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The Effects of the Affordable Care Act Medicaid Expansion On Breast And Cervical Cancer Screening Rates On Low-income Childless Women

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The Effects of the Affordable Care Act Medicaid Expansion on Breast and Cervical Cancer Screenings among Childless Women

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Abstract

In 2010, the Obama administration passed the Patient Protection and Affordable Care Act (ACA) commonly known as Obamacare. However, it is in 2014 that several key parts of the ACA went into effect. Among those key parts is the Medicaid expansion program. States that chose to adopt the policy, expanded Medicaid access to everyone under 138 percent of the federal poverty line. This extension had the largest impact on childless adults who previously were not covered by the program. Moreover, ACA made it mandatory for all health plans (private and public) to include the ten essential health benefits in their most basic packages. One of the 10 essential benefits is preventive care that includes cancers' screenings. Consequently, screenings became more affordable and accessible for millions of individuals across the country. Using the Behavioral Risk Factor Surveillance System (BRFSS), I estimated the impact of the ACA policy changes to make breast and cervical cancer screenings more available. My results were not significant enough to draw any conclusions. It is likely that the limitations I encounter with my data sample (breast and cervical cancer screenings questions were only available for even years in the BRFSS Database), reduced my ability to analyze any significant trends. However, I found out that having an insurance and a health care provider was highly correlated with the respondents following cancer screenings guidelines (every three years for pap smear and every two years for mammograms).

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Introduction

On March 23rd, 2010, the Obama administration passed the Patient Protection and Affordable Care Act (ACA) commonly known as Obamacare. Obamacare was a comprehensive health care reform with three principal goals. One was to provide a more affordable health care coverage via subsidies ("premium tax credits") that lowered healthcare costs for households with incomes between 100% and 400% of the federal poverty level. The second one was to support innovative medical care delivery methods with the aim to decrease health care cost in the long term. Lastly, the ACA aimed at expanding the already existing Medicaid program to cover all adults under the age of 65 with income below 138% of the federal poverty level. Prior to ACA, federal health agencies had strict categorical eligibility requirements which often excluded childless and non-pregnant women regardless of their income (Adams & Johnston, 2016). Through the enactment of the Medicaid expansion (ACA; Pub L No. 111–148), millions of low-income females became eligible for health insurance in 2014. Moreover, ACA made it mandatory for private insurance to include family planning and preventive care services without copayments for women at 100% to 400% of the federal poverty level who are non-eligible for Medicaid.

The ACA also made it mandatory for insurance companies to cover ten essentials health benefits among which was preventive care. The main objective for implementing these ten essential health benefits was to positively impact the health of the low and middle-income Americans whose health lag behind their peers in developed countries such as France, Canada, and Germany (Komlos & Lauderdale, 2007). Preventive care occupies a central place in public health and health economics as it is a valuable tool to address control health care spending in the

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long term. Preventive care includes services such as cancer screenings, counseling and routine vaccines.

According to the American Cancer Society, 13,170 new cases of invasive cervical cancers and 252,710 new cases of invasive breast cancer will be diagnosed in 2019. Although there are already several federal and state programs (pre-ACA expansion) supporting the provision of free or low-cost cancer screenings to low-income women, screening rates are still not optimal. This may be due to uninsured women being unaware of the benefits offered by such programs. Research has shown that higher cancer screening rates correlate with a decrease in rates in late-stage diagnosis of breast and cervical cancers. Unfortunately, death's rates from these diseases are higher among underinsured and uninsured women. Women with either no health insurance or no regular health care source underuse mammograms and Pap tests (White et al., 2017). This may lead to the diagnosis of breast and cervical cancers at later stages explaining the high mortality rate among low income and minority women (Hiat et al., 2001).

The U.S. Preventive Services Task Force - an independent panel of experts in primary care and prevention - recommends biennial screening mammography for women aged 50 to 74 years and triannual Pap screening for women 21-65 years old, which can be extended to five years if the Pap smear is taken along the Human papilloma virus (HPV) vaccine.

For this study, I explored the change in cancer and cervical screening rates among BRFSS respondents between the year of 2012 and 2016. I chose these two years as 2012 and 2016 mark respectively two years before and after the enactment of the Medicaid expansion in 2014.

