



# Health insurance coverage and contraceptive use at the state level: findings from the 2017 Behavioral Risk Factor Surveillance System

Megan L. Kavanaugh\*, Ayana Douglas-Hall, Sean M. Finn

Guttmacher Institute, New York

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## ABSTRACT

**Objective:** To examine associations between health insurance coverage, income level and contraceptive use – overall and most/moderately effective method use – among women ages 18–44 at risk of pregnancy, within and across 41 United States jurisdictions in 2017.

**Study design:** Using data from the 2017 Behavioral Risk Factor Surveillance System, we calculated the proportions of women using any contraceptive method and using a most or moderately effective method for each state/territory and across all jurisdictions, categorized by health insurance coverage and income groups. For both contraceptive use outcomes, we ran simple and multivariable logistic regression models to test for significant differences in outcomes between insured and uninsured individuals.

**Results:** Across jurisdictions, compared to uninsured women, those who had health care coverage had higher levels of contraceptive use (65% versus 59%;  $p < .001$ ) and most/moderately effective contraceptive use (43% compared to 35%;  $p < .001$ ); low-income women with coverage also had higher levels of contraceptive use (64% versus 61%;  $p < .05$ ) and most or moderately effective contraceptive use (42% versus 36%;  $p < .01$ ) than their uninsured counterparts. Controlling for individual-level demographic characteristics, health insurance coverage was associated with increased odds of most or moderately effective contraceptive use across jurisdictions (adjusted odds ratio = 1.33,  $p < .01$ ). In 11 states, insured women had significantly higher odds of at least one contraceptive use metric than their uninsured counterparts.

**Conclusions:** Variation in contraceptive use across the states likely reflects broader demographic, social and structural differences across state and local populations. States' political will and support around contraceptive access likely play a role in individuals' ability to obtain and use contraception.

**Implications:** Our key finding that insurance coverage is significantly associated with use of most/moderately effective contraceptive methods across the states but not any contraceptive use underscores the importance of health insurance in aiding access to methods that are more costly and often require a visit to a health care provider.

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## 1. Introduction

Across the United States, the use of contraception is ubiquitous among sexually active individuals. As of 2013, 99% of women ages 15–44 who had ever had sex reported using some form of contraception [1], and as of the most recent national data, over 72 million women ages 15–49 (65% of all American women in this age group) were using some form of contraception in 2016 [2]. While these national-level data are helpful in understanding an overall picture of contraceptive use for the country as a whole, varying patterns of use among individuals at the state level could inform state-specific initiatives supporting contraceptive access for individuals seeking to prevent pregnancy. A recent state-level analysis

demonstrated that a majority of women of reproductive age in every state use some form of contraception, although method-specific rates of use show wide variability across the states, especially for female sterilization, intrauterine devices (IUDs), oral contraceptives and condoms [3].

Notably, health insurance coverage is a key factor related to contraceptive use that varies widely across states of residence. At the national level, women with health insurance are more likely to use contraception than those who are uninsured. Further, compared to privately insured women, uninsured women are more likely to use less effective, coital methods like condoms and withdrawal [4,5].

Many changes related to health insurance – especially those that may influence contraceptive use – have occurred since the last, most comprehensive subnational estimates of contraceptive use were available for 2004 [6]. The implementation of the Affordable Care Act (ACA) has expanded individuals' access to health insurance coverage broadly [7–10]; since 2013, when many of the law's major coverage

\* Corresponding author at: Guttmacher Institute, 125 Maiden Lane, 7th Floor, New York, NY 10038. Tel.: +1 646 438 8725; fax: +1 212 248 1951.

E-mail address: [mkavanaugh@guttmacher.org](mailto:mkavanaugh@guttmacher.org) (M.L. Kavanaugh).

provisions went into effect, the percentage of uninsured women of reproductive age has declined significantly in nearly every state [10]. The ACA also increased the number of states that expanded their state Medicaid coverage to cover millions more low-income individuals seeking health care. Individuals with health insurance coverage now have access to contraception without cost-sharing, achieved by those with private insurance through the ACA's preventive services requirement (which includes contraception in a list of key preventive services that needs to be covered without cost-sharing) [11] and by those with Medicaid coverage through long-standing federal law [12].

