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The Association between the Affordable Care Act's Medicaid Expansion and New HIV Diagnoses by State, 2012 to 2014

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An abstract of
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Abstract

The Association between the Affordable Care Act's Medicaid Expansion and New HIV Diagnoses by State, 2012 to 2014

By Shelby Mullin

Background

By January 2014, 27 states had expanded Medicaid under the Affordable Care Act to at least 138% of the Federal Poverty Level. This ecological analysis aims to see if there are differing trends in new HIV diagnosis rates in Medicaid expansion and non-expansion states between 2012, before the implementation of the Affordable Care Act, and 2014, after the implementation.

Methods

We assembled a state-level dataset using publicly-available data for HIV and other covariates for the years 2012 and 2014. Linear regression models were used to compare new HIV diagnoses over time in expansion compared to non-expansion states.

Results

In 2012, the mean new HIV diagnosis rate among the expansion states was 15.12 and decreased to 13.67 in 2014 ($p = 0.43$). Among the non-expansion states, the mean new HIV diagnosis rate was 12.41 in 2012 and slightly increased to 12.82 in 2014 ($p = 0.47$). The final model ($r^2 = 0.94$) included the 2012 new HIV diagnosis rate measured as a continuous outcome, expansion status measured as a binary outcome, and the interaction variable of the two. The interaction term between the 2012 diagnosis rate and expansion status was statistically significant at the 5% significance level ($p = 0.03$).

Conclusion

Our final model showed that among states with low rates of new HIV diagnoses, those that did not expand Medicaid on average experienced a decreased rate of new diagnoses whereas states that did expand Medicaid on average experienced an increased rate of new diagnoses. However, among states with high rates of new HIV diagnoses, those states that chose not to expand Medicaid on average experienced an increased rate of new diagnoses whereas states that did expand Medicaid on average experienced a decreased rate of new diagnoses. This initial analysis provided evidence that the effect of Medicaid expansion may vary according to the severity of the initial HIV epidemic in the state.

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Background/Literature Review

The Patient Protection and Affordable Care Act (ACA) was passed by Congress and signed into law by President Obama on March 23, 2010 (1). The goal of the Affordable Care Act was to increase the number of Americans covered by health insurance and to decrease the overall cost of health care. Ten titles were created in an effort to achieve the goals of the ACA. Some of the major provisions of the ACA included the creation of quality, affordable health care, expanding Medicaid in the states, closing the coverage gap in prescription drug costs for Medicare beneficiaries, and making prevention and screening a priority by removing copayments for certain preventive services (1). In 2010, the uninsured rate was 16%, with 49 million individuals without insurance in the United States (2).

Mandatory Medicaid expansion of the States became a contentious topic after the passing of the Affordable Care Act. The ACA stated that states could provide coverage for all adults between the ages of 18 and 65 with household incomes up to 133% of the federal poverty level (3). States would receive 100% federal funding for the first three years to support expanding coverage starting in 2014, phasing to 90% federal funding by 2020 (4). In June 2012, the Supreme Court upheld the Affordable Care Act, but made Medicaid expansion optional for states (5). States that chose to adopt Medicaid expansion received the federal funding set in place by the ACA; however, states that chose not to adopt Medicaid expansion received no such funding. In states that did not expand Medicaid there became a gap in coverage for Americans whose income was too high to meet the income requirements for Medicaid, but too low to save in a Marketplace plan (3).

Under the ACA, all new plans were required to cover certain preventive services without charging a deductible, co-payment or co-insurance. The coverage of these select preventive services would allow for detection of preventable or treatable illnesses early to reduce the overall health cost and health burden if they were left untreated. For adults, there were 15 services covered under the ACA some of which included HIV testing and syphilis screening for all adults at high risk and STI prevention counseling for adults at higher risk (6). There were 22 preventive services covered for women, including pregnant women, and 26 services covered for children (6). STI and HIV prevention, screening and counseling were covered for all groups under the ACA. These preventive services, as covered under the ACA, make them free of charge since a deductible, co-payment or co-insurance cannot be charged when performed by an individual's primary care provider.

In October 2013, the health insurance marketplace opened enrollment. During the first open enrollment period, between October 2013 and April 2014, approximately 10 million people gained health insurance coverage (7). Medicaid/CHIP enrollment has increased 30 percent (17 million people) since the first open enrollment period, with enrollment in the Medicaid expansion states being greater than those in the non-expansion states, 37.1% vs. 16.5% respectively (8). Between September 2013 and February 2014 the number of adults without insurance fell by 16.9 million people (7). States that chose to adopt Medicaid expansion saw a greater decline in their uninsured rate compared to those states that chose not to adopt the expansion, especially when they previously had a high population of uninsured adults (2). Among the states that expanded Medicaid, the uninsured rate for non-elderly adults declined

9.2 percentage points and 7.9 percentage points among the states that did not expand Medicaid (8).

Research has shown that the introduction of the ACA has led to improvements in trends for access to care, affordability of care, and overall health (8-10). Sommers et al. found that about a year before the ACA there were continued negative trends in the number of people uninsured, access to a physician, access to medication, poor health, and lack of affordability of care (9). However, after implementation of the ACA there was a positive trend in the same areas towards improved health and access (9). Shartzer et al. found that by March 2015 there were significant improvements in access to care and reductions in affordability challenges that existed before ACA implementation (10). Low-income adults targeted by Medicaid expansion saw a 5.2 percentage point increase in their access to a usual source of care (e.g., access to a particular medical professional, office, clinic, or community health center) (8, 10).

