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Medicaid Expansion and Access to Care among Cancer Survivors: A Baseline Overview

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Abstract

Purpose—Medicaid expansion under the Affordable Care Act facilitates access to care among vulnerable populations, but 21 states have not yet expanded the program. Medicaid expansions may provide increased access to care for cancer survivors, a growing population with chronic conditions. We compare access to healthcare services among cancer survivors living in non-expansion states to those living in expansion states, prior to Medicaid expansion under the Affordable Care Act.

Methods—We use the 2012 and 2013 Behavioral Risk Factor Surveillance System to estimate multiple logistic regression models to compare inability to see a doctor because of cost, having a personal doctor, and receiving an annual checkup in the past year between cancer survivors who lived in non-expansion states and survivors who lived in expansion states.

Results—Cancer survivors in non-expansion states had statistically significantly lower odds of having a personal doctor (adjusted odds ratio [AOR] 0.76; 95 % confidence interval [CI] 0.63–

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0.92; $p < 0.05$) and higher odds of being unable to see a doctor because of cost (AOR 1.14, 95 % CI 0.98–1.31, $p < 0.10$). Statistically significant differences were not found for annual checkups.

Conclusions—Prior to the passage of the Affordable Care Act, cancer survivors living in expansion states had better access to care than survivors living in non-expansion states. Failure to expand Medicaid could potentially leave many cancer survivors with limited access to routine care.

Implications for Cancer Survivors—Existing disparities in access to care are likely to widen between cancer survivors in Medicaid non-expansion and expansion states.

Keywords

Medicaid expansion; Cancer survivors; Access to care; Disparities

Introduction

Cancer survival is improving as a result of earlier detection of the disease and advances in treatment [1]. In 2014, there were 14.5 million adults and children with a history of cancer living in the United States, and approximately 1.6 million new cases of cancer are expected to be diagnosed in 2015 [2]. Given the high incidence and survival rates, cancer survivors consume a considerable amount of health care services [3]. For example, they require oncology visits for cancer surveillance and follow-up care as well as primary care visits for routine care related to other health conditions, pain and other symptom control, and secondary malignancy screenings [4–7]. However, many cancer survivors face financial problems that prevent them from receiving timely and recommended health care [8]. A study using data from the National Health Interview Survey (NHIS) found that cancer survivors were more likely to delay care because of cost than the general population and among cancer survivors who reported financial difficulties, they were more likely to delay or even give up medical care entirely [9,10].

The Institute of Medicine (IOM), the Centers for Disease Control and Prevention (CDC), and the American Society of Clinical Oncology (ASCO) recommend that each cancer survivor receive a survivorship care plan to facilitate follow-up care [11,12]. For example, ASCO recommends that breast cancer patients receive a physical examination every three to six months for the first three years following breast cancer treatment, every six to 12 months in the fourth and fifth years, and annually thereafter [12]. However, among uninsured and publicly insured individuals aged 18 to 64 years, cancer survivors are less likely to have a usual source of care and use preventive services than other individuals who were not diagnosed with cancer [8].

While transitioning to survivorship, cancer patients may experience difficulties, such as lack of health insurance, low socioeconomic status, poor communication with primary care providers, and uncertainty about follow-up care [13,14]. These and other factors contribute to lack of coordinated care or even absence of care for disadvantaged patients [15]. When older breast cancer survivors were asked how they could be helped to deal with the financial

burden of cancer, they reported that they mostly needed financial assistance through public agencies and better health insurance with lower cost-sharing [16].

Prior to the Affordable Care Act (ACA), Medicaid provided health insurance coverage to certain groups of low-income people, including children, pregnant women, and disabled individuals. Medicaid eligibility varied across states, but the program covered mandatory services such as laboratory services, family planning, prescription drugs, and inpatient and outpatient hospital services. In addition, states varied in their pre-ACA expansion experiences. Many states, such as Arkansas and Oregon received Section 1115 waivers to expand Medicaid eligibility to childless adults. These waivers were not only different in implementation year and duration, but also in their eligibility requirements, creating differences in generosity of Medicaid across states. For example, Massachusetts and Vermont were very generous, with eligibility thresholds higher than 200% of the federal poverty level (FPL), while Michigan's threshold was below 100% FPL [17].