Using the most recently available state-level data on contraceptive use from 2017, we examine the association between health insurance coverage and contraceptive use, taking into account income level, among women ages 18–44 at risk for pregnancy in each of the jurisdictions in the United States with available data.

## 2. Materials and methods

### 2.1. Data

This analysis used data from the 2017 Behavioral Risk Factor Surveillance System (BRFSS). Annually, BRFSS provides cross-sectional data on various health-related topics for all 50 US states, the District of Columbia, Guam, Puerto Rico and the US Virgin Islands. Surveys are administered by trained interviewers over the phone throughout the year and are representative of the noninstitutionalized adult population within each state and territory. The median combined response rate for all 2017 BRFSS samples was 45.9%, with the rate ranging from 30.6% in Illinois to 64.1% in Wyoming [13].

Along with the core survey, comprised of a fixed set of standardized questions asked uniformly across jurisdictions, BRFSS also allows states and territories to administer optional modules approved by the Centers for Disease Control and Prevention (CDC). One such optional module, the Preconception Health/Family Planning module, includes questions about reproductive health indicators. This analysis drew on data from the Preconception Health/Family Planning module to examine contraceptive use and risk of pregnancy. As such, our analysis is limited to 42 of the 43 jurisdictions that administered the module.\* The 43rd jurisdiction, US Virgin Islands, included the Preconception Health/Family Planning module in the 2017 BRFSS, but we did not include these data in the analysis because the sample size was too small to allow for reliable estimates. Module data for all jurisdictions are publicly available, except for Illinois and Kentucky. In these two states, data collection timelines for the Preconception Health/Family Planning module differed from the other jurisdictions; we therefore obtained data for these two states through a special request to the state survey administrators. More detailed information on BRFSS methodology, data collection, sampling design and procedures is available elsewhere [14–16].

The full BRFSS sample across the focus states included 63,803 women† aged 18–49. We limited our analytic sample to women aged 18–44 who

were at risk for pregnancy. Women were defined as at risk for pregnancy if they reported being sexually active with one or more male partners the last time they had sex, had not had a hysterectomy, and were not pregnant or postpartum. Individuals who indicated “same sex partner” as a reason for not doing anything to prevent pregnancy at last sex were considered at risk of pregnancy given the possibility of them having had a male partner in close proximity to their last sex and evidence indicating that people who identify as a sexual minority are at higher risk for unintended pregnancy [17–22].

### 2.2. Analysis

Our two key outcomes of interest were contraceptive use at last sex and use of most or moderately effective contraceptive methods at last sex. On the BRFSS questionnaire, respondents who report having been sexually active in the past year and indicate that they did something to prevent pregnancy the last time they had sex are asked to report the contraceptive method they used. Most and moderately effective contraceptive methods in this analysis were loosely categorized based on the CDC tiers of effectiveness model [23] and generally require women's contact with the health care system to obtain. This category includes the following methods: female sterilization,‡ IUDs, implants, pills, the patch, the ring and injectables. Given the focus of our analysis on understanding associations between health insurance coverage and contraceptive use, our key independent variables included health insurance coverage and income levels (because people with lower income have less ability to pay for care out of pocket in the absence of health insurance coverage).§ Household income was collected as a categorical variable in the BRFSS. The 12% of female respondents aged 18–44 at risk of pregnancy who did not report household income were excluded from the analysis.\*\* The final analytic sample included 27,818 women aged 18–44 who were at risk for pregnancy with reported incomes. We calculated income levels by dividing the median of the reported household income band by the sum of adults and children reported to be living in the household at the time of interview [24].†† The overall distribution of income levels was stratified into three groups: low, medium and high income, an approach adopted by other researchers using BRFSS income data [25]. Individual health insurance coverage was assessed by asking respondents if they had any kind of health insurance, including prepaid plans such as HMOs and government plans such as Medicaid, or coverage through the Indian Health Service at the time of interview.