The Affordable Care Act and Medicaid expansion have increased health access for many people who were unable to have coverage before. Miller et al. found that two years after expansion among low-income adults there were large reductions in reports that individuals could not afford care or took less medication to save money in expansion states compared to non-expansion states (11). Using data from the National Health Interview Survey, they also found increases in some types of preventive care (11). Sommers et al. found that by the end of 2015 there were significant increases in coverage, which in turn increased preventive care, outpatient office visits, annual checkups and chronic disease care in the expansion states (12).

In 2014, an estimated 44,073 persons were diagnosed with HIV in the United States (13). From 2005 to 2014 the rate of new HIV diagnoses decreased by 19% (13). This decrease in new diagnoses may be due to an increase in more targeted prevention efforts. However, there has been an increase in new infections among a few key groups. Gay and bisexual men accounted for an estimated 83% of HIV diagnoses among men, making them the population most affected by HIV (13). African Americans continue to be highly affected by HIV despite being only 12% of the US population. African Americans accounted for an estimated 44% of new HIV diagnoses in 2014 (13). Among regions of the United States, the South had the highest rate of new HIV diagnoses followed by the Northeast, West, and Midwest (13).

Many studies to date on the effects of health from the ACA have shown significant changes in insurance status and healthcare utilization (2, 7, 9-12). These factors are very important among populations at risk for HIV and those currently living with HIV. The Affordable Care Act removed restrictions on pre-existing conditions, including HIV, that could exclude people from being insured or dropped them from their current insurance (14). Additionally, the ACA removed lifetime limits on insurance coverage (14). In a study by Satre et al. the authors looked at pre-/post-ACA enrollment into the Kaiser Permanente Northern California health system. They found that in a cohort of HIV positive patients, those enrolled after the ACA were more likely to utilize primary care services than those who were enrolled in the health system before the ACA (15). They also found that a large portion of those enrolled in the health system after the ACA were enrolled by Medicaid (15). Using data from the National HIV Behavioral Surveillance (NHBS), Cooley et. al. found that among men who

have sex with men (MSM), a population heavily affected by HIV, there was a 16% increase in health insurance coverage from 2008 to 2014 (16).

In 2010, the White House Office of National AIDS Policy (ONAP) developed the National HIV/AIDS Strategy. The HIV/AIDS Strategy had three overarching goals: to reduce the number of new HIV infections, to increase access to care and optimize health outcomes for people living with HIV, and to reduce the health disparities related to HIV (17). An updated strategy was released in 2015 to continue the efforts of their original goals into 2020. In this update they highlighted the strides made from the implementation of the ACA and its ability to allow HIV testing to millions of Americans free of cost (18).

In 2012, an estimated 1,218,400 individuals (diagnosed and undiagnosed) were living with an HIV infection (13). It is estimated that among them, 13% are undiagnosed (13). Testing individuals for HIV is important because it serves as an important gateway for HIV prevention services, such as HIV pre-exposure prophylaxis (PrEP). PrEP has been proven to be effective in reducing the risk of acquiring HIV. Initial studies on PrEP showed a 44% reduction in the risk of acquiring HIV, but among people who took the pill daily there was over a 90% decrease in the risk of acquiring HIV (19, 20). HIV testing is also an essential step to getting individuals who may be unaware of an HIV infection into care. By treating HIV positive individuals with antiretroviral therapies, the amount of virus circulating is drastically diminished, reducing the risk of viral transmission to others. Treatment as prevention has been proven a useful tool to lower new HIV infections with the CDC initiating a campaign, Prevention Is Care (21). Through the ACA and Medicaid expansion,

there are now more options for insurance coverage for persons currently living with HIV, which means they can begin to seek comprehensive care for their HIV including antiretroviral medications. Additionally, preventive services including HIV and STI testing and prevention are covered as preventable services for all people. The passing of the ACA and the coverage of preventive services should increase the number of people who are tested for HIV, diagnosed and enter treatment if positive and potentially enhance access to PrEP among negative individuals.

This ecological analysis aims to see if there are differing trends in new HIV diagnosis rates between Medicaid expansion and non-expansion states between 2012, before the implementation of the Affordable Care Act, and 2014, after the implementation. States that adopted Medicaid expansion had greater increases in the number of insured individuals and thus more individuals were able to utilize health services including HIV testing and treatment. We hypothesized a difference and potential increase in the new HIV diagnosis rate in 2014 after the implementation of the Affordable Care Act compared to the pre-ACA rates in 2012, and that this differences would greater between states with Medicaid expansion and without.

Methods

For this ecological analysis, we assembled a state-level dataset using publicly-available data for HIV diagnoses and other covariates for the years 2012 and 2014.

Data Sources

Supplemental Table 1 provides an outline of all data sources utilized for analysis. All data that were abstracted represent the 50 U.S. states and the District of Columbia (D.C.). Puerto Rico was not included in any analyses as data were not complete for the territory across all data sources. All data were abstracted for both years 2012 and 2014 where available.

New HIV diagnoses were abstracted for years 2012 and 2014 from AIDSVu, a publicly-available online resource (22, 23). HIV surveillance data for AIDSVu are provided by the CDC's National HIV Surveillance System at the Division of HIV/AIDS Prevention's HIV Incidence and Case Surveillance Branch in Atlanta, GA (24). The data are collected by state and local health departments and de-duplicated and processed by the CDC. All 50 states, the District of Columbia, and U.S. territories collect comparable case reports of persons living with diagnosed HIV infection based on an established case definition. The case definition for persons newly diagnosed with HIV are "people newly diagnosed with HIV infection or persons living with diagnosed HIV infection classified as stage 3 (AIDS) during a given 1-year time period" (24). All estimates are for persons aged 13 and older. The data from AIDSVu may differ from the data collected directly from the state HIV surveillance programs because the states use methods that differ from those used by CDC and AIDSVu (25).