In addition, the Obama government efforts were put to halt in 2012 with the ruling of National Federation of Independent Business v. Sebelius case by the United States Supreme Court. The ruling made the Medicaid expansion optional for states. Hence, they are separate groups of states, one that comprised states that expanded their Medicaid program (expansion states) and another that comprised those that did not (Non-Expansion States).

These conditions created a natural experiment to study the effect of ACA Medicaid expansion across the country. In this study, I analyzed the impact of expanded insurance coverage through the Affordable Care Act on the rates of the two above mentioned cancer preventive services, Pap smear and mammogram among childless women.

For this study, I hypothesized that the post ACA year (2016) will show higher screening rates in expansion states compared to states that did not expanded Medicaid.

Literature Review

Numerous studies have demonstrated that ACA Medicaid expansion had positive impacts on health coverage disparities and access to health care (Buchmueller, et al., 2017, p. 1416-1421). However, there is still a lack of extensive research on the effect of the ACA Medicaid expansion on cancer preventive services. The few published ones present mixed results, some argue that the expansion has led to a shift towards an early-stage diagnosis of cancers such as cervical and breast cancers (Hang et al., 2016; Robins et al., 2015) while others did not find significant changes (Mehta et al., 2015).

According to the National Cancer Institute, new cancer cases per year is expected to rise to 23.6 million by 2030. Hence, it is more than crucial to thoroughly study the effects of policies such as the Medicaid expansion. In addition, the United States as a country has been lagging in terms of health and health care disparities. It is not only essential to explore how instrumental extending public health insurance to a larger population, but also necessary to study if this action has an impact in health gap among different groups of people across the nation.

Black and Hispanic women are more at risk of late-stage breast and cervical cancer diagnosis, which might be related to lack of access to prevention services due to numerous causes such as access (lack of knowledge about cancer and cancer screenings, fear of cancer, lack of primary doctor), lack of health insurance or fees of screening services (Breslow et al., 2008).

Materials and Methods

Data

Data from this study were obtained from the Behavioral Risk Factor Surveillance System (BRFSS). BRFSS data is a critically important and easy to access data-source for analysis because of the large comprehensive set of questions regarding health status and insurance coverage. It is a system of telephone surveys of more than 400,000 adults ($\geq$18 years of age) U.S. residents. Samples are chosen to be state representative; a common set of questions are used across states, with flexibility for states to supplement their survey. BRFSS data, including survey weights, are publicly available through the Centers for Disease Control and Prevention commonly known as CDC.

Analytic Sample

The study sample is composed of BRFSS 2012 and 2016 datasets merged together. The 2012 dataset served as the pre-aca sample while the 2016 one was used as the post-ACA sample. At start, I first intended to use two years (2012, 2013) for the pre-expansion period and 2 years (2015-2016) as the post-expansion period. However, breast and cervical screening related questions were optional for the years of 2013 and 2015, meaning less than ten states per year had data related to mammograms or pap smear for those years. 2014 was not included as I considered it as the wash out period to study the impact of ACA.

Moreover, the sample was restricted to childless non-pregnant women of 18-64 years old for pap smear screening rates analysis. While for breast cancer screening rate studies, the sample was limited to childless non-pregnant women 50-74 years of age. The age restrictions were done in accordance with the U.S. Preventive Services Task Force recommendations, while the focus on non-pregnant women was set because pregnant women were already cover prior through ACA.

States like New York, California or Maine with early or late ACA Medicaid expansions or pre-ACA Medicaid waiver covering childless adults up to 100% of the Federal Poverty Level were excluded. Expansion states referred to states that implemented the ACA by January 2014 while Non-Expansion states are those that did not implemented the ACA between January 2014 and January 2016, see Table (1).