All analyses were conducted using Stata version 15.1. Because of BRFSS's multistage, probability-based complex sample design, we applied sampling weights that yield estimates representative of resident women aged 18–49 within each state or territory. In addition, we used design variables for the sampling stratum and cluster to obtain correct standard errors for all estimates. For each jurisdiction, we calculated the overall proportion of women using any contraceptive method by health insurance coverage and income groups. We did the same for

\* Jurisdictions included in our analysis include Alabama, Alaska, Arizona, California, Connecticut, Delaware, District of Columbia, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Puerto Rico, South Carolina, South Dakota, Texas, Utah, Virginia, West Virginia, Wisconsin and Wyoming. The US Virgin Islands were excluded because of a low number of observations.

† All respondents were asked at the time of the interview to identify their sex as male or female in the Demographic section of the core questionnaire, except if they already self-identified their sex in the landline household enumeration. Only individuals self-identifying as female are included in our sample. Of note, sex assigned at birth was asked in 28 jurisdictions that implemented the BRFSS Sexual Orientation and Gender Identity (SOGI) module. In the 22 jurisdictions that implemented both the Preconception Health/Family Planning module and the SOGI module, approximately 1% of individuals who identified as female in the core questionnaire identified as either male to female transgender, gender nonconforming, stated they were unsure or refused to answer whether they considered themselves to be transgender. These individuals are included in our study sample.

‡ Although the CDC categorization of most and moderately effective methods of contraception includes male sterilization (vasectomy), given our analytic focus on methods that may be influenced by a user's own health insurance coverage, we excluded partner use of vasectomy in our calculations of overall contraceptive use and use of most/moderate contraception.

§ We also ran these analyses including a state-level variable representing Medicaid expansion program status (present/absent) in our models, which we found to have no significant impact on either contraceptive outcome. Given a state's Medicaid expansion program status really being a proxy for expanded insurance coverage among individuals within a state, we chose to present the simpler and more direct association between insurance coverage at the state level and our contraceptive use outcomes.

\*\* Analyses were conducted including and excluding respondents with missing income data; differences in contraceptive prevalence estimates and (adjusted) odds ratios were negligible.

†† The number of children in the household was assumed to be zero and the number of adults in the household was assumed to be one for cases where this information was missing.

most and moderately effective contraceptive method use. For both contraceptive use outcomes, simple logistic regression models testing significance of differences in contraceptive use between insured and uninsured individuals, overall and low income, were run for jurisdictions with income data available for at least 50 individuals per jurisdiction. For jurisdictions with less than 50 individuals who fell into either contraceptive use outcome according to their income and insurance characteristics, we suppressed model results in the tables given the instability of calculations using such small numbers. For the two simple logistic regression models testing significance of difference in each of our two contraceptive use outcomes between insured and uninsured individuals, overall and low income, across jurisdictions, women in all jurisdictions were included in these models.

Next, we constructed two multivariable logistic regression models for each jurisdiction, examining the association between the key independent variable of health insurance coverage at the time of interview and our outcomes of interest: (1) any contraceptive use and (2) most or moderately effective contraceptive method use. Both models control for income, age, race/ethnicity, education level, marital status and, given their association, the interaction between income and insurance coverage.

### 3. Results

Across the 42 US jurisdictions included in our analysis, most women aged 18–44 at risk of pregnancy used a contraceptive method at last intercourse (64%), ranging from 55% in Kentucky to 72% in Maine (Table 1). Across jurisdictions, women at risk of pregnancy who had health care coverage had higher levels of contraceptive use than their uninsured counterparts (65% versus 59%;  $p < .001$ ). This pattern held in 18 of the 25 states where reliable estimates were obtained for both insured and uninsured women. The largest gaps in contraceptive use between insured and uninsured women (14–24 percentage points) occurred in Florida, Idaho, Missouri and Ohio. Among low-income women in particular, the population that stands to benefit most from health insurance coverage, those with coverage also had higher rates of overall contraceptive use than did those without health insurance coverage across the jurisdictions (64% versus 61%;  $p < .05$ ).

