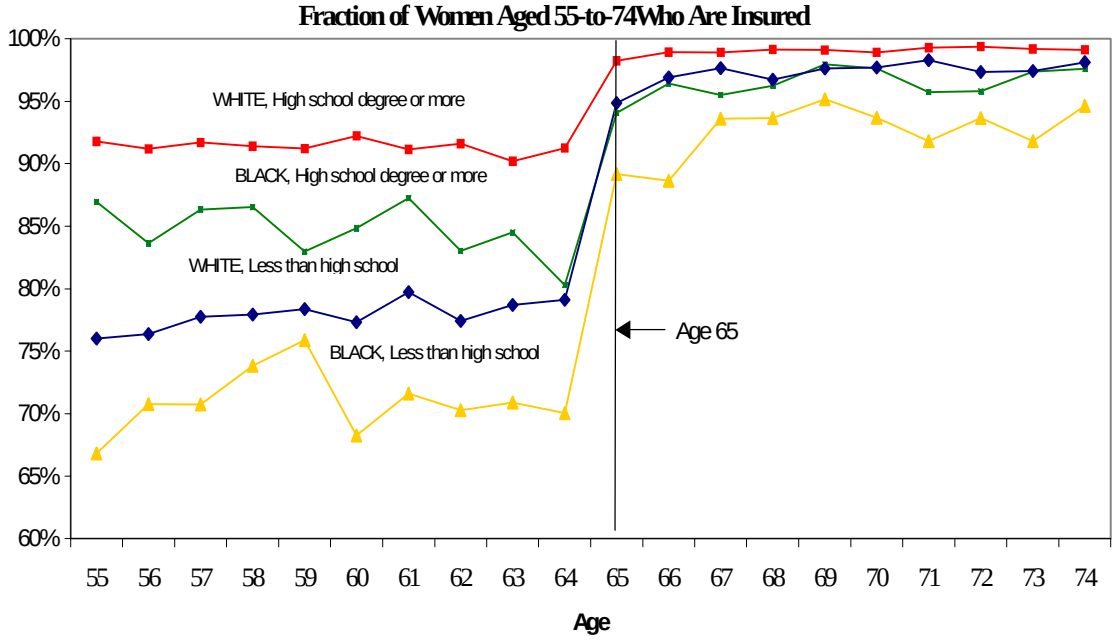
This table uses data from the BRFSS, 1991-2000. Each column consists of logit estimates. All regressions include year and region effects. Standard errors are in parentheses under coefficient estimates. "Before age 65" refers to the predicted probability of the dependent variable for those under age 65. The "Turning 65 effect" refers to the difference between the predicted probability of the dependent variable for those over 65 minus that for those under 65. The symbols * and ** refer to significance at the 5 and 10% level respectively.

Table IV
Probability of Late Stage Breast Cancer Diagnosis
Among Women Aged 55 to 74

	White		Black	
	Lower Eduation	Higher Education	Lower Eduation	Higher Education
Age	-0.004	-0.012*	-0.027*	0.007
	(0.004)	(0.003)	(0.008)	(0.025)
Turned 65	**-0.107***	**-0.077***	**0.146**	**-0.689***
	(0.048)	**(0.029)**	**(0.090)**	**(0.287)**
Married	-0.162*	-0.195*	-0.084*	-0.299*
	(0.026)	(0.016)	(0.047)	(0.148)
Non-Federal MDs per capita	-0.036*	-0.016*	-0.031	-0.107
	(0.018)	(0.006)	(0.025)	(0.105)
Log likelihood	-19,214	-52,704	-5,519	-572
N	29,166	86,946	8,399	914
Late stage under age 65	0.420	0.317	0.477	0.406
Turning 65 effect	-0.025	-0.016	Not significant	-0.145
Percent turning 65 effect	-5.95%	-5.05%	-	-35.71%