Medicaid expansion status was assessed in 2014 for states, according to whether that states had expanded Medicaid, effective as of January 2014. Under the Affordable Care Act, Medicaid expansion for most states was determined as Americans who earn less than 138% of the federal poverty level would be eligible to enroll in Medicaid (26). States who did not expand Medicaid under the Affordable Care Act did not increase to the 138% FPL cutoff. The expansion status of states was obtained through review of articles and tables from the Henry J. Kaiser Family Foundation (27).

Total population was abstracted for years 2012 and 2014 from the U.S. Census and included ages 13 and up, to align with the population represented by the HIV diagnosis data. Total population was assembled using population estimates as of July 1st for 2012 and 2014 based from the 2010 Census estimates (28). Total population was summed for all individuals 13 and older for each state. Total population was used as the denominator for all calculated rates.

State-level potential confounders and effect modifiers included federal sources of HIV prevention and treatment funding, total primary care physicians (primary care density), poverty and insurance status. HIV funding was abstracted from the Henry J. Kaiser Family Foundation and included all major federal and state based funding for HIV prevention, research or care (29, 30). This included funding from the Center for Disease Control and Prevention (CDC), Ryan White, the Substance Abuse and Mental Health Services Administration (SAMHSA), Housing Opportunities for Persons with HIV/AIDS Program

(HOPWA), and the Office of Minority Health (OMH). The total number of primary care physicians by state was abstracted from the Area Health Resource File and represented the total physician workforce from 2014 to 2015 (this was the only data available and was utilized for both 2012 and 2014) (31). Poverty was abstracted from the U.S. Census. Poverty status was defined as living at or below 138% federal poverty level (FPL). For 2012 data were not available for 138% FPL from the Census so the 125% FPL was used instead (32). Insurance status was abstracted for years 2012 and 2014 from the U.S. Census for the total population of those who were uninsured in March of the following year (33).

Statistical Analysis

All rates were calculated using the total population in each state, ages 13 and older. Pearson's correlation analyses were used to assess relationships between 2012 and 2014 new HIV diagnoses rate and potential confounders and effect modifiers, including expansion status, HIV funding, primary care density, and poverty. Paired t-tests were used to assess significant differences between the 2012 and 2014 new HIV diagnoses rates, HIV funding sources, primary care density, poverty rate, and percent uninsured in expansion and non-expansion states. Linear regression models were used to compare new HIV diagnoses over time in expansion compared to non-expansion states. Regression models included an interaction with expansion status and a continuous log-transformed 2012 HIV diagnosis rate variable. A natural log transformed diagnosis rate for 2012 and 2014 was used in order to help normalize the distribution of these variables. The 2014 new HIV diagnosis rate was assessed as the outcome variable and was predicted by the 2012 new HIV diagnosis rate and Medicaid expansion. Medicaid expansion was considered as an effect modifier in the relationship

between 2014 and 2012 new HIV diagnoses and was included as a dichotomous variable. A mediation analysis was performed to assess if insurance status mediated the effect of between the 2012 and 2014 diagnosis rate. A difference variable and a ratio variable of the 2014 and 2012 insurance status rates was included in the model to assess a 10% change in the estimate for this effect modification. Potential confounders were assessed using the 10% change in estimate approach for confounding. Model significance was estimated using an alpha level of 0.05 and a 95% confidence interval. All analyses were performed in SAS 9.4 (SAS Institute, Inc., Cary, NC).

Results

By January 2014, 27 states including the District of Columbia had expanded Medicaid under the Affordable Care Act to at least 138% of the federal poverty level. Table 1 gives an overview of the expansion and non-expansion states in 2012 and 2014. In 2012, the mean new HIV diagnosis rate among the expansion states was 15.12 and deceased to 13.67 in 2014 ($p = 0.43$). Among the non-expansion states, the mean new HIV diagnosis rate was 12.41 in 2012 and slightly increased to 12.82 in 2014 ($p = 0.47$). Table 1 also compares funding, poverty rate, the physician rate, and percent insured in the expansion and non-expansion states for 2012 and 2014. There was a significant decline in the percent uninsured from 2012 to 2014 among both the expansion and non-expansion states. Expansion states went from almost 12% uninsured to 8.8% uninsured ($p < 0.0001$), while non-expansion states when from a little over 15% uninsured to 12.8% uninsured ($p < 0.0001$). There was a slight increase in CDC funding in both the expansion and non-expansion states from 2012 to 2014, $3.14 per capita to $3.37 per capita in expansion states ($p = 0.02$) and $1.70 per capita to $1.91 per capita in non-expansion states ($p = 0.001$). Ryan White funding had significant declines from 2012 to 2014 in both expansion and non-expansion states ($p = 0.01$ and $p < 0.0001$ respectively). SAMHSA funding had a minimal decrease between 2012 and 2014 among both expansion and non-expansion states ($p = 0.68$ and $p = 0.63$ respectively). The poverty rate from 2012 to 2014 remained relatively unchanged in both expansion and non-expansion states ($p = 1.0$ and $p = 0.81$ respectively). Lastly, the primary care physician density showed a slight decrease from 2012 to 2014 in both the expansion and non-expansion states ($p < 0.0001$ for both). Figure 1a and 1b show an overview of the new HIV diagnosis rate for expansion and non-expansion states, from 2012 to 2014. Most states follow a fairly

linear trend of diagnosis with the rates in 2012 and 2014 staying vary similar. The District of Columbia has the highest HIV epidemic compared to other states. Expansion and non-expansion states follow no discernable pattern in diagnosis rates, as they go across the spectrum of diagnosis rates.