Overall across the 42 jurisdictions with available data, two-fifths (42%) of all women ages 18–44 at risk of pregnancy used one of the most or moderately effective contraceptive methods that require contact with the health system at last intercourse (Table 2). Women at

**Table 1**  
Percentage of women at risk of pregnancy, aged 18–44, using contraception, by health insurance coverage and household income, BRFSS 2017

	Among all women at risk of pregnancy (%)	Insured (%)				Uninsured (%)			
		All	Low income	Medium income	High income	All	Low income	Medium income	High income
Kentucky	55	55	52	57	63	-	-	-	-
Delaware	56	56	54	63	48	58	72	-	-
Arizona	58	60	61	58	64	51	50	-	-
Hawaii	59	60	59	63	54	-	-	-	-
Ohio	59	61	61	59	62	37**	-	-	-
Texas	59	60	66	48	63	57	56	-	-
Illinois	59	61	66	56	-	-	-	-	-
Nevada	60	60	55	67	-	-	-	-	-
Idaho	61	65	68	62	-	49	47*	-	-
Nebraska	61	62	62	63	-	56	54	-	-
Mississippi	62	60	55	65	-	66	-	-	-
Missouri	62	65	65	60	77	50*	53	-	-
Wisconsin	62	61	66	56	62	-	-	-	-
Georgia	62	64	75	58	61	54	57*	-	-
Louisiana	62	66	63	67	-	-	-	-	-
Florida	63	67	67	68	65	50**	55	47	-
Connecticut	63	64	59	64	77	-	-	-	-
West Virginia	63	64	66	61	-	-	-	-	-
Minnesota	63	64	57	64	70	52*	49	-	-
Kansas	63	64	67	61	61	61	62	-	-
Oklahoma	63	63	64	58	-	-	-	-	-
Indiana	64	65	65	64	70	55	63	-	-
Utah	64	64	63	65	67	62	62	-	-
District of Columbia	64	65	60	69	68	-	-	-	-
Wyoming	64	65	69	63	63	60	-	-	-
Alabama	64	66	72	58	-	58	58	-	-
Iowa	65	64	67	61	65	65	-	-	-
Puerto Rico	65	65	65	59	-	-	-	-	-
Maryland	65	67	66	62	80	-	-	-	-
Oregon	66	66	68	62	73	-	-	-	-
North Carolina	66	66	64	68	63	65	67	-	-
New Jersey	66	67	69	64	68	63	64	-	-
South Carolina	66	67	67	68	67	61	70	-	-
Virginia	67	67	71	63	68	63	71	-	-
New York	67	66	64	66	73	73	71	-	-
Massachusetts	67	67	66	67	69	-	-	-	-
South Dakota	67	66	65	63	78	79	-	-	-
California	68	68	65	70	76	71	71	-	-
New Mexico	69	69	70	64	-	71	71	-	-
Alaska	70	70	60	77	-	-	-	-	-
Pennsylvania	71	71	66	74	75	-	-	-	-
Maine	72	71	73	68	-	-	-	-	-
<b>Total</b>	<b>64</b>	<b>65</b>	<b>65</b>	<b>64</b>	<b>68</b>	<b>59***</b>	<b>61*</b>	<b>55</b>	<b>48</b>

Notes: Simple logistic regression models testing significance of differences in contraceptive use between insured and uninsured individuals, overall and low income, were run for jurisdictions with income data available for at least 50 individuals per jurisdiction. For jurisdictions with less than 50 individuals who were contraceptive users within certain income and insurance categories, we suppressed model results given the instability of calculations using such small numbers. For the two simple logistic regression models testing significance of difference in contraceptive use between insured and uninsured individuals, overall and low income, across jurisdictions, women in all jurisdictions were included in these models. \*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ .

**Table 2**  
Percentage of women at risk of pregnancy, aged 18–44, using most or moderately effective contraception, by health insurance coverage and household income, BRFSS 2017