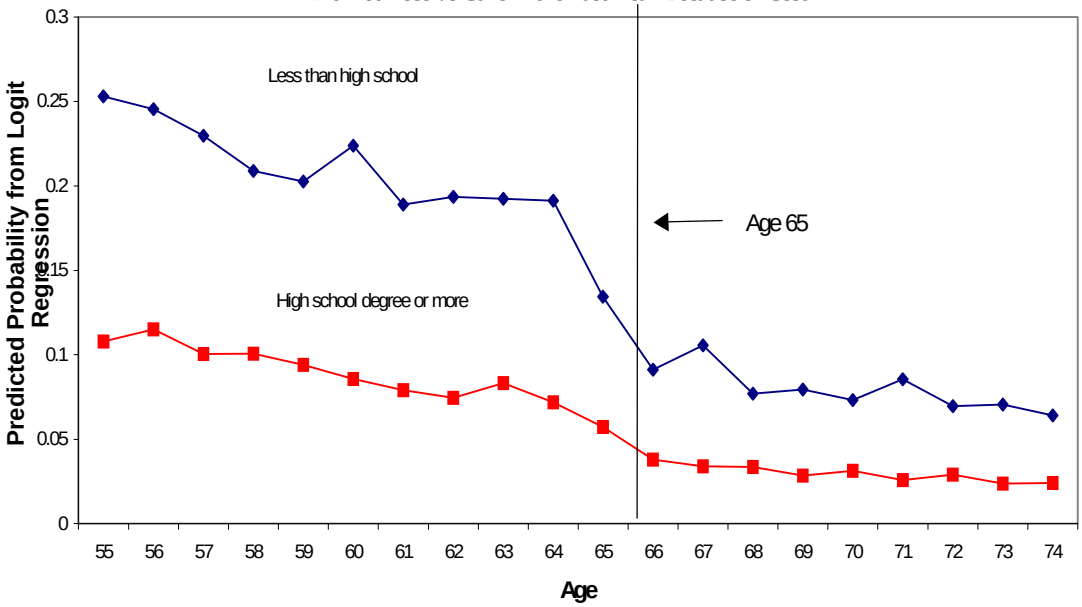
This table uses data from SEER, 1980-1998. Each column reports logit estimates. All regressions include year and area effects. Standard errors are in parentheses under coefficient estimates. "Low education" refers to living in a county where the percent high school educated is below 75 (by race). . "Late stage under age 65" refers to the predicted probability of the dependent variable for those under age 65. The "Turning 65 effect" refers to the difference between the predicted probability of the dependent variable for those over 65 minus that for those under 65. The symbols * and ** refer to significance at the 5 and 10% level respectively.

Figure I
Fraction of Women Aged 55-to-74 Who Are Insured



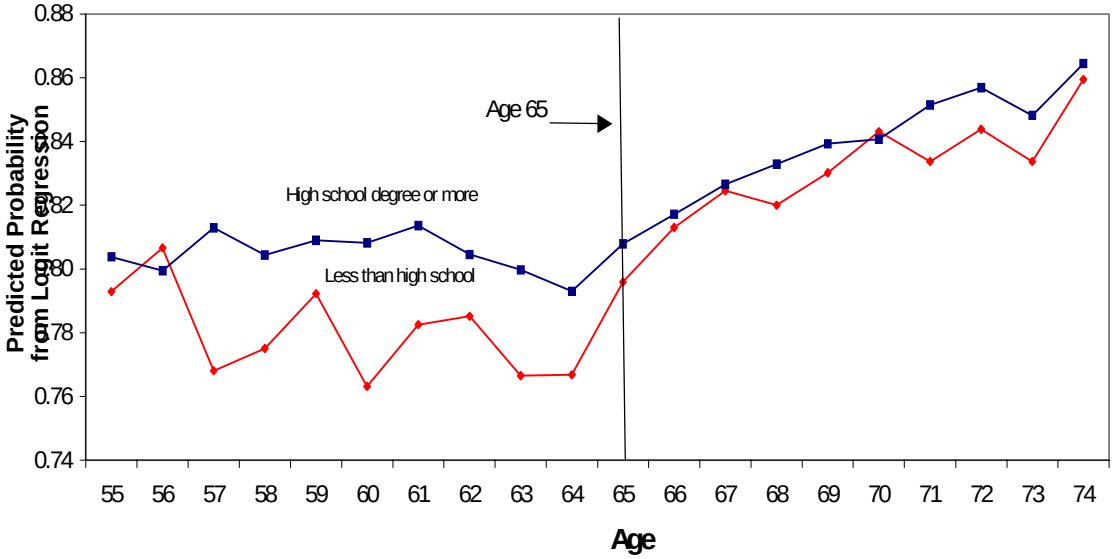
Source: BRFSS 1991-2000.