Table 2 presents the final model used for analysis of the data. The final model, Model 1, includes the 2012 new HIV diagnosis rate measured as a continuous outcome, expansion status measured as a binary outcome, and the interaction variable of the two. The model showed a very high coefficient of determination of 0.94. All the beta estimates for Model 1 were significant at the 5% significance level. Figure 2 plots the estimated regression lines for expansion vs. non-expansion states plotted against the natural log for 2012 and 2014 new HIV diagnoses for each state. As seen in the figure, the regression lines for expansion and non-expansion states cross in the middle and diverge.

Table 3 shows predicted values using Model 1 and quartiles of the 2012 new HIV diagnosis rate to predict the 2014 new HIV diagnosis rate. The predicted rates for expansion and non-expansion are presented for each quartile and the mean value and the ratio of expansion vs. non-expansion estimates are shown. The p-value for all individual estimates were significant at the 5% significance level. However, the ratio estimates of expansion to non-expansion states suggest that only at the extremes (minimum and maximum) are the results truly significant. Figure 3a and 3b presents the quartiles (minimum, Q1, median, Q3, and maximum) of expansion and non-expansion prediction estimates and lines for the 95% confidence interval for each. The ratio between the expansion and non-expansion prediction

estimates is greatest at the maximum values for each. Among expansion states, the predicted 2014 new HIV diagnosis rate is 76.69 at the maximum value of the 2012 new HIV diagnosis rate. Among non-expansion states, the predicted 2014 new HIV diagnosis rate is 109.06 at the maximum value. The ratio of these estimates is statistically significant at the 5% significance level (ratio = 0.70, p = 0.04). At the minimum value of the 2012 new HIV diagnosis rate, among expansion states the 2014 new HIV diagnosis rate is 2.17 and among non-expansion states is 1.61. The ratio of these two estimates is also statistically significant at the 5% significance level (ratio = 1.35, p = 0.03).

We also tested a model without the District of Columbia to see how the analysis would change. When removed from the model the interaction term was no longer significant (p = 0.10). This suggests that the District of Columbia may be a highly-influential value in our model.

Table 2 also presented the models for mediation analysis. Model 2 and Model 3 were done to assess if the percent of people uninsured mediated the effect in estimating 2014 new HIV diagnoses from 2012 new HIV diagnoses and expansion status. Model 2 tested this effect by using a ratio of the two uninsured rates for each year. Model 3 tested this effect by using a difference of the two uninsured rates for each year. The coefficient of determination for Models 2 and 3 were high and unchanged relative to Model 1, approximately 0.94 in each. Additionally, using the 10% change in estimate approach, the beta for the predictor variable, new HIV diagnosis rate for 2012, did not change more than 10% when the mediators were added to the model.

Table 4 investigated CDC per capita spending, Ryan White per capita spending, poverty rate, and physician density as potential confounders for Model 1. All variations of the confounders were added to Model 1 and assessed to see if they led to more than a 10% change in the estimate. Estimates were assessed at the median, quartile 1 and quartile 3 values for each potential confounding model and compared to the no confounding model. Fifteen combinations of the potential confounders were compared to Model 1 to see if they changed the beta estimate. However, no combination of confounders changed the estimate more than 10% at any of the median, quartile 1 or quartile 3 values for the 2012 new HIV diagnosis rate.

Discussion

In this analysis, we explored the effects of Medicaid expansion before and after the implementation of the ACA on new HIV diagnosis by state. Our results followed trend with previous literature by showing that there was a decrease in the uninsured percent from 2012 to 2014 among both states that chose to expand Medicaid and those that chose not to expand Medicaid (2, 7-9, 11). Although not statistically significant, our initial analysis showed that overall there was a slight, 1.4 point decrease in the rate of new HIV diagnosis among states that chose to expand Medicaid from 2012 to 2014, however in non-expansion states there was no such decrease. However, since the decrease in the percent uninsured occurred in both expansion and non-expansion states the importance of expansion may have been eclipsed by the significant increases in the number of people insured. Although very important, the impact of Medicaid expansion on new HIV diagnoses may have been hard to detect in this analysis due to the nationwide increases in insurance coverage.

Our final regression model showed that among states with low rates of new HIV diagnoses, those that did not expand Medicaid on average experienced a decreased rate of new diagnoses whereas states that did expand Medicaid on average experienced an increased rate of new diagnoses. However, among states with high rates of new HIV diagnoses, those states that chose not to expand Medicaid on average experienced an increased rate of new diagnoses whereas states that did expand Medicaid on average experienced a decreased rate of new diagnoses. Those states that fell in the middle, with average rates of diagnosis, saw little change whether they expanded Medicaid or did not expand Medicaid. This is somewhat consistent with our original hypothesis that there would be an increase in new HIV diagnosis

rate after the implementation of the Affordable Care Act compared to the pre-ACA rates. However, our hypothesis is only supported in states that have low rates of new HIV diagnoses and expanded Medicaid or have high rates of new HIV diagnoses and did not expand Medicaid. These are the only places in which the rate of new HIV diagnoses increased between the two years. There are some potential explanations for this finding. It is possible that with the introduction of PrEP, individuals who have greater risk profiles for HIV are being encouraged by medical providers to go on the medication. PrEP has been proven to be effective in the reducing the risk of HIV acquisition (19). This would lead to an overall reduction in the rates of new HIV diagnoses if there were less chance of acquiring the disease. It is also possible that with Medicaid expansion, men who are HIV positive have more access to comprehensive medical services to control their HIV infection (15). Treatment as prevention could be an effective strategy at combating rate of new HIV infections if there is an overall decrease in the number of people who are able to transmit the disease.