	Among all women at risk of pregnancy (%)	Insured (%)				Uninsured (%)			
		All	Low income	Medium income	High income	All	Low income	Medium income	High income
District of Columbia	28	29	22	33	32	-	-	-	-
Illinois	34	36	37	38	-	-	-	-	
Texas	34	34	37	27	34	35	35	-	-
New York	37	38	37	38	42	33	32	-	-
Arizona	38	40	40	38	40	30	29*	-	-
Delaware	38	37	34	43	32	46	54	-	-
Georgia	38	40	45	39	35	32	37	-	-
Louisiana	38	40	39	40	-	-	-	-	-
New Jersey	39	40	40	40	40	33	37	-	-
Kentucky	39	40	37	41	49	-	-	-	-
Florida	40	45	44	46	44	23***	24*	22	-
Ohio	40	41	44	40	40	27	-	-	-
Connecticut	40	41	36	41	55	-	-	-	-
Hawaii	41	42	41	45	32	-	-	-	-
Maryland	41	43	42	39	54	-	-	-	-
South Carolina	42	43	39	46	54	32	37	-	-
Nebraska	42	44	44	44	-	31	32	-	-
Missouri	42	43	39	44	53	37	40	-	-
Mississippi	42	42	40	44	-	41	-	-	-
California	42	42	39	46	49	45	44	-	-
Virginia	43	44	48	42	43	35	41	-	-
Idaho	43	46	48	42	-	33	32	-	-
Kansas	44	44	50	39	41	38	41*	-	-
Indiana	44	46	44	46	55	31**	36	-	-
Minnesota	44	45	39	44	52	36	31	-	-
Wisconsin	45	44	46	41	50	-	-	-	-
Alaska	45	46	48	44	-	-	-	-	-
Nevada	45	46	45	46	-	-	-	-	-
Utah	45	46	44	48	48	40	38	-	-
Alabama	46	46	48	43	-	43	45	-	-
South Dakota	46	45	46	39	58	53	-	-	-
Oregon	47	47	51	40	52	-	-	-	-
North Carolina	48	48	53	47	34	45	46	-	-
Pennsylvania	49	49	44	54	53	-	-	-	-
Oklahoma	49	52	55	46	-	-	-	-	-
Iowa	49	49	49	49	48	47	-	-	-
West Virginia	49	49	50	51	-	-	-	-	-
Puerto Rico	49	49	51	26	-	-	-	-	-
Massachusetts	50	51	55	52	46	-	-	-	-
Wyoming	50	51	52	49	52	47	-	-	-
New Mexico	51	51	54	45	-	52	53	-	-
Maine	57	57	59	55	-	-	-	-	-
<b>Total</b>	<b>42</b>	<b>43</b>	<b>42</b>	<b>43</b>	<b>44</b>	<b>35***</b>	<b>36**</b>	<b>31</b>	<b>28</b>

Notes: Most or moderately effective contraception includes female sterilization, LARC or hormonal contraception. Simple logistic regression models testing significance of differences in most or moderately effective contraceptive use between insured and uninsured individuals, overall and low income, were run for jurisdictions with income data available for at least 50 individuals per jurisdiction. For jurisdictions with less than 50 individuals who were most or moderately effective contraceptive method users within certain income and insurance categories, we suppressed model results given the instability of calculations using such small numbers. For the two simple logistic regression models testing significance of difference in most or moderately effective contraceptive use between insured and uninsured individuals, overall and low income, across jurisdictions, women in all jurisdictions were included in these models. \*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$ .

risk of pregnancy who had health insurance coverage used most and moderately effective contraceptive methods at higher levels than did their uninsured counterparts (43% compared to 35%;  $p < .001$ ). This pattern held in 20 of the 25 states where reliable estimates were obtained for most and moderate contraceptive use for both insured and uninsured women. The largest gaps in most and moderate contraceptive use between insured and uninsured women (13–22 percentage points) occurred in Florida, Indiana, Nebraska and Ohio. Among low-income women in particular, those with coverage also had higher rates of most and moderately effective contraceptive use than did those without health insurance coverage across the jurisdictions (42% versus 36%;  $p < .01$ ).