Medicaid expansion under the ACA provides coverage for individuals, including childless adults, with income up to 138% of the FPL. Medicaid expansion will broadly cover preventive services, but narrowly cover prescription drugs [18]. Although Medicaid expansion aims to reduce the uninsurance rate, the debate continues as to whether Medicaid will improve access to care and use of services [19,20]. While there is evidence of poorer outcomes among Medicaid enrollees than uninsured individuals in some domains, research shows an association between Medicaid coverage and improvement in access to care and health outcomes [21]. Compared to their low-income privately insured peers, Medicaid beneficiaries have comparable access to services such as doctor visits and preventive care [22,23]. Medicaid expansion to low-income childless adults prior to the Affordable Care Act (ACA) was associated with a reduction in all-cause mortality, an increase in insurance coverage, and a reduction in delayed care related to cost among older adults, nonwhite, and poor individuals [24]. However, under the ACA, only 29 states and the District of Columbia have expanded Medicaid coverage to low-income childless adults [25].

Despite general agreement about the importance of receiving follow-up care for cancer survivors, little is known about the receipt of care among cancer survivors living in non-expansion states compared to those living in expansion states [26–28]. Previous studies have focused on the type of provider seen by survivors, survivors' perceptions of care options, personal barriers to receive care, challenges of providers, and qualitative studies to identify unmet needs of survivors [4,6,14,16,29–31]. No study to date has focused on the changes in Medicaid policies that influence care during the survivorship period.

The purpose of this paper is to compare access to healthcare services among cancer survivors who reside in states that have not expanded Medicaid under the ACA and those who reside in states that expanded Medicaid, using data prior to the implementation of the ACA. We assess whether, at baseline, cancer survivors were unable to see a doctor because of cost, if they had a personal doctor, and if they received annual checkups in non-expansion states compared to expansion states. To minimize the effect of other potential factors affecting the association between residence in non-expansion or expansion states, we control for patient demographic characteristics, annual household income, and insurance coverage.

As nearly half of states debate Medicaid expansion, an understanding of pre-expansion access to care among cancer survivors can inform policy and clinical decisions.

Methods

Data sources

We use pooled cross sectional data from the 2012 and 2013 Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is a nationally representative annual survey that collects information on self-reported preventive health practices and risk behaviors. It is a random, population-based telephone survey of non-institutionalized adults in all 50 states and the District of Columbia (DC) [32]. In addition to using BRFSS data, we use 2012 and 2013 information from the Department of Health and Human Services to construct a measure of income as a percentage of the FPL for each household in every year [33]. For a secondary analysis, we use 2012 Area Health Resources Files (AHRF) national data to control for county-level characteristics [34].

Study population

We restrict our analyses to cancer survivors who responded to the BRFSS survey during the study period. We define a cancer survivor as any individual aged 18 to 64 years who reports having been diagnosed with any type of cancer other than skin cancer. We use this age range because it allows for inclusion of adults who may be eligible for Medicaid coverage under ACA expansions. The BRFSS data do not distinguish between melanoma and non-melanoma skin cancer. In addition, the BRFSS does not include information on 2013 skin cancer. Therefore, we exclude survivors with skin cancer from our sample. After this exclusion, we identified 30,249 cancer survivors. We excluded observations with missing data on income (n=3,295), checkup (n=261), inability to see a doctor because of cost (n=52), personal doctor (n=38), race/ethnicity (n=386), and missing data on education, employment, marital status, and insurance coverage (n=164). The sample used for the analysis consists of 26,053 cancer survivors.

Dependent variables

We use three self-reported dependent variables from the BRFSS health care access module, which contains questions about the ability of respondents to access health care services [35]. The first two dependent variables are whether the respondent was unable to see a doctor because of cost and if the respondent reported having a personal doctor in the past year. The third dependent variable is related to utilization of preventive health care services and focuses on whether the respondent received an annual checkup in the past 12 months.