Figure II
Probability that a White Women Aged 55-to-74
Did Not Receive Care in the Past Year Because of Cost



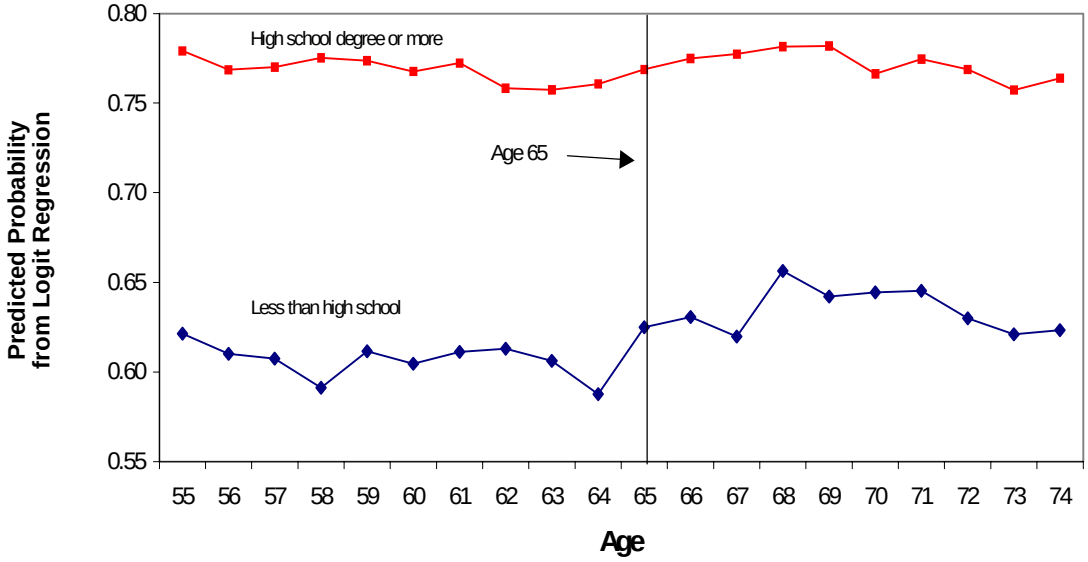
Source: BRFSS 1991-2000. Notes: Controls for marital and employment status, body mass index, year and state effects included.

Figure III
Probability that a White Woman Aged 55-to-74
Has Had a Routine Checkup in the Past Year



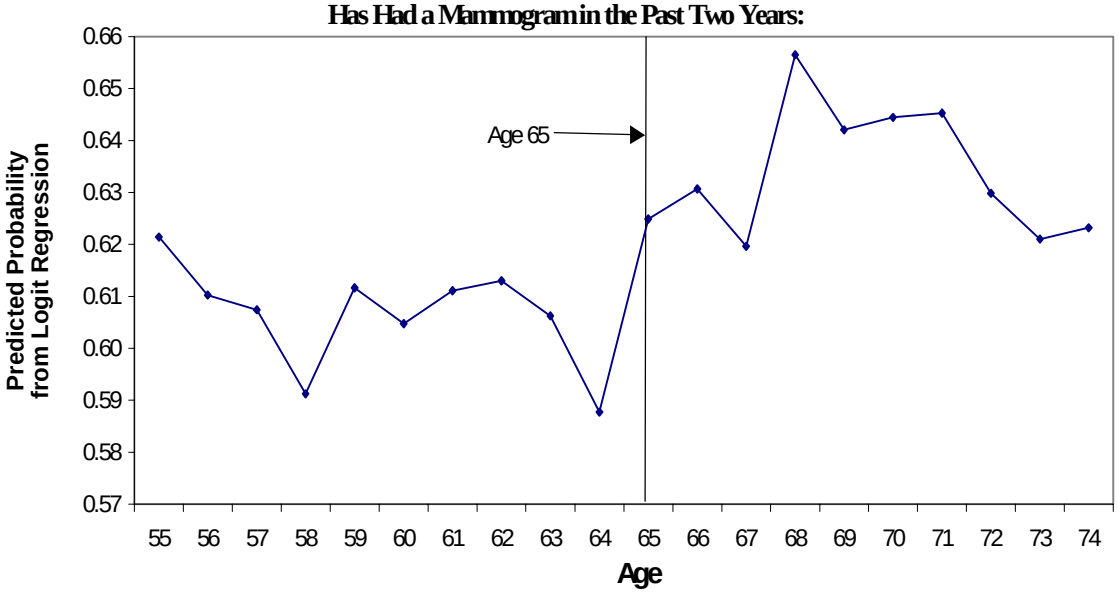
Source: BRFSS 1991-2000. Notes: Controls for marital and employment status, body mass index, year and state effects included.