Table 1: States Classification

Expansions States	Non-Expansion States	Excluded States
Arkansas	Alabama	Alaska
Arizona	Florida	California
Colorado	Georgia	Connecticut
Delaware	Idaho	Kentucky
Illinois	Kansas	District of Columbia
Maryland	Mississippi	Hawaii
Massachusetts	Missouri	Indiana
Minnesota	Nebraska	Louisiana
Nevada	North Carolina	Maine
New Mexico	Oklahoma	Michigan
North Dakota	South Carolina	Montana
Ohio	South Dakota	New Hampshire
Oregon	Texas	Iowa
Rhode Island	Utah	New Jersey
West Virginia	Virginia	New York
Washington	Wyoming	Pennsylvania
		Tennessee
		Vermont
		Wisconsin

Design and Variables

This study used a quasi-experiment difference-in-difference (DID) approach. This analytic design tests a comparison of the change in trends of outcomes before and after Medicaid expansion across expansion states vs non-expansion states. The difference-in-differences method is widely used for assessing the effect of a policy change such as the Medicaid expansion. It involves subtracting the difference between the pre and post period for a control group from the same difference for a treatment group. With such method we can account for any co-founders that may affect the cancer screening rates before and after the Medicaid expansion.

Analysis were conducted using STATA/IC 15.1. The dependents variables are indicators of access to preventive care services. For breast cancer screening rates, I established two indicators: one for whether or not a woman had a mammogram in her lifetime, and the other one for whether or not she had it in the past two years. For cervical cancer screening rates, two similar indicators were used as dependent variables one for whether or not a woman had a pap smear in her lifetime, and the other one is whether or not she had it in the past three years. Those indicators represent responses to the four following BRFSS survey questions:

1) A mammogram is an x-ray of each breast to look for breast cancer. Have you ever had a mammogram?

2) How long has it been since you had your last mammogram?

3) A Pap test is a test for cancer of the cervix. Have you ever had a Pap test?

4) How long has it been since you had your last Pap test?

To control for the effects of ACA, I included several socio-demographic factors that are usually associated with cancer screening use, including race/ethnicity (white, black non-Hispanic, Hispanic, other non-Hispanic), first language (English, or other) marital status (married/living with partner, unmarried/not living with partner), existence of a health care provider (has at least one doctor, has no doctor) and health status (excellent/very good/good, fair/poor) as these have also been shown to be related to screening use (Aiken, et. al., 1994).

It is important to note that although income is an important socio-demographic factor in health and healthcare, I decided to not include it in this study. As the BRFSS being a telephone survey, inaccuracy in income report might be an issue. Instead, I used education (did not graduate high school, graduate high school, attended college, graduated college) as a substitute for income as level of education is often highly correlated to income.

Guided by the aforementioned, the following models were established:

Mam= β_1(expand) + β_2(post) + β_3(post_expand)+ β_4(marital status) + β_5(race) + β_6 (languagespoken) + β_7(education) + β_8(age) + β_9(healthstatus) + β_{10}(personalphysician)+ μ

MamPast2= β_1(expand) + β_2(post) + β_3(post_expand)+ β_4(marital status) + β_5(race) + β_6 (languagespoken) + β_7(education) + β_8(age) + β_9(healthstatus) + β_{10}(personalphysician)+ μ

Pap= β_1(expand) + β_2(post) + β_3(post_expand)+ β_4(marital status) + β_5(race) + β_6 (languagespoken) + β_7(education) + β_8(age) + β_9(healthstatus) + β_{10}(personalphysician)+ μ

PapPast3= β_1(expand) + β_2(post) + β_3(post_expand)+ β_4(marital status) + β_5(race) + β_6 (languagespoken) + β_7(education) + β_8(age) + β_9(healthstatus) + β_{10}(personalphysician)+ μ

Where Mam, MamPast2, Pap and PapPast3 are binary measures for respectively mammogram screening in lifespan, mammogram screening in the past two years, pap screening in lifespan, pap smear screening in the past three years. Race is a set of indicators for each minority or race group (Black Non-Hispanic, Other Non-Hispanic, Hispanic). Post_expand is the interaction term for postACA year and state effects. The coefficient β_1 represents the main effect of state on outcomes while β_2 represents the main effect of the ACA Medicaid expansion policy. The coefficient β_3 capture the interaction effect between state effects and Medicaid expansion policy. When state fixed effects and year fixed effects are also included in the model, the coefficient of this variable measures the effect of the presence of an expansion on the likelihood of each outcome for childless women, holding other factors constant.