Additionally, we investigated the possibility that the District of Columbia (D.C.) may be overly influencing our model findings. We ran Model 1 without D.C. and found that the interaction variable between expansion status and 2012 new HIV diagnosis rate was no longer significant at a 5% significance level. This suggested that the epidemic in D.C. has a modifying effect on our original model and may need to be controlled for or removed in future analysis.

Lastly, we investigated the possibility of mediation by insurance status. We used the percent of uninsured individuals for each state and included it as a mediation term in the final model. We assessed mediation using two models, neither of which produced an attenuation of the predictor variable indicating that insurance status is not a mediator for estimating the 2014 new HIV diagnosis rate. We also looked at several confounders that may have influenced our initial model. Using a 10% change in estimate, we found no significant change when variations of the confounding variables were included in the model. The lack of change in the model estimates may be due to the strong correlations in predicting new HIV diagnoses based on previous years. Additionally, expansion status showed a strong correlation with new HIV diagnoses, which may mean that our potential modifiers are not significant to affect the model.

Limitations

There were several limitations in this analysis. There was not a significant amount of time that lapsed between the implementation of the ACA and when we conducted our analysis. The ACA was really only in effect for about one year when the data for our analysis were collected. Although not statistically significant, we did see a difference in the rates of new HIV diagnosis among expansion and non-expansion states. These differences may have been statistically significant had we had more than a year of post ACA implementation data to analyze. Additionally, the mediation analysis might have been significant if we had been able to use a longer time period. We expected that insurance status might be a mediator in the analysis since it is associated with Medicaid expansion. Individuals previously unable to afford insurance now have more access to becoming insured under the ACA and states that

adopted Medicaid expansion. Our initial analyses even showed that there was a significant decrease in the percent of uninsured individuals, however this did not affect our model. Additionally, the District of Columbia was included in all of our analyses. We ran a model without D.C. and found that our interaction term was no longer significant. It is possible that upon removing D.C. from all of the analyses we may have very different findings.

Future Directions

Despite limitations, this analysis provides evidence that Medicaid expansion may have a significant effect on new HIV diagnoses. The decreasing number of uninsured Americans means an increasing number of people receiving necessary medical care and preventive health services. Over time, the increased number of HIV positive individuals who are able to seek medical care will mean more people with access to treatment from antiretroviral therapy. However, more people seeking medical care will also most likely lead to an increase in HIV diagnoses, as those who were unable to be tested in the past due to no primary care access will now be diagnosed and entered into care. In the long run, there will hopefully be a decrease in the number of new HIV diagnoses. Future research should involve running similar analyses to see if there are more significant changes in the number of new HIV diagnoses by state with and without D.C.

Additionally, there are concerns that in the new political climate there could be a repeal or amendment to the ACA. This preliminary analysis provides evidence that Medicaid expansion and the ACA have had an effect on new HIV diagnoses across the country. This analysis also supports previous research that the percent uninsured has had a significant

decrease since 2012. If there is the potential for an ACA repeal, there could be a reverse of the current progress that has been made in the direction of improved overall healthcare for the American people.

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Table 1.

Table 1. Overall Averages and Mean Difference for 2012 and 2014, Expansion and Non-Expansion States

Mean (SD)	Expansion (n = 27)				Non-Expansion (n = 24)			
	2012	2014	Difference	p-value	2012	2014	Difference	p-value
New Diagnosis Rate (per 100,000 persons)	15.12 (20.91)	13.67 (12.29)	-1.4460	0.4287	12.41 (9.17)	12.82 (9.63)	0.4084	0.4716
Percent Uninsured (%)	11.97 (4.29)	8.82 (2.91)	-3.1481	<0.0001	15.14 (3.55)	12.78 (2.86)	-2.3625	<0.0001
CDC per capita spending	3.14 (6.35)	3.37 (6.44)	0.2272	0.0170	1.70 (0.71)	1.91 (0.83)	0.2110	0.0008
Ryan White per capita spending	9.69 (18.26)	7.87 (14.67)	-1.8207	0.0149	5.70 (3.67)	4.85 (3.39)	-0.8455	<0.0001
SAMHSA per capita spending*	1.04 (1.98)	0.87 (1.24)	-0.1306	0.6767	0.42 (0.33)	0.37 (0.27)	-0.0246	0.6315
Poverty Rate (per 100 persons)	16.51 (3.74)	16.51 (4.30)	-0.0003	0.9995	17.35 (3.34)	17.43 (3.67)	0.0801	0.8052
Physician Rate (per 1,000 persons)	3.96 (1.79)	3.89 (1.74)	-0.0662	<0.0001	3.00 (0.47)	2.94 (0.47)	-0.0515	<0.0001

*SAMSHA per capita spending was not included in the final model selection analysis due to the number of states that did not receive funding for 2012 and 2014. For 2012, the total number of states that did not have funding through SAMSHA was 19 and for 2014 it was 16.

Table 2.

Table 2. Estimated Change in New HIV Diagnoses from 2012 to 2014

Variables	Estimate	Standard Error	p-value	r^2
Model 1				0.9392
2012 Diagnoses	0.968	0.045	<0.0001	
Expansion	0.359	0.156	0.0261	
2012 Diagnosis * Expansion	-0.150	0.065	0.0248	
Model 2 (Mediation)				0.9379
2012 Diagnoses	0.968	0.046	<0.0001	
Expansion	0.363	0.171	0.0389	
2012 Diagnosis * Expansion	-0.151	0.066	0.0273	
Percent Uninsured 2014 / Uninsured 2012	0.021	0.435	0.9616	
Model 3 (Mediation)				0.9390
2012 Diagnoses	0.968	0.045	<0.0001	
Expansion	0.337	0.159	0.0392	
2012 Diagnosis * Expansion	-0.146	0.065	0.0293	
Percent Uninsured 2014 – Uninsured 2012	-0.017	0.019	0.3736	

Table 3.