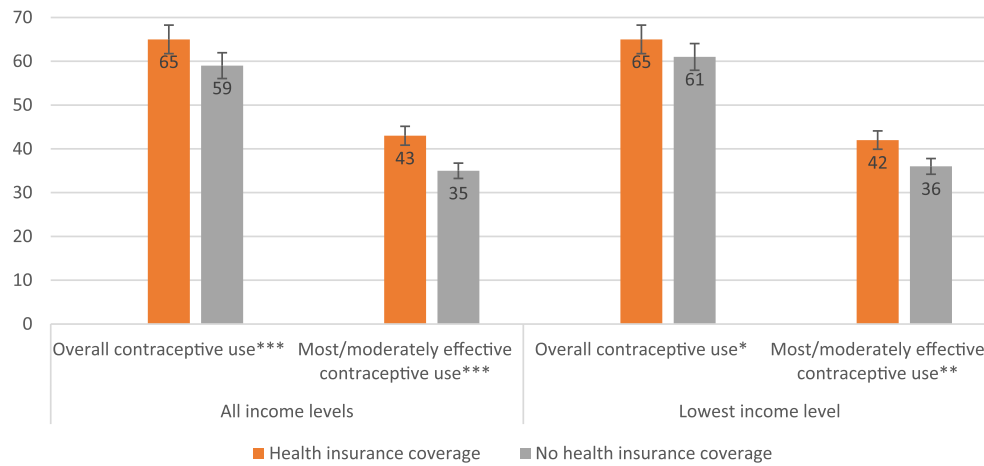
In bivariate analyses, by both contraceptive use metrics across US jurisdictions, insurance is significantly associated with higher levels of contraceptive use, especially among low-income individuals at risk of pregnancy (Fig. 1).

Controlling for several individual-level demographic characteristics potentially associated with contraceptive use, we found no significant association between health insurance coverage and use of any method

of contraception among women ages 18–44 at risk of pregnancy across US jurisdictions (Table 3). In contrast, we did find a significant association between health insurance coverage and use of most and moderately effective contraceptive methods among women ages 18–44 at risk of pregnancy across US jurisdictions [adjusted odds ratio (AOR) = 1.33]. In 11 states (Alabama, Arizona, Florida, Georgia, Hawaii, Idaho, Kansas, Louisiana, Nebraska, Ohio and Oklahoma), insured women ages 18–44 at risk of pregnancy had significantly higher odds of either any contraceptive method use or specific use of most or moderately effective forms of contraception than their uninsured counterparts.

#### 4. Discussion

Several national studies have demonstrated that health insurance is key to increasing access to health care and decreasing delays in desired services [26–28]. Additional evidence indicates that health insurance coverage plays a key role in influencing variation in unintended pregnancy rates across states; in 2006 analyses of state-level data, increased



**Fig. 1.** Differences in contraceptive use, overall and most/moderately effective method use, among women ages 18–44 at risk of pregnancy across 42 US jurisdictions, by health insurance coverage and income level, BRFSS 2017.

rates of unintended pregnancy were associated with higher proportions of uninsured women, while decreased rates of unintended pregnancy were associated with higher proportions of women receiving Medicaid coverage in states [29]. Our study contributes to the literature by using state-specific data to demonstrate that health insurance coverage may be a key factor influencing contraceptive use, especially among low-income women at risk of pregnancy using methods that require connecting to the health care system, like long-acting reversible contraception (LARC) methods and shorter-acting hormonal methods such as the pill, patch, injectables and ring.

Our key finding that insurance coverage is significantly associated with use of most and moderately effective contraceptive methods across the states but not any contraceptive use underscores the importance of health insurance coverage in aiding access to methods that are more costly and often require a visit to a health care provider. Insurance coverage may facilitate users to shift between methods, especially from less expensive (and less effective) ones like condoms and withdrawal, more than driving a shift from nonusers to users of contraception.

Medicaid expansion programs represent one example of state initiatives that may significantly improve access to and use of contraceptive use generally, and the more effective methods available only through health care providers specifically, by increasing eligibility levels for health insurance and, thus, numbers of individuals with coverage. The ACA's Medicaid expansions – which offer full-benefit Medicaid coverage to people with incomes up to 138% of the federal poverty level in states that have taken up this option – have led to increases in both health insurance coverage and access to health care services for state residents, particularly among low-income and other vulnerable populations. [10,30]

In addition, many states, starting in the 1990s, have expanded Medicaid in a more targeted way by offering coverage only for family planning and related services to individuals who are ineligible for full-benefit Medicaid coverage, usually for individuals below a specific income level (an “income-based Medicaid family planning expansion”). Contraceptive use among women broadly [31] and in abortion care settings [32] is higher among those who live in states with income-based Medicaid family planning expansion programs as compared to use among those who do not. Further, a number of state program evaluations have also found increases in overall contraceptive use and the use of most/moderately effective contraception as well as improved continuity of contraceptive use between the time prior to and following states' establishment of a family planning expansion program [33].