Independent variables

The independent variable of interest is residence in a non-expansion state. We classify states into two groups: non-expansion and expansion states. We define non-expansion states as those that have not expanded Medicaid under the ACA as of June, 2015. We obtained information on states' Medicaid expansion from the Centers for Medicare and Medicaid Services (CMS) [36]. Additional covariates include patient demographic information (sex, age, race, ethnicity, marital status, childlessness "not having children under 18 years old")

and socioeconomic status (annual household income, education, employment status, insurance coverage). Age is constructed as a categorical variable (18–29 [reference group], 30–39, 40–49, 50–59, 60–64 years). Race is categorized as white [reference group], African American, Asian, other. Sex, ethnicity (Hispanic or non-Hispanic), marital status, childlessness, employment and insurance status are binary variables. Annual household income is specified as less than 138% of FPL [reference group], 138–400% of FPL, more than 400% of FPL. Education is categorized as less than high school [reference group], high school, some college, college or more. In addition, we control for number of chronic diseases (no chronic diseases [reference group], 1, 2, 3 or more chronic diseases).

In secondary analyses, we include county-level variables from the AHRF. These factors include primary care physician supply (sum of number of physicians in general practice, family medicine, and internal medicine per 1000 population); whether or not the county is a primary care physician shortage area (the whole county is a shortage area vs. only part or none of the county is a shortage area); percent of the county population residing in an urban area (based on 2010 census); percent of the population who are minorities (defined by subtracting the white-non-Hispanic population from the total population and dividing by total population for 2010); and 2012 median household income at the county level.

Statistical analysis

We use multiple logistic regression models to compare differences in the outcome measures between cancer survivors living in non-expansion and expansion states. We generate adjusted odds ratios and 95% confidence intervals to compare the estimated differences in each outcome measure between cancer survivors living in non-expansion and expansion states. In addition to using the full sample ($n=26,053$), we repeat the analyses using a subsample consisting of low-income cancer survivors ($n=8,862$). Low-income survivors are most affected by changes in insurance status and are less likely to access care if they do not have affordable insurance [37]. We use survey weights in the analyses to control for the complex sampling design of the BRFSS survey, nonresponse, and telephone non-coverage rates among respondents in different states [32]. All statistical analyses were conducted using Stata 12.

Because states are different in the generosity of their pre-ACA Medicaid eligibility, we repeated our analyses comparing states that had generous Medicaid eligibility (before the ACA) with the same set of post-ACA non-expansion states. We defined generous states as those with Medicaid eligibility threshold equal to or higher than 200% FPL. We hypothesized that comparing these two groups would show larger differences in outcome measures between non-expansion and generous eligibility states than the differences we obtained from the primary analysis when we compared non-expansion states with all post-ACA Medicaid expansion states.

Our main goal is to compare access to care for cancer survivors living in states and those living in non-expansion and expansion states. We extended our main analysis to control for county-level characteristics that may be important determinant of our access outcome variables: being unable to see a doctor, having a personal doctor, and receiving annual checkups. To control for these factors, we merge 2012 BRFSS data with 2012 AHRF data by

county and state codes. These factors include primary care physician supply, whether or not the county is a shortage area of primary care physicians, percent of the county residing in an urban area, percent of the population who are minorities, and median household income at the county level. Because BRFSS dataset does not include information on county code in 2013 and we may lose half of the observations if we use 2012 data only, we are not able to include the 2013 BRFSS in our secondary analysis.

Results

Table 1 reports descriptive statistics for cancer survivors for expansion and non-expansion states. Significantly greater proportions of cancer survivors in non-expansion states were African American (15.8%), had household incomes lower than 138% FPL (46.1%), and had lower rates of insurance coverage (83.4%) than survivors residing in expansion states. Survivors residing in non-expansion states had a statistically significantly greater rate of inability to see a doctor in the past year because of cost (26.0% versus 21.1%, $p < 0.001$). In addition, survivors residing in non-expansion states were significantly less likely to report having a personal doctor (85.7% compared to 89.4%, $p < 0.001$), but had comparable probabilities of receiving annual checkups to survivors residing in expansion states.