Table 2: Variables Description

Variable	Description
mam	Indicator for having a mammogram at least once in a lifetime
mampast2	Indicator for having a mammogram in the past two years
Pap	Indicator for having a pap test at least once in a lifetime
Pappast3	Indicator for having a pap test in the past three years.
insurance	Indicator for having health care coverage
single	Non-Married
goodhealth	Indicator for having Excellent/ Very good/ Good/ Fair Health
doctor	Indicator for having at least one primary care provider
somehs	Attended High School
hsgrad	Graduate from College
somecol	Attended College
collegegrad	College Graduate
blacknonhis	Black Non-Hispanic
othernonhis	Other Non-Hispanic
his	Hispanic white
white	Non-Hispanic white

Results

Descriptive Statistics

Table 2 shows the independent and defendant variables descriptions.

Table 3 shows the weighted descriptive statistics of the sample which was limited to mammogram age-specific respondents (50-74 years old). In average, 96% percent of respondents had a mammogram at least once in their lifetime, while 81 percent respondents had their mammogram in the past two years. Among females in the expansion state, 83% of women are currently in good terms with screening guideline (had their mammogram in the past two years) compared to 81% in the non-expansion states. Overall, the population demographic in both the expansion and the non-expansion states are quite similar.

Table 4 shows the descriptive statistics in year category (2012 vs 2016). While insurance rate among the respondent increased from 92% in 2012 to 96% in 2016, the percentage of women who got their mammogram in the past two years is lower by one percent in 2016 compared to 2012.

Table 5 and Table 6 show the weighted descriptive statistics for the pap smear sample (18-64 years old). 78 % of Women in expansion states had their mammogram in the past 3 years compared to 75% in non-expansion states. Table 5 shows a decrease in 2016 of the percentage of respondents who ever had a pap test and a pap test in the past three years, respectively 95% to 93% and 78% to 75%.

Analysis Results

  In table 7, I show results from the difference-in-difference regression for the breast cancer screening rates indicators. The two dependent variables are mam (indicator for "having eve received a mammogram" and mampast2, the indicator for "having received a mammogram in the past two years". Both variables are binary. Our primary interest is in the coefficients of the ACA Medicaid effect (PostACA) and the coefficients on the interaction of ACA Medicaid effects and state effects. Column one shows finding for "mam" indicator while column 2 shows finding for "mampast2" indicator. There does not appear to be significant difference between mammograms screening rates before and after the ACA expansion, other things controlled. However, the interaction term between states and ACA expansion for mammogram screening in the past two years is negative and statistically significant at $p<0.01$. Having an insurance and a doctor is strongly correlated with having received mammogram in the past two years.

In table 8, I examined the main effects and interaction of state and ACA expansion on pap smear screening rates. The difference-in-difference model for this regression indicates that after the ACA expansion, the rates of pap smear rates were lowered by 4% ($p<0.01$). Education appears to have a positive correlation with having received the mammogram in the past three years. College grads, College drop-outs and High school graduates are respectively 10, 5 and 4 % more likely to be following the screening guidelines compare to high school dropouts ($p<0.01$). Having an insurance and a doctor is strongly correlated with having received pap smear in the past three years. Moreover, the younger the respondent, the higher the chance they had a mammogram in the past three years.

Table 3: Descriptive Statistics for Age-Specific Breast Cancer Screening (Expansion States vs Non Expansion states)

Variable	Non-ExpansionState	ExpansionState
	Mean	Mean
mam	0.96	0.96
mampast2	0.81	0.83
insurance	0.93	0.95
single	0.44	0.45
goodhealth	0.92	0.94
doctor	0.92	0.93
somehs	0.09	0.06
hsgrad	0.31	0.27
somecol	0.30	0.30
collegegrad	0.31	0.37
blacknonhis	0.11	0.06
othernonhis	0.04	0.04
his	0.08	0.05
white	0.77	0.85
age50_54	0.14	0.14
age55_59	0.20	0.20
age60_64	0.23	0.24
age65_69	0.23	0.23
age70_74	0.20	0.19