Table 3. Prediction Estimates from Model 1 of 2014 New HIV Diagnosis Rate using Average Values of 2012 New HIV Diagnosis Rate

	Expansion		Non-Expansion			
	Estimate of Diagnosis Rate	Standard Error	Estimate of Diagnosis Rate	Standard Error	Ratio	95% Confidence Interval
Mean	13.62	1.04	14.11	1.04	0.97	(0.86, 1.08)
Median	10.34	1.04	10.18	1.04	1.02	(0.91, 1.13)
Minimum	2.17	1.10	1.61	1.10	1.35	(1.03, 1.77)
Maximum	76.69	1.12	109.06	1.13	0.70	(0.50, 0.99)
Quartile 1	6.22	1.05	5.58	1.05	1.12	(0.98, 1.27)
Quartile 3	16.98	1.04	17.04	1.05	0.94	(0.83, 1.07)

Table 4.

Table 4. Confounding Assessment with Potential Confounders to Model 1 using 10% Change in Estimate Approach

	Median Diagnosis Rate	Q1 Diagnosis Rate	Q3 Diagnosis Rate	More than 10% Change
CDC, RW, POV, PHY	1.0302	1.0996	0.9742	No
CDC, RW, POV	1.0277	1.0971	0.9718	No
CDC, RW, PHY	1.0345	1.1082	0.9754	No
RW, POV, PHY	1.0279	1.1077	0.9642	No
CDC, POV, PHY	1.0377	1.1246	0.9688	No
CDC, RW	1.0163	1.0908	0.9566	No
CDC, POV	1.0297	1.1166	0.9607	No
CDC, PHY	1.0413	1.1312	0.9700	No
POV, PHY	1.0363	1.1223	0.9680	No
RW, POV	1.0318	1.1119	0.9678	No
RW, PHY	1.0325	1.1176	0.9649	No
RW	1.0204	1.1055	0.9529	No
POV	1.0262	1.1223	0.9505	No
CDC	1.0185	1.1101	0.9461	No
None (Model 1)	1.0157	1.1150	0.9377	No

Figures and Figure Legends

Figure 1a.

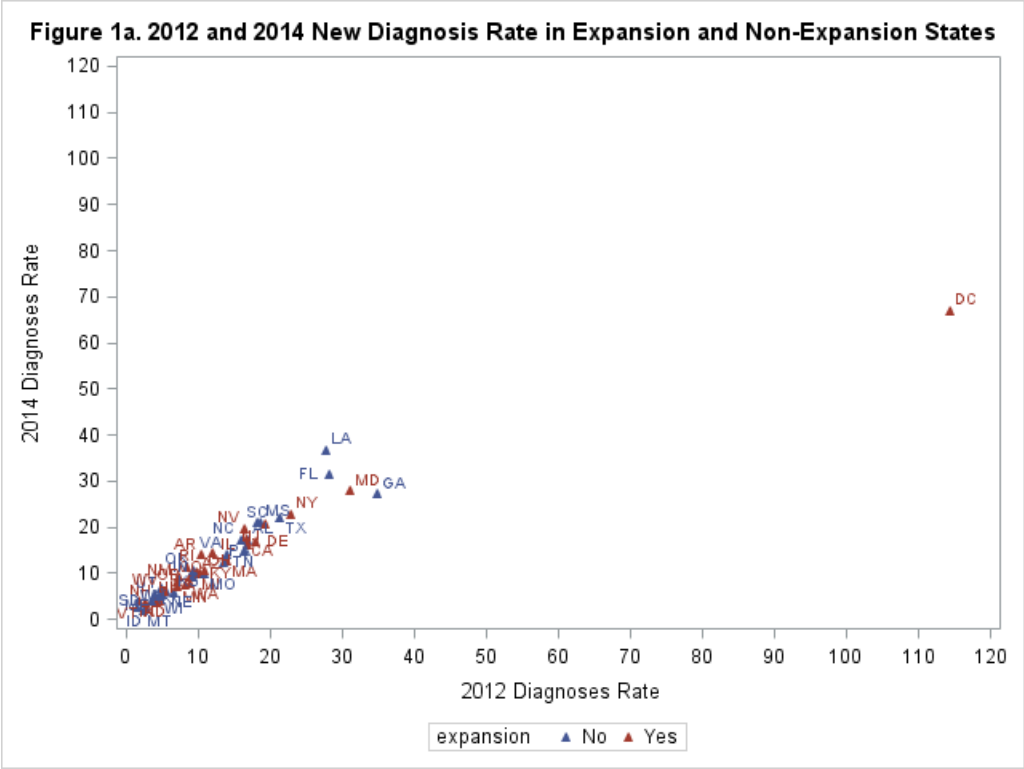

Figure 1a. 2012 and 2014 new HIV diagnosis rate in expansion and non-expansion states on a linear scale.

Figure 1b.