Table 2 (Panels A and B) reports results from the multiple logistic regression analyses that assessed factors associated with access to and utilization of healthcare services for both the full sample and the low-income sample. Residing in a non-expansion state was positively and statistically significantly associated with inability to see a doctor because of cost in the full sample (adjusted odds ratio [AOR] 1.14; 95 % confidence interval [CI] 0.98–1.31; $p < 0.10$) and (AOR 1.22; 95% CI 1.01–1.49, $p < 0.05$) in the full sample and the low-income sample, respectively. Cancer survivors residing in non-expansion states had statistically significantly lower odds for having a personal doctor in the past year (full sample AOR 0.76; 95% CI 0.63–0.92, $p < 0.001$; low-income sample AOR 0.75, 95% CI 0.58–0.97, $p < 0.05$). There was no statistically significant difference in the odds of receiving annual checkups in the full or the low-income sample. Further, annual household income was positively associated with having a personal doctor and receiving annual checkups and negatively associated with inability to see a doctor in the full sample.

Table 3 Panel A reports the coefficients of the logit model for the three outcomes when we restricted our sample to survivors living in non-expansion states and states with generous eligibility prior to the ACA. Cancer survivors residing in non-expansion states had statistically significantly lower odds (AOR 0.76, 95% CI 0.59–0.97, $p < 0.05$) of having a personal doctor in the past year than survivors residing in states with generous eligibility. Table 3 Panel B reports that low-income survivors living in non-expansion states had marginally statistically significantly higher odds of inability to see a doctor because of cost (AOR 1.24, 95% CI 0.97–1.59, $p < 0.10$), lower odds of having a personal doctor (AOR 0.73, 95% CI 0.53–1.02, $p < 0.10$), but higher odds of receiving annual checkups (AOR 1.26, 95% CI 0.98–1.62, $p < 0.10$).

Table 4 Panel A reports the results of the logit model for the 2012 full sample ($n = 11,474$) when we control for county-level characteristics. Cancer survivors residing in non-expansion

states have statistically significantly lower odds (AOR 0.71, 95% CI 0.53–0.94, $p<0.05$) of having a personal doctor in the past year than survivors residing in expansion states, controlling for both individual and county-level factors. Panel B in the same table shows the coefficients for the same sample without controlling for county-level characteristics. When we control for individual characteristics only but not for county-level characteristics, cancer survivors residing in non-expansion states had marginally statistically significantly lower odds (AOR 0.67, 95% CI 0.51–0.88, $p<0.10$) of having a personal doctor in the past year than survivors residing in expansion states. Coefficients for inability to see a doctor because of cost and receiving annual checkups were not statistically significant regardless of controlling for county-level factors.

Discussion

We compared access to care, prior to Medicaid expansion under the ACA, among cancer survivors who live in states that expanded Medicaid and survivors who live in states that did not expand Medicaid under the ACA. In all analyses, we controlled for other factors that may affect access including patient demographic characteristics, household income, and insurance coverage. Cancer survivors who live in non-expansion states were more likely to face financial barriers to see a doctor and less likely to have a personal doctor than cancer survivors who live in expansion states. These findings were statistically significant in the full sample and the low-income sample. However, we did not find statistically significant differences between residency in expansion and non-expansion states in the likelihood of receiving annual checkups.