Progress demonstrated by these and other initiatives to increase and improve health insurance coverage for reproductive-aged individuals may stall or slide backwards given recent federal efforts to undermine the ACA and Medicaid [34]. The number of US residents who were

uninsured increased in 2018, for the first time since the ACA was enacted [35]. An ongoing lawsuit, *Texas v. U.S.*, could overturn the ACA entirely, resulting in millions more people losing coverage and eliminating important protections such as the federal contraceptive coverage guarantee [36]. In addition, the current administration has worked to undermine the contraceptive coverage guarantee directly by establishing broad exemptions for employers with religious or moral objections to contraception; those exemptions have been blocked by federal courts thus far, but if allowed to go into effect, some privately insured people could lose coverage for some or all contraceptive methods [37].

One potential strategy to mitigate inequitable access to contraception among uninsured and underinsured individuals is to provide broad access to contraceptive services through Title X, the federally funded family planning program expressly created to support the provision of contraceptive and broader sexual and reproductive health-related services to low-income and young people [38]. However, our findings indicate that the presence of this program in every state is not enough to realize the goal of securing full contraceptive access regardless of insurance coverage or ability to pay. In fact, Title X grant money is designed to supplement, not replace, insurance, and Title X clinics rely on Medicaid and private insurance for 50% of their program revenue [39]. Given recent changes to regulations guiding the Title X program that undermine the original intent behind its creation [40], it is likely that other strategies – specifically at the state level – may continue to be needed to reduce gaps in contraceptive use based on health insurance coverage.

Our findings are subject to several limitations, many of which are inherent to the study design of the BRFSS. Response rates to surveys administered over the phone are typically lower than in-person ones [41,42], and these low response rates may be associated with underrepresentation of several demographic groups, especially some of those that we focus on in our models (racial/ethnic minorities and young people) [43]. Household income level, in particular, had high item nonresponse; this variable was missing for 12% of the analytic sample. Some individuals enrolled in a Medicaid family planning expansion program but who are otherwise uninsured may have been represented within the uninsured category of health insurance coverage in BRFSS. As a result, our finding of an association between health insurance coverage and contraceptive use may be an underestimate, especially in states with large proportions of the population covered through these family planning expansion programs, like California. In addition to the self-report nature of contraceptive use in BRFSS possibly being subject to response bias, assessment of this measure in the BRFSS allows for only one method used at a single point in time (last sex) to be recorded by the interviewer, despite growing evidence indicating that many individuals employ more complex contraceptive strategies than using just one



**Table 3**

Adjusted odds ratios and confidence intervals representing associations between health insurance coverage and contraceptive method use, any and most/moderately effective method use, among women at risk of pregnancy, aged 18–44 years old, by jurisdiction,<sup>a</sup> BRFSS 2017