Table 4: Descriptive statistics for Age-Specific Breast Cancer Screening Sample (PreAcA vs PostAca)

Variable	PreAca(2012)	PostAca(2016)
	Mean	Mean
mam	0.96	0.96
mampast2	0.82	0.81
insurance	0.92	0.95
single	0.45	0.44
goodhealth	0.93	0.93
doctor	0.92	0.92
somehs	0.08	0.07
hsgrad	0.30	0.28
somecol	0.29	0.30
collegegrad	0.32	0.35
blacknonhis	0.09	0.09
othernonhis	0.04	0.04
his	0.06	0.06
white	0.81	0.81
age50_54	0.16	0.13
age55_59	0.21	0.19
age60_64	0.23	0.23
age65_69	0.22	0.25
age70_74	0.18	0.20

Table 5: Descriptive Statistics for Age-Specific Cervical Cancer Screening Sample (Expansion States vs Non-Expansion states)

Variable	Non-Expansion State	Expansion State
	Mean	Mean
pap	0.937	0.945
Pappast3	0.755	0.781
insurance	0.862	0.908
goodhealth	0.933	0.943
doctor	0.848	0.871
single	0.450	0.461
somehs	0.074	0.052
hsgrad	0.273	0.245
somecol	0.308	0.299
collegegrad	0.345	0.404
white	0.719	0.806
blacknonhis	0.131	0.071
othernonhis	0.052	0.058
his	0.098	0.066
age25_29	0.049	0.051
age30_34	0.032	0.036
age35_39	0.029	0.029
age40_44	0.045	0.044
age45_49	0.095	0.090
age55_59	0.261	0.262
age60_64	0.298	0.303

Table 6: Descriptive statistics for Age-Specific Cervical Cancer Screening Sample (PreAcA vs PostAca)

Variable	Pre ACA(2012)	Post ACA(2016)
	Mean	Mean
pap	0.952	0.928
Pappast3	0.785	0.747
insurance	0.859	0.912
goodhealth	0.936	0.940
doctor	0.865	0.852
single	0.459	0.452
somehs	0.067	0.060
hsgrad	0.264	0.255
somecol	0.302	0.305
collegegrad	0.368	0.380
white	0.767	0.754
blacknonhis	0.101	0.104
othernonhis	0.055	0.055
his	0.078	0.088
age25_29	0.045	0.055
age30_34	0.031	0.038
age35_39	0.027	0.031
age40_44	0.048	0.041
age45_49	0.098	0.087
age55_59	0.263	0.259
age60_64	0.289	0.313

Table 7: Regression Results for Breast Cancer Screening

	mam	mampast2
postaca	-0.004	-0.003
	(1.14)	(0.57)
post_expand	0.004	-0.019
	(0.96)	(2.35)*
expansionstate	-0.002	0.008
	(0.87)	(1.62)
insurance	0.070	0.192
	(9.71)**	(16.10)**
single	-0.012	-0.044
	(5.31)**	(9.85)**
goodhealth	0.002	0.090
	(0.40)	(8.53)**
doctor	0.101	0.213
	(14.69)**	(19.03)**
hsgrad	0.012	0.034
	(2.07)*	(3.80)**
somecol	0.027	0.027
	(5.08)**	(2.96)**
collegegrad	0.035	0.065
	(6.58)**	(7.36)**
blacknonhis	0.016	0.095
	(4.18)**	(14.08)**
othernonhis	-0.011	-0.023
	(1.67)	(1.78)
his	0.017	0.077
	(3.31)**	(8.57)**
age55_59	0.014	-0.008
	(3.75)**	(1.14)
age60_64	0.022	0.001
	(5.69)**	(0.21)
age65_69	0.018	0.012
	(5.36)**	(1.88)
age70_74	0.021	0.001
	(6.42)**	(0.08)
_cons	0.770	0.325
	(61.56)**	(16.41)**
R^2	0.05	0.07
N	148,473	141,631

[All Results Rounded to the Nearest Ten Thousandth of a Point] * $p<0.05$; ** $p<0.01$