While cancer survivors are at high risk of developing other cancers or experiencing late effects of treatment, our findings imply that survivors living in non-expansion states are less likely to access healthcare services, which are necessary to receive the care they need [38–40]. Our finding highlights a gap between non-expansion and expansion states prior to the ACA Medicaid expansions. These differences in access to care may exacerbate known disparities in non-expansion states. Uninsured non-elderly survivors are less likely to have a usual source of care or use preventive services than a similar group of privately insured survivors [8]. When uninsured survivors fail to receive continuous care, they may be at risk for adverse health events. Our findings inform the debate on Medicaid expansions by providing an important understanding of baseline access to care for cancer survivors in states that expanded Medicaid as of June 2015 and those that are still exploring the option of expanding the program.

We did not observe statistically significant differences for receiving annual checkups, but instead found comparable rates among survivors living in expansion and non-expansion states. We can interpret this finding in different ways. A respondent could have been diagnosed with cancer in the past year and still be receiving treatment, alleviating the need for checkups or follow-up visits. Additionally, survivors may be vigilant about annual checkups and continue to receive care from their oncologists or other providers regardless of other barriers to access. Interestingly, we found African Americans were more likely to report receiving annual checkups than whites regardless of controlling for county-level characteristics. Reasons for this observations are unknown.

Our results did not change substantively when we controlled for county-level characteristics in the 2012 sample, with the exception that having a personal doctor increased by three percentage points and became less significant ($p < 0.05$ instead of < 0.001), indicating that county-level characteristics could be one of the mechanisms that influence ability of patients to have a personal doctor. This finding highlights the importance of the availability of physicians along with individuals' characteristics in determining access to care. There may be a need for interventions to increase physician supply in non-expansion states.

Several limitations must be acknowledged. Like other survey-based research, the analyses are based on self-reported data, creating concerns about validity and reliability. However, self-reported measures of preventive care in the BRFSS have been used in several previous studies that examined changes in Medicaid [41–43]. To address concerns on self-reported data, we used sampling weights to account for complex sampling design and correct for potential nonresponse biases [44]. Another limitation is that the BRFSS data do not have information on Medicaid coverage. We used Medicaid eligibility threshold of 138% FPL to create the low-income sample that would be eligible for Medicaid. Also, response rates for BRFSS can be low (rates range from 27.7– 60.4% in 2012, and 29.0– 60.3% across states in 2013). We use survey weights to reduce potential bias from low response rates. As this study is specific to cancer survivors, it may not be generalizable to populations with other chronic conditions or acute illness. We were not able to control for variables such as cancer type and time since cancer diagnosis because these variables are not available in BRFSS. Further, the BRFSS data do not provide a distinction between melanoma and non-melanoma skin cancers. In a sensitivity analysis, we included all patients with skin cancer and our results did not change (results available upon request) relative to models excluding this group. Last, the 2013 BRFSS did not include information on county codes to allow us include county level characteristics for 2013.

Medicaid expansion under the ACA aims to increase health insurance coverage for low-income populations. While the original law intended that all the states expand Medicaid, the 2012 decision of the Supreme Court gave each state the option to expand or not. Cancer survivors, like many other patients with chronic conditions, need regular care with a primary care provider to manage their health and receive follow-up screenings and tests [4,5]. Medicaid expansion provides insurance coverage for people with annual income lower than 138% of FPL. This study provides insight regarding the pre-existing differences in access to care before Medicaid expansion under the ACA. States that choose not to expand Medicaid could potentially leave many cancer survivors without access to routine healthcare services, exacerbating disparities between states.

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Table 1

Descriptive statistics for cancer survivors sample by 2015 state Medicaid expansion status