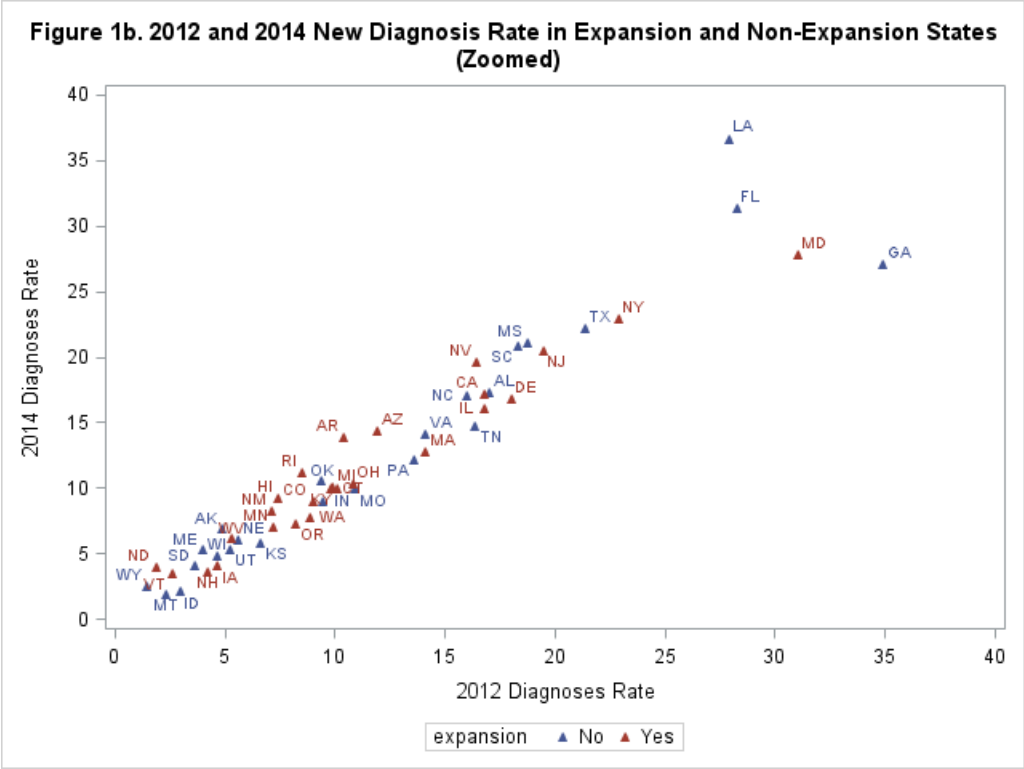

Figure 1b. 2012 and 2014 new HIV diagnosis rate in expansion and non-expansion states on a linear scale without Washington, D.C.

Figure 2.

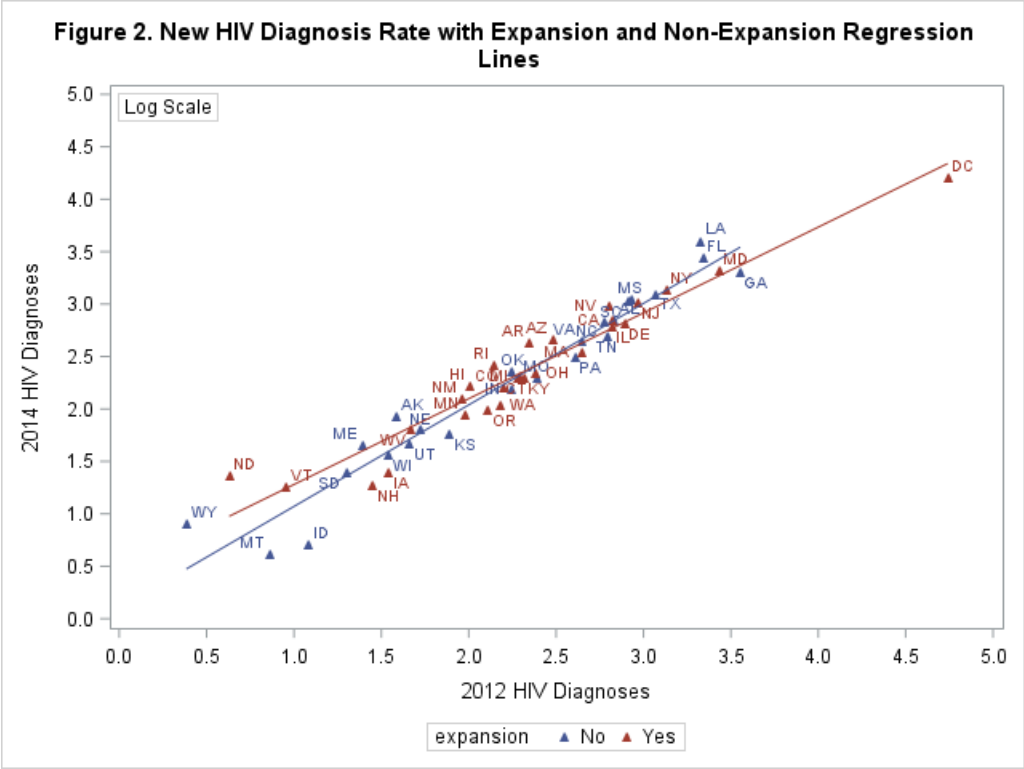

Figure 2. New HIV diagnosis rate with expansion and non-expansion regression lines on the log scale. The regression lines for expansion and non-expansion cross.

Figure 3a.