Figure IV
Probability that a White Women Aged 55-to-74
Has Had a Mammogram in the Past Two Years



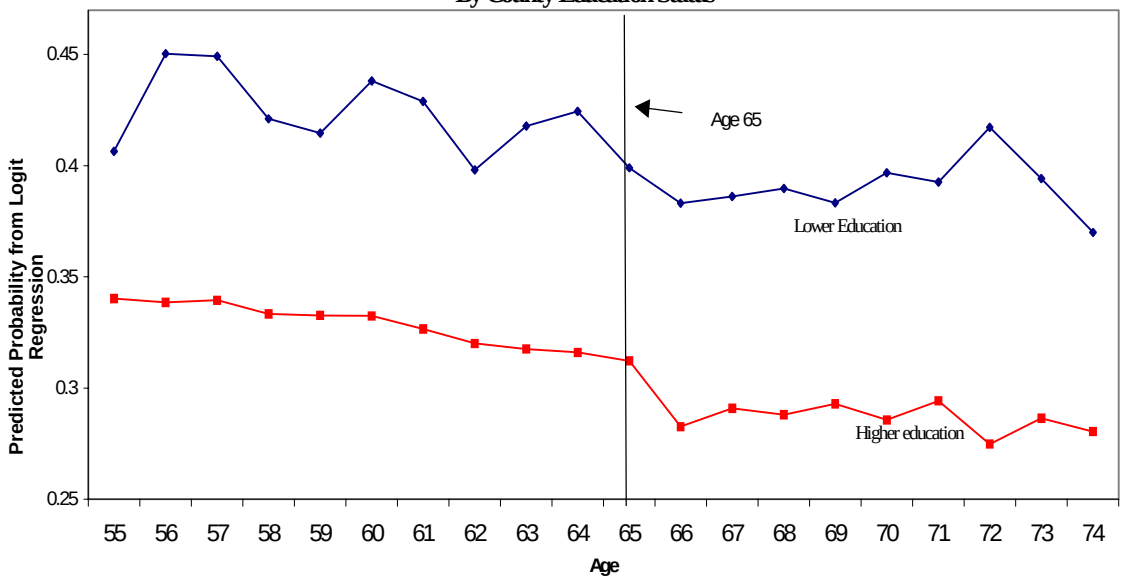
Source: BRFSS 1991-2000. Notes: Controls for marital and employment status, body mass index, year and state effects included.

Figure V
Probability that a White Women Aged 55-to-74
with Less than a High School Education
Has Had a Mammogram in the Past Two Years:



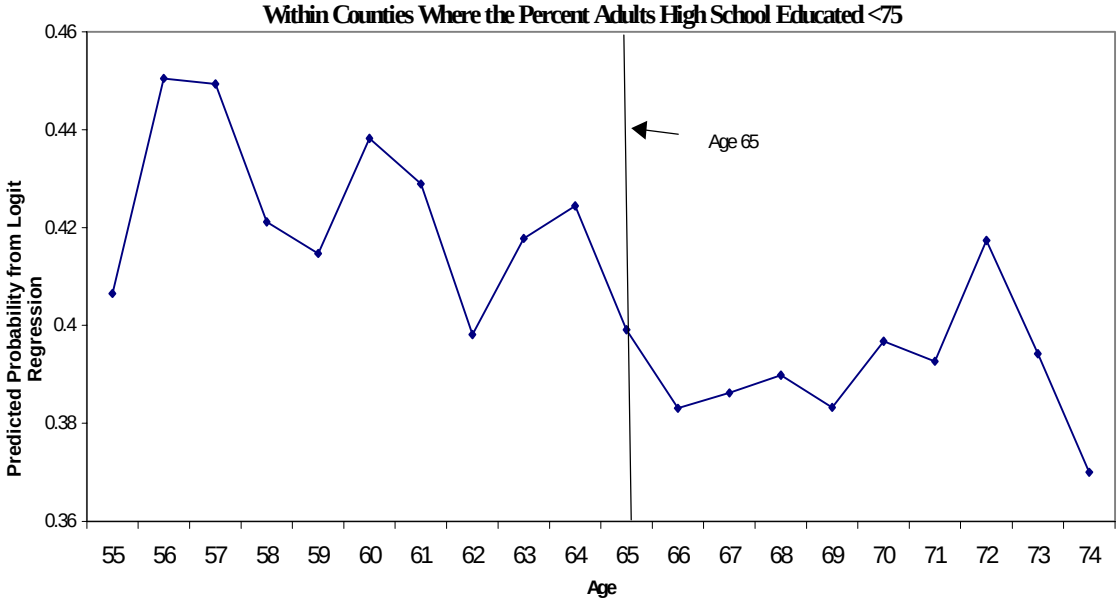
Source: BRFSS 1991-2000. Notes: Controls for marital and employment status, body mass index, year and state effects included.

Figure VI
Probability that a White Woman Aged 55 to 74
Is Diagnosed Late with Breast Cancer
By County Education Status



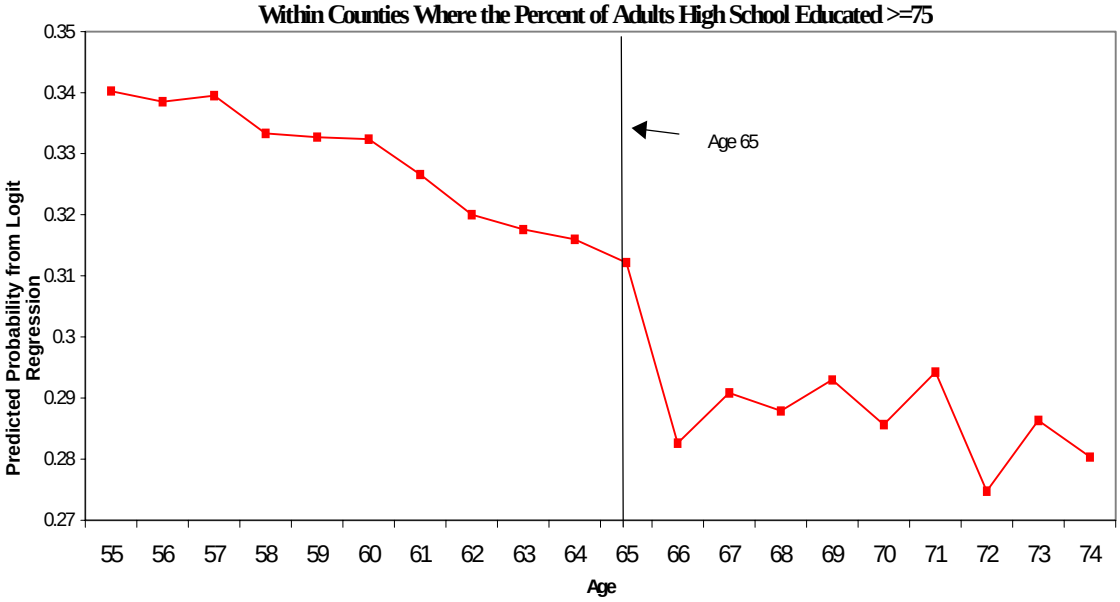
Souce: SEER 1980-1988. Note: Controls for marital status, county characteristics, area and year effects included.

Figure VII
Probability that a White Woman Aged 55 to 74
Is Diagnosed Late with Breast Cancer
Within Counties Where the Percent Adults High School Educated <75



Souce: SEER 1980-1988. Note: Controls for marital status, county characteristics, area and year effects included.

Figure VIII
Probability that a White Woman Aged 55 to 74
Is Diagnosed Late with Breast Cancer
Within Counties Where the Percent of Adults High School Educated >=75



Souce: SEER 1980-1988. Note: Controls for marital status, county characteristics, area and year effects included.