Characteristic	Expansion States (N= 15,478)	Non-expansion States (N= 10,575)	P Value
Inability to see a doctor because of cost (%)	21.1	26.0	<0.001
Having a personal doctor (%)	89.4	85.7	<0.001
Annual checkup (%)	74.7	74.8	
Age group (%)			
18– 29 years	7.8	7.3	
30– 39 years	12.1	12.3	
40– 49 years	19.1	20.1	
50– 59 years	37.9	37.2	
60– 64 years	23.1	23.0	
Gender (%)			
Male	30.3	29.2	
Female	69.7	70.8	
Race (%)			
White	80.9	77.5	
African American	9.3	15.8	
Asian	4.5	1.5	
Other race	5.3	5.2	
Ethnicity (%)			
Hispanic	11.5	7.5	<0.001
Non-Hispanic	88.5	92.5	
Marital status (%)			
Married	54.0	56.7	<0.05
Unmarried	46.0	43.3	
Education (%)			
Less than high school	13.2	14.9	<0.10
High school	27.7	27.4	
Some college	34.3	34.8	
College	24.7	22.9	
Income (%)			
<138% of FPL	40.1	46.1	<0.001
138–400% of FPL	42.9	39.0	
>400% of FPL	17.0	14.9	
Employment (%)			
Employed	54.0	52.3	
Unemployed	46.0	47.7	
Insurance coverage (%)			
Insured	87.1	83.4	<0.001

Characteristic	Expansion States (N= 15,478)	Non-expansion States (N= 10,575)	P Value
Uninsured	12.9	16.6	
Childlessness (%)			
Childless adult	65.7	65.0	
Has dependent children	34.3	35.0	
No. of chronic diseases (%)			<0.001
0	33.4	29.8	
1	29.2	28.2	
2	17.8	17.7	
3 or more	19.7	24.3	

Table 2

Adjusted odds ratios from multiple logistic regressions for the three outcome measures for the full and low-income samples

	Cost Barrier AOR	95% CI	Personal Doctor AOR	95% CI	Checkpoint AOR	95% CI
Panel A: Full sample (N= 26,053)						
Expansion status (Expansion state reference category)						
Non-expansion state	1.14 *	(0.98 – 1.31)	0.76 ***	(0.63 – 0.92)	1.06	(0.93 – 1.20)
Household income (< 138% of FPL reference category)						
138–400% of FPL	0.44 ***	(0.37 – 0.52)	1.92 ***	(1.54 – 2.40)	1.21 **	(1.03 – 1.41)
>400% of FPL	0.20 ***	(0.15 – 0.26)	2.55 ***	(1.86 – 3.51)	1.58 ***	(1.30 – 1.93)
Age (18–29 years reference category)						
Age 30–39 years	1.05	(0.74 – 1.48)	1.50 **	(1.05 – 2.15)	1.07	(0.79 – 1.44)
Age 40–49 years	0.93	(0.68 – 1.29)	2.57 ***	(1.81 – 3.64)	1.35 **	(1.03 – 1.78)
Age 50–59 years	0.63 ***	(0.46 – 0.86)	3.70 ***	(2.64 – 5.19)	1.44 **	(1.09 – 1.90)
Age 60–64 years	0.43 ***	(0.30 – 0.61)	3.95 ***	(2.74 – 5.71)	1.75 ***	(1.31 – 2.35)
Gender (female reference category)						
Male	0.76 ***	(0.63 – 0.92)	0.75 ***	(0.61 – 0.91)	1.00	(0.87 – 1.14)
Race (White reference category)						
African American	0.95	(0.76 – 1.19)	1.09	(0.81 – 1.47)	2.04 ***	(1.62 – 2.57)
Asian	1.41	(0.67 – 2.98)	1.03	(0.60 – 1.76)	1.22	(0.66 – 2.27)
Other race	1.03	(0.75 – 1.41)	0.71 *	(0.49 – 1.03)	0.84	(0.62 – 1.12)
White						
Ethnicity (Non-Hispanic reference category)						
Hispanic	0.99	(0.73 – 1.35)	0.98	(0.68 – 1.41)	1.33 **	(1.01 – 1.75)
Marital status (unmarried reference category)						
Married	0.88	(0.75 – 1.03)	1.26 ***	(1.03 – 1.55)	1.05	(0.92 – 1.20)
Education (less than high school reference category)						
High school	0.91	(0.71 – 1.17)	1.27	(0.94 – 1.71)	1.02	(0.81 – 1.29)