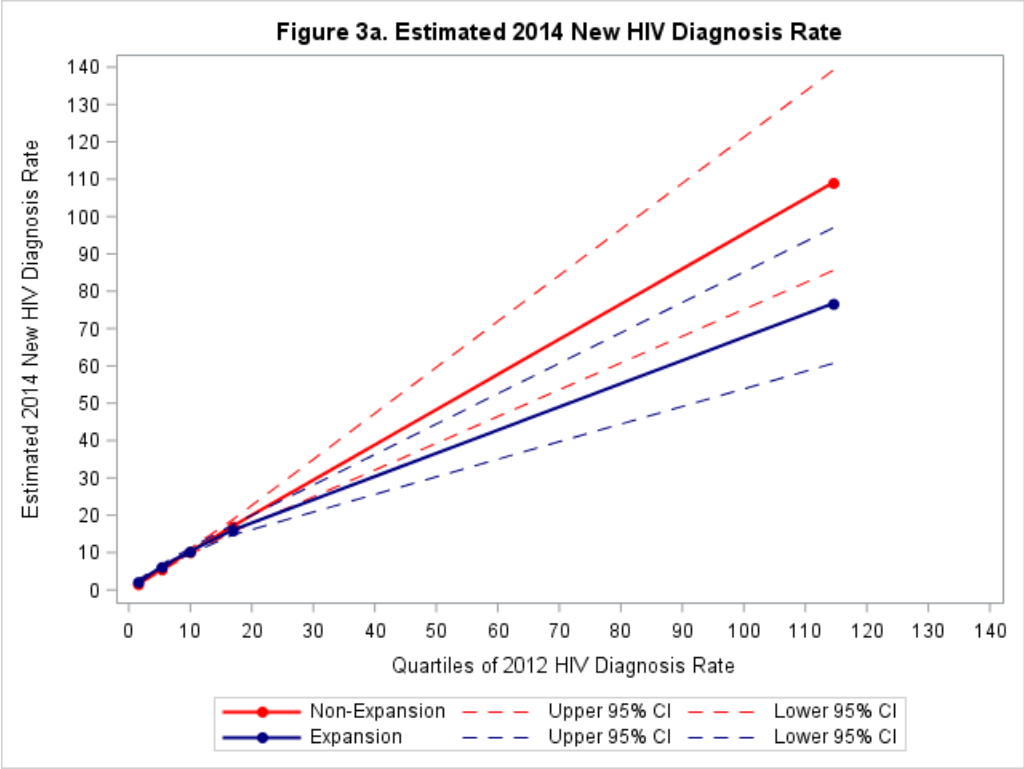

Figure 3a. Estimated 2014 new HIV diagnosis rate on the linear scale using the minimum, Q1, median, Q3, and maximum values with Model 1. 95% confidence bands are included for both expansion and non-expansion states.

Figure 3b.

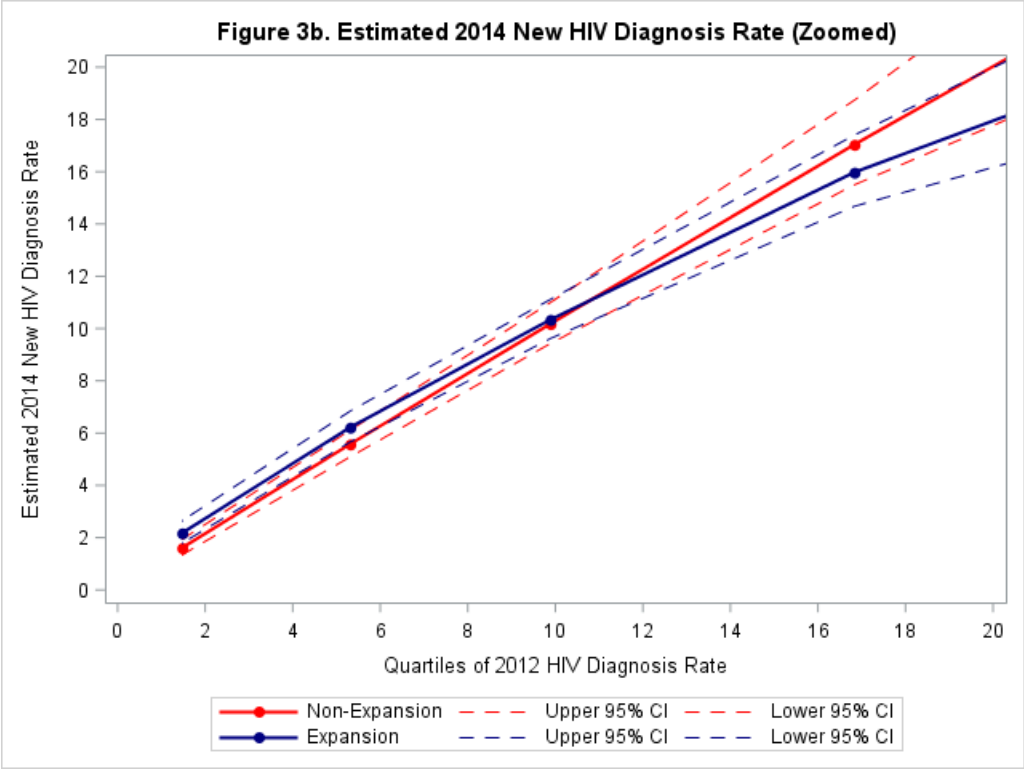

Figure 3b. Zoomed estimated 2014 new HIV diagnosis rate on the linear scale using the minimum, Q1, median, Q3, and maximum values with Model 1. 95% confidence bands are included for both expansion and non-expansion states. Zoomed view removes the maximum value.

Appendix

Supplemental Table 1.

Table 1. Overview of Data Sources

Data Variable	Data Source	Brief Description
New HIV Diagnoses	AIDSVu.org (22, 23)	Abstracted for 2012 and 2014 persons newly diagnosed with an HIV infection aged 13 and older
Population	Census.gov (28)	Abstracted for 2012 and 2014 aged 13 and older
Insurance status	Census.gov (33)	Abstracted for 2012 and 2014 as those who are uninsured
Expansion	Kaiser Family Foundation (27)	States which expanded Medicaid in 2014 to at least the 138% FPL
HIV Funding	Kaiser Family Foundation (29, 30)	HIV related funding from CDC, Ryan White, SAMSHA, HOPWA, OMH
Primary Care Physicians	Area Health Resource File (31)	Total physician workforce for 2014 - 2015
Poverty	Census.gov (32, 34)	Abstracted for 2012 and 2014 for persons aged 18 and older who fell at or below 138% FPL