Table 8: Regression Results for Cervical Cancer Screening

	Pap	Pappast3
postaca	-0.032	-0.039
	(5.83)**	(6.25)**
post_expand	-0.002	0.006
	(0.29)	(0.73)
expansionstate	-0.002	-0.003
	(0.53)	(0.55)
hsgrad	0.018	0.041
	(1.91)	(3.63)**
somecol	0.052	0.050
	(5.70)**	(4.44)**
collegegrad	0.077	0.101
	(8.65)**	(9.28)**
blacknonhis	0.002	0.098
	(0.23)	(15.20)**
othernonhis	-0.110	0.022
	(11.34)**	(2.42)*
his	-0.044	0.108
	(5.89)**	(13.81)**
insurance	0.019	0.144
	(2.78)**	(17.04)**
goodhealth	-0.006	0.117
	(0.89)	(9.82)**
doctor	0.036	0.116
	(5.41)**	(16.22)**
single	-0.042	-0.031
	(11.95)**	(6.92)**
age18_24	-0.409	0.270
	(42.27)**	(35.89)**
age25_29	-0.082	0.234
	(9.76)**	(29.33)**
age30_34	-0.042	0.202
	(5.27)**	(20.80)**
age35_39	-0.017	0.173
	(1.92)	(16.29)**
age40_44	0.003	0.130
	(0.54)	(11.39)**
age45_49	0.008	0.100
	(2.21)*	(11.28)**
age50_54	0.000	0.069
	(0.06)	(9.20)**
age55_59	0.001	0.036
	(0.21)	(5.18)**
_cons	0.929	0.318
	(77.47)**	(17.88)**
R^2	0.30	0.10
N	121,818	113,357

[All Results Rounded to the Nearest Ten Thousandth of a Point] * $p<0.05$; ** $p<0.01$

Discussion

My results did not match my expectations. I expected to obtain significant coefficients for postACA and expansion state variables, as this would indicate the positive impact of Medicaid expansion shown by previous papers. Besides, not being statistically significant, most coefficients were negative. I suspect that this may be due to several reasons. First, each state has its own specific Medicaid program implementation conditions and requirements. While using the BRFFS, there is no specific way to account state specific effect among expansion or non-expansion states. Moreover, the results showed having an insurance is a strong indicator to have either mammograms or pap smear in accordance with the cancer screening recommendations. With most insurance nowadays including mammogram at no cost or minimal copay, the impact of ACA Medicaid expansion may not be noticeable. It might also be too early to track the effect of a 2014 policy on prevention services such as cancer screenings. Moreover, 2016 had overall a lower proportion of respondents (N=39896) who had pap tests compared to 2012 (48828). This might expand the negative coefficient for the interaction post_expand indicator. In 2011, The Affordable care act created the Medicaid incentives for the prevention of chronic disease which awarded five years grants to ten states to provide incentives to Medicaid beneficiaries who participated in prevention programs, among those states are California, Connecticut, Minnesota included in our expansion state group. The early implementation of such policies may have built up the number of respondents who got their screenings. They are several local county health departments and women's clinics that provide mammogram and pap smear Free or Low-Cost Pap smears. The national breast and cervical cancer early detection program is a federally funded program that helps uninsured and impoverished women get regular mammograms and pap smear according to the cancer screening guideline. The program is available to eligible low-income

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women ages 18-64 without insurance or whose insurance does not cover cervical and breast screening cost.

Limitation

This study had several limitations. One of the strongest one is the data set. Since cancer and cervical screenings questions were optional in 2013 and 2015, and we used 2014 as a washout year, we had only 2012 data for our pre-ACA period and 2016 for the post-ACA period. This left us with only two years to explore the impact of a complex policy such as the Medicaid expansion.

Conclusion

My results were not significant enough to draw any conclusions. They did not support my hypothesis which was that the post ACA year (2016) would show higher screening rates in expansion states compared to states that did not expanded Medicaid.   It is likely that the limitations I encounter with my data sample has an effect on my analysis. Future work should continue to monitor cancer preventive services rates in populations targeted by the Medicaid expansion. They add to the literature on the effect of the importance of insurance and the impact of education.

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