	Cost Barrier AOR	95% CI	Personal Doctor AOR	95% CI	Checkup AOR	95% CI
Some college	0.89	(0.70 – 1.14)	1.69***	(1.28 – 2.25)	0.89	(0.71 – 1.12)
College or more	0.68***	(0.53 – 0.89)	1.78***	(1.32 – 2.40)	1.03	(0.81 – 1.31)
Employment (not employed reference category)						
Employed	0.93	(0.79 – 1.10)	0.77**	(0.62 – 0.95)	0.85**	(0.74 – 0.97)
Insurance status (uninsured reference category)						
Insured	0.12***	(0.10 – 0.15)	6.16***	(5.03 – 7.56)	3.82***	(3.23 – 4.52)
Childlessness (has dependent children reference category)						
Childless adult	1.21**	(1.01 – 1.46)	0.78**	(0.64 – 0.96)	1.01	(0.86 – 1.19)
Number of chronic diseases (no diseases reference category)						
1 chronic disease	1.64***	(1.33 – 2.02)	1.43***	(1.13 – 1.81)	1.08	(0.92 – 1.27)
2 chronic diseases	2.46***	(1.89 – 3.21)	1.29	(0.94 – 1.75)	1.17	(0.96 – 1.41)
3 or more chronic diseases	3.25***	(2.61 – 4.01)	1.40**	(1.05 – 1.86)	1.22**	(1.00 – 1.47)
Panel B: Low-income sample (N= 8,862)^d						
Expansion status (Expansion state reference category)						
Non-expansion state	1.22**	(1.01 – 1.49)	0.75**	(0.58 – 0.97)	1.15	(0.94 – 1.39)

* p<0.10,

** p<0.05,

*** p<0.01

^dWe only report adjusted odds ratios from multiple logistic regressions which include all the independent variables listed in Table 2

Table 3

Adjusted odds ratios from multiple logistic regressions for Medicaid expansion status using states with generous eligibility as a comparison group^a

	Cost Barrier AOR	95% CI	Personal Doctor AOR	95% CI	Checkup AOR	95% CI
Panel A: Full sample (N= 14,073)						
Expansion status (Expansion state with generous eligibility reference category)						
Non-expansion state	1.11	(0.92 – 1.34)	0.76**	(0.59 – 0.97)	1.08	(0.93 – 1.27)
Panel B: Low-income sample (N= 5,048)						
Expansion status (Expansion state with generous eligibility reference category)						
Non-expansion state	1.24*	(0.97 – 1.59)	0.73*	(0.53 – 1.02)	1.26*	(0.98 – 1.62)

* p<0.10,

** p<0.05,

*** p<0.01

^a Adjusted odds ratios from multiple logistic regressions which include all the independent variables listed in Table 2: indicator variables for household income, age, gender, race, ethnicity, marital status, education, employment status, insurance status, childlessness, and number of chronic diseases.