	Use of any contraceptive method		Use of most and moderately effective contraceptive method <sup>b</sup>	
	AOR	(95% CI)	AOR	(95% CI)
Alabama	<b>2.27</b>	(1.11, 4.63)	1.34	(0.66, 2.73)
Alaska	0.95	(0.22, 4.07)	1.25	(0.26, 6.00)
Arizona	1.63	(0.97, 2.75)	<b>2.00</b>	(1.15, 3.48)
California	0.57	(0.30, 1.08)	0.70	(0.40, 1.23)
Connecticut	1.28	(0.48, 3.42)	1.90	(0.69, 5.26)
Delaware	0.52	(0.18, 1.53)	0.46	(0.16, 1.32)
District of Columbia	2.44	(0.39, 15.29)	2.25	(0.18, 28.39)
Florida	<b>2.14</b>	(1.08, 4.24)	<b>2.75</b>	(1.31, 5.77)
Georgia	<b>2.81</b>	(1.22, 6.45)	<b>2.33</b>	(1.03, 5.29)
Hawaii	<b>3.73</b>	(1.27, 10.91)	<b>5.89</b>	(1.48, 23.35)
Idaho	<b>2.88</b>	(1.22, 6.80)	1.90	(0.80, 4.46)
Illinois	2.48	(0.78, 7.88)	4.33	(0.92, 20.38)
Indiana	0.97	(0.52, 1.80)	1.24	(0.72, 2.15)
Iowa	1.75	(0.69, 4.45)	1.87	(0.77, 4.55)
Kansas	1.30	(0.86, 1.96)	<b>1.49</b>	(1.01, 2.19)
Kentucky	0.76	(0.17, 3.39)	2.11	(0.56, 7.94)
Louisiana	<b>2.88</b>	(1.21, 6.88)	2.02	(0.77, 5.26)
Maine	1.23	(0.32, 4.67)	2.16	(0.57, 8.12)
Maryland	0.89	(0.26, 3.07)	1.43	(0.44, 4.64)
Massachusetts	0.60	(0.09, 3.82)	0.86	(0.15, 4.86)
Minnesota	1.17	(0.53, 2.60)	1.01	(0.49, 2.11)
Mississippi	0.55	(0.20, 1.46)	0.89	(0.33, 2.41)
Missouri	1.68	(0.79, 3.57)	1.08	(0.52, 2.24)
Nebraska	2.03	(0.91, 4.53)	<b>2.26</b>	(1.01, 5.04)
Nevada	1.12	(0.34, 3.64)	2.65	(0.86, 8.20)
New Jersey	0.97	(0.40, 2.37)	1.00	(0.43, 2.33)
New Mexico	1.18	(0.49, 2.81)	1.18	(0.54, 2.58)
New York	0.77	(0.36, 1.65)	1.60	(0.80, 3.20)
North Carolina	0.99	(0.38, 2.61)	1.17	(0.48, 2.81)
Ohio	<b>4.88</b>	(1.53, 15.56)	2.52	(0.81, 7.81)
Oklahoma	1.12	(0.41, 3.01)	<b>2.66</b>	(1.03, 6.86)
Oregon	2.28	(0.84, 6.19)	1.03	(0.42, 2.55)
Pennsylvania	0.89	(0.27, 2.92)	1.95	(0.48, 8.02)
Puerto Rico	0.83	(0.41, 1.66)	1.05	(0.56, 1.99)
South Carolina	0.40	(0.10, 1.58)	0.93	(0.29, 2.98)
South Dakota	1.48	(0.76, 2.91)	1.09	(0.57, 2.07)
Texas	0.64	(0.37, 1.08)	0.86	(0.50, 1.47)
Utah	1.21	(0.52, 2.80)	1.45	(0.68, 3.10)
Virginia	1.10	(0.40, 3.04)	0.67	(0.22, 2.06)
West Virginia	0.75	(0.20, 2.81)	0.78	(0.29, 2.12)
Wisconsin	0.78	(0.25, 2.42)	1.51	(0.53, 4.31)
Wyoming	1.25	(0.22, 6.95)	2.31	(0.24, 22.15)
Total	1.19	(0.99, 1.44)	<b>1.33</b>	(1.11, 1.59)

<sup>a</sup> Each model tests the relationship between the dependent variables of contraceptive use, any and most/moderately effective method use, and the key independent variable of health insurance coverage within jurisdictions and across jurisdictions. Models control for income, insurance\*income interaction, age, race/ethnicity, education level and relationship status. Adjusted odds ratios in **bold** represent tests producing significant differences in the outcome.

<sup>b</sup> Most and moderately effective methods include female sterilization, IUDs, implants, pills, patch, ring and injectables.

method at each coital act [44,45]. The wording of the BRFSS contraceptive use item also points respondents who report being sexually active in the past year only to the last time that they had sex; no time frame was provided to limit respondents as to how far back in time the last act of intercourse may have occurred (e.g., within the last 3 months or last year).

Variation in contraceptive use across the states, especially in use by health insurance status and income level, likely reflects broader demographic, social and structural differences across state and local populations. For example, the extent to which individuals may plan or want a pregnancy, and subsequent contraceptive use to achieve these pregnancy goals, varies widely across the states [46]. In addition, particularly in today's climate in which federal support for family planning services

is in question, states' political will and support around contraceptive access likely play a key role in individuals' ability to obtain and use contraception. Further research is needed to broaden understanding as to how factors at each of these levels may enable or hinder individuals in their desires and ability to access and use their preferred contraceptive method.

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## Conflicts of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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