Table 4

Adjusted odds ratios from multiple logistic regressions for the 2012 samples

	Cost Barrier AOR	95% CI	Personal Doctor AOR	95% CI	Checkup AOR	95% CI
Panel A: Full sample controlling for county-level characteristics (N= 11,474)						
Expansion status (Expansion state reference category)	1.18	(0.93 – 1.49)	0.71 **	(0.53 – 0.94)	1.00	(0.82 – 1.22)
Non-expansion state						
Household income (< 138% of FPL reference category)						
138–400% of FPL	0.48 ***	(0.38 – 0.62)	1.97 ***	(1.43 – 2.72)	1.32 **	(1.05 – 1.67)
>400% of FPL	0.23 ***	(0.15 – 0.34)	2.90 ***	(1.82 – 4.60)	1.51 ***	(1.13 – 2.03)
Age (18–29 years reference category)						
Age 30–39 years	0.76	(0.49 – 1.19)	1.59 **	(1.01 – 2.51)	1.12	(0.71 – 1.78)
Age 40–49 years	0.73	(0.47 – 1.14)	3.74 ***	(2.34 – 5.95)	1.33	(0.87 – 2.02)
Age 50–59 years	0.52 ***	(0.34 – 0.80)	5.05 ***	(3.23 – 7.88)	1.40	(0.90 – 2.17)
Age 60–64 years	0.41 ***	(0.25 – 0.68)	4.66 ***	(2.83 – 7.69)	1.67 **	(1.06 – 2.63)
Gender (female reference category)						
Male	0.69 ***	(0.52 – 0.91)	0.67 **	(0.50 – 0.91)	1.19 *	(0.97 – 1.46)
Race (White reference category)						
African American	0.68 **	(0.49 – 0.95)	1.19	(0.77 – 1.82)	2.00 ***	(1.42 – 2.80)
Asian	1.50	(0.34 – 6.69)	1.64	(0.53 – 5.09)	1.25	(0.38 – 4.09)
Other race	1.08	(0.72 – 1.62)	0.64 *	(0.40 – 1.03)	0.89	(0.59 – 1.34)
White						
Ethnicity (Non-Hispanic reference category)						
Hispanic	0.95	(0.61 – 1.48)	1.02	(0.62 – 1.67)	1.25	(0.80 – 1.97)
Marital status (unmarried reference category)						
Married	0.85	(0.69 – 1.04)	1.07	(0.81 – 1.42)	0.91	(0.75 – 1.11)
Education (less than high school reference category)						
High school	0.77	(0.55 – 1.08)	1.51 **	(1.02 – 2.24)	0.96	(0.69 – 1.33)
Some college	0.78	(0.56 – 1.09)	1.79 ***	(1.20 – 2.66)	0.97	(0.69 – 1.35)

	Cost Barrier AOR	95% CI	Personal Doctor AOR	95% CI	Checkup AOR	95% CI
College or more	0.68 *	(0.46 – 1.01)	1.50 *	(0.98 – 2.29)	1.08	(0.76 – 1.54)
Employment (not employed reference category)						
Employed	0.91	(0.70 – 1.18)	0.81	(0.60 – 1.08)	0.85	(0.70 – 1.05)
Insurance status (uninsured reference category)						
Insured	0.14 ***	(0.11 – 0.18)	6.80 ***	(5.09 – 9.08)	3.19 ***	(2.49 – 4.08)
Childlessness (has dependent children reference category)						
Childless adult	1.17	(0.90 – 1.53)	0.84	(0.61 – 1.15)	1.15	(0.91 – 1.47)
Number of chronic diseases (no diseases reference category)						
1 chronic disease	1.71 ***	(1.27 – 2.29)	1.21	(0.86 – 1.70)	1.04	(0.82 – 1.32)
2 chronic diseases	2.90 ***	(1.91 – 4.40)	1.20	(0.81 – 1.80)	1.13	(0.85 – 1.50)
3 or more chronic diseases	3.34 ***	(2.45 – 4.56)	1.13	(0.75 – 1.70)	1.16	(0.87 – 1.55)
Physician supply	1.38 *	(0.95 – 2.01)	1.72 **	(1.03 – 2.88)	0.99	(0.73 – 1.32)
Primary care shortage area	1.05	(0.83 – 1.32)	0.97	(0.74 – 1.28)	1.04	(0.86 – 1.25)
Percent of urban population 2013	1.00	(0.99 – 1.00)	0.99 ***	(0.98 – 1.00)	1.00	(1.00 – 1.01)
Percent of minorities 2010	1.00	(0.99 – 1.01)	1.00	(1.00 – 1.01)	1.00	(0.99 – 1.00)
Median household income 2010	1.00	(1.00 – 1.00)	1.00 ***	(1.00 – 1.00)	1.00	(1.00 – 1.00)
Panel B: Full sample without controlling for county-level characteristics (N= 11,474)^a						
Expansion status (Expansion state reference category)						
Non-expansion state	1.15	(0.93 – 1.42)	0.67 *	(0.51 – 0.88)	1.00	(0.82 – 1.20)

* p<0.10,

**

p<0.05,

p<0.01

^aWe only report adjusted odds ratios from multiple logistic regressions which include all the independent variables listed in